



# Inquiry@Queen's

## 12<sup>th</sup>

### Annual

### Undergraduate

### Research Conference

## Program

March 8 & 9, 2018  
Queen's Learning Commons  
Stauffer Library

***[queensu.ca/iatq](http://queensu.ca/iatq)***

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March 2018

We are now in our 12<sup>th</sup> year of celebrating the discoveries of a new generation of scholars at the Annual Inquiry@Queen's Undergraduate Research Conference. We have two full days to share, discuss, think, learn and feel excited about the research of our undergraduate students. The work they will present comes from many avenues - course work, theses, design projects, and summer research opportunities; some came simply from an interest in a topic, and a desire to know more and think more. For the first time this year we are excited to have student researchers from outside Queen's - from Carleton University, McMaster University, and University of Toronto.

Inquiry@Queen's is more than a conference; it is an approach to learning where the teacher and the learner reside in the same person. It is a natural extension of a university that prides itself on the quality of undergraduate education and its scholarship and research.

We invite you to attend the oral presentations, to view the posters and talk to the presenters, to ask questions, to attend the opening ceremonies and the special events, but most certainly to enjoy the breadth of undergraduate student scholarship. Drop by for an hour, an afternoon, a day or two days! To all those who have supported us in many ways over the last twelve years...we thank you! Congratulations to all participants! On behalf of Inquiry@Queen's,

Vicki Remenda  
Head, Department of Geological Sciences & Geological Engineering  
Faculty of Arts and Science

Jackie Druery  
Head Humanities & Social Sciences Librarian  
Queen's University Library

Nathalie Soini  
Head, Information Services Division  
Queen's University Library

Patrick Patterson  
Reference Assistant  
William Lederman Law Library/Information Services

## CONFERENCE AGENDA

### Thursday, March 8, 2018

- 9:15-9:30 Coffee (Speaker's Corner, Stauffer Library)
- 9:30 Session I: Kids! (Speaker's Corner)
- 9:30 Session II: Emancipation & Empowerment I (Seminar Room)
- 11:00 Session III: Innovation Improving our Health & Lives I (Speaker's Corner)
- 1:00 Session IV: Science! (Speaker's Corner)
- 1:00 Session V: Digital Detectives (Seminar Room)
- 2:50 Session VI: Emancipation & Empowerment II (Speaker's Corner)
- 2:30 Session VII: Money (Seminar Room, Stauffer Library)

### Friday, March 9, 2018

- 9:00 Session VIII: Innovation Improving our Health & Lives II (Speaker' Corner)
- 9:00 Session IX: Social Media, Human Behaviour (Seminar Room)
- 10:45 3 Minute Thesis, Demystifying Undergraduate Research (Speaker's Corner)
- 11:30-1:00 Session X: Lunch with Poster Presenters (Seminar Room) All Welcome!
- 1:30 Session XI: Magic Circle (Union Gallery, Stauffer Library)
- 1:00 Session XII: Human Rights (Speaker's Corner)
- 1:30 Session XIII: Breakout (Seminar Room)

## ORAL PRESENTATIONS

### Session I: Kids!

#### Speaker's Corner

Thursday, March 8, 9:30-10:50

Moderator: Dr. Valerie Michaelson

#### **Children's Right to Sexual Education Despite Religious Concerns Raised by Parents: A Case Study of the 2015 Ontario "sex-ed" Curriculum**

Presenter: Andie Rexdiemer, Global Development [Studies]

Faculty Supporter: Dr. Valerie Michaelson

A critical case approach is taken to address religious opposition to recent changes in curriculum regarding sex education in Ontario public schools. This includes consideration of the influence of the Christian "purity movement" that is popularized in some parts of North American culture.

In a recent Ontario study of parents of elementary and secondary students, 95% of parents agreed that some level of sexual health education should be provided in schools. A separate 2016 poll showed that 82% of parents self-identifying with "no religion" supported the revisions, as did 61% of Catholic parents, 55% of Protestant parents, and 20% of Pentecostal Christians. One in six Ontario parents considered pulling their children from public school over the new sex-ed curriculum, in favour of homeschooling their children or placing them in private Catholic schools. Of the parents who did remove their children from sex education, the majority did so for religious reasons.

And yet, evidence suggests that depriving children of sexual health information as a result of the religious identity of a child's family is a form of unlawful discrimination that may result in physical, sexual, and/or psychological harm to the child. This paper submits that the option for parents to be able to remove their children from sex-education lessons in schools due to a conflict with their religious and cultural values violates children's human rights in accordance with international law as per the United Nations Convention on the Rights of the Child.

#### **"Working in Concert": Examining Music's Role in Cross-Curricular Education**

Presenter: Emily Browne, Music and Concurrent Education

Faculty Supporter: Dr. Julia Brook

The purpose of this presentation is to investigate the power of the cross-curricular teaching and learning practice while exploring the relationship between music and other subject areas in an educational environment. In recent years, the curriculum of countries such as Sweden, Australia, and the United Kingdom, has placed greater emphasis on utilizing the cross-curricular learning and teaching practice. This progressive pedagogy strives to engage students by connecting different curricular areas within an activity or lesson. Students have the opportunity to engage in a deeper form of learning, applying their knowledge and transferring their skills as they discover similarities between distinct subject areas. Additionally, the cross-curricular practice can attract pupils to disciplines that otherwise might not have held their attention. As everyday life is filled with tasks that draw on multiple subject areas, this teaching approach ultimately enables the educational system to better prepare pupils for their future. However, the cross-curricular practice can pose a challenge to teachers who lack confidence in their knowledge of content across the many curricular areas. This is particularly relevant to music education, as many teachers who do not possess a solid knowledge base of skills and techniques shy away from incorporating music into their teaching practice. Nevertheless, cross-curricular learning seems to be a valuable learning process, therefore, I will discuss method of incorporating music into cross-curricular lessons in order to provide

classroom teachers with potential examples and resources that encourage the integration of music into the classroom environment.

### **An Identity Prescribed & Non-Negotiable: The Childhood of Tibetan Tulkus**

Presenter: Amy Hetherington, Religious Studies

Faculty Supporter: Dr. Valerie Michaelson

A lama is a spiritual leader or guider of the dharma in Tibetan Buddhism. When a lama dies their spirit is said to move into the body of an infant born shortly after their death, and this child is called a tulku. The word tulku translates to the Sanskrit word nirmanakaya. This means "pure physical body," and is in reference to a fully enlightened being. In the following essay, I engage in a discussion about the childhood experiences and notions of individuality of Tibetan tulkus. Due to the shortage of academic material on this topic, I draw on personal written accounts of specific tulkus and from these make my own inferences and conclusions. By exploring notions of discipline, familial relationships, personal autonomy, identity, and exploitation, I argue that the recognition and identification as a tulku does not allow one to experience an ordinary childhood and deprives one of pursuing a normative or undisturbed upbringing. In this essay, I utilize the term 'normative' to mean any version or rendition of childhood that the child would have experienced had they not been identified as a tulku. I hope my findings will be useful in further discussions about whether a child's putative identity changes their right to access a typical childhood characterized by family, leisure, and personal exploration, or whether their tulku status overrides and reconditions this right.

### **Evaluating the effectiveness of Let's Talk Period's educational outreach for high school students**

Presenter: Lubnaa Hossenbaccus, Life Sciences

Faculty Supporter: Dr. Paula James

Von Willebrand Disease, the most common bleeding disorder, is inherited equally by men and women, though bleeding symptoms are usually more evident in females due to their menstrual cycles and childbirth. The goal of developing a youth outreach project was to empower young female high school students with knowledge and resources about abnormal bleeding. The 75-minute presentation was given to five Grade 9 Girls' Health classes across the Limestone District School Board, and led by a Hemophilia Nurse, supported by a Clinical Research Assistant and a 2nd year undergraduate student, who interacted with students and documented the presentation with photographs. Queen's REB approved the project, and parental and student permission was obtained for photographs. Using Kahoot, an interactive online quiz program, students participated in short pre- and post-presentation quizzes to evaluate their knowledge and learning. Questions including "True/False: Iron deficiency is normal and expected among young females," were posed within the set of 9 questions on topics of anemia, menstruation, and abnormal bleeding. 84 students participated, aged 14 and 15, and 58 had evaluable quiz results. The results showed an average pre-presentation score of 77%, ranging from 72-83%, with a post-presentation quiz average of 92%, ranging from 83-95%. It was determined that students' post-presentation scores were significantly higher ( $p < 0.001$ ) than those before the presentation, providing evidence for an increase in student understanding. Testing efficacy of these presentations can help determine their level of utility as a resource for health teachers to implement in their classrooms.

## Session II: Emancipation & Empowerment I

Seminar Room

Thursday, March 8, 9:30-11:30

Moderator: TBA

### **Failures of the M’Naghten Rules: Women and the Insanity Defence in Victorian England**

Presenter: Sara Buder, History/Classics

Faculty Supporter: Dr. Sandra den Otter

This paper examines the medicolegal insanity defence in criminal trials in Victorian England. It analyzes the test for criminal liability embodied in a set of rules called the M’Naghten rules that followed the trial and acquittal of Daniel M’Naghten in 1843. The paper examines the difficulties in upholding the rules in criminal case law in the middle decades of the 19th century. The research question that will be addressed is: what role did gender play when determining the mental condition of the accused in Victorian society? Moreover, how did gender affect the treatment and the punishment of mentally ill individuals who had been convicted of crimes, and how did the stigma of mental illness shape treatment and punishment? Rather than being labelled as insane, people suffering from mental illnesses were sometimes given the titles “missing,” “absent,” and “unconscious.” What happened to those who did not meet the legal criteria to be tried as mentally insane? Finally, what difficulties did the courts and testifying physicians face while interpreting criminal responsibility? The paper will investigate key legal cases and trial narratives in several Victorian novels to draw conclusions about the cultural history of the insanity defence.

### **Women in North American Sports: Why Are Young Girls Dropping Out? Presenter:**

Sarah Cvetkovski, Philosophy/Women’s Studies

Faculty Supporter: Dr. Jacqueline Davies

By the age of fourteen, young girls are dropping out of sports at two times the rate of boys. Society has worked towards changing this statistic by including women in the male dominated institution of organized sports, yet females are still faced with traditional stereotypes, ultimately limiting their physical expression. Women are expected not to demonstrate characteristics deemed as masculine, which often dissuades females from lifting weights, sweating, participating, and competing in sports as a whole. Although these standards have changed over the twentieth century, when the principle of femininity is brought up, women are expected to live up to their specific gender roles and face a significant wage gap. In 2015, the champions of the Women’s World Cup received \$2 million while the men’s team pocketed \$35 million for winning the previous year, a \$33 million difference. Not to mention that the women’s team had more viewership on Fox for the same event. On top of this, society places a pressure upon its citizens to conform with the majority. The stigma in society that women participating in sport promotes homosexuality often associates female athletes as masculine, lesbian, or butch. These ignorant societal beliefs foster an unhealthy lifestyle for young girls throughout North America. While a different factor comes into play for each athlete, more often than not a tipping point is reached. Once the motivation behind these young girls dropping out of sports is universally understood, headway can be made towards ensuring women flourish in North American society.

## **"More Than a Woman": Elizabeth I's Self-Representation as an Exceptional Woman in "The Golden Speech"**

Presenter: Anthea Feaver, English Language and Literature

In *The First Blast of the Trumpet against the Monstrous Regiment of Women*, John Knox vehemently argues against women's capacity to rule because of what he believes to be their natural inferiority to men. However, he also allows for the possibility of outstanding women who have been elevated by God, through no merit of their own, as an exception to their otherwise weak sex. Queen Elizabeth I's rhetorical strategy, in the "Golden Speech" and elsewhere, relies heavily on this construct of the exceptional woman as a means of legitimizing her power within a patriarchal system of governance. Elizabeth presents herself as an exceptional woman by justifying her authority through God, negating her learned eloquence in the very act of expressing herself, and maintaining the inferiority of women in order to foreground herself as uniquely powerful. She furthers her exceptionality by claiming a special access to masculine modes of authority, constructing an authority that is inseparable from herself and thus not available to women generally. Reading Elizabeth through this strategy undermines the idea that simply having women in positions of power abolishes patriarchal systems of governance, and shows that the power of patriarchy to persist relies, in part, on its capacity to implicate women in their own subjugation.

## **Existentialism and Abortion in the Modern World**

Presenter: Samantha Gamero, Political Studies and Philosophy

Faculty Supporters: Dr. Jacqueline Davies and Dr. Paul Fairfield

Some people within the abortion debate argue that the key question in the abortion debate is whether the fetus is a human being. They say that if it is not, then abortion is always permissible and does not need any justification; if it is, then there are no circumstances that can ever justify it.

I would disagree with this view. I argue that, using an existentialist lens, we can see abortion as the killing of a human being and still accept it. The question surrounding abortion is an existentialist one, not a metaphysical or religious one.

I will argue that, using an existentialist framework, abortion should be accepted as an example of freedom and a way to create an individual meaning in a world without absolutes.

## **"Whereunto I made them no answer, but smiled;" Textual and Ironic Authority in Anne Askew's Examinations**

Presenter: Katherine Hope, English Language and Literature

This essay examines the ways in which Anne Askew constructs an authoritative position for herself in her Examinations through the rhetorical placement of her smile. I focus specifically on how her smile acts as a response to her examiner's questions and reverses the role of power from the male hierarchical position of authority to the subordinate female voice of Early Modern literature. Askew's smile subverts the expectation of torture and imprisonment being a form of control over the body through her extensive biblical knowledge, use of Socratic irony as a form of response, and ability to manipulate her inferior hierarchical position as a woman and as an individual under interrogation. She carefully shifts the power dynamics throughout the text, using the smile to critique preconceived notions of masculine authority and manipulating the reader's perception of herself by securing an authoritative position over her examiners. By allowing her readership a privileged understanding of her interrogations through the recordings of her accounts, Askew's complicated text reveals the value of broadening the sphere of what counts as

researchable texts within English departments, allowing a space to study non-traditional literature of Early Modern female authorship.

### **For Girls: The Sexual Politics of Girls' Comics in Post-War Britain**

Presenter: Tegwyn Hughes, History

Faculty Supporter: Dr. Sandra den Otter

This paper will investigate girls' comics in late 20th century Britain to illuminate the experiences of the adolescent post-war generation. My research focuses on girls' comics, specifically *Bunty*, *Mandy*, and *Judy*, which were read widely throughout the country. The illustrated stories in these publications typically portrayed teenage girls as the protagonists in a variety of situations and adventures. By using the primary source documents of the comics as the main basis for my research, I explore the following questions: to what extent did the comics reflect the changing assumptions about gender and gender expectations in British society from the 1950s to 1970s? Did girls feel empowered by the stories they read, or did they feel like they had to conform to a certain ideal of womanhood produced by gender norms? How were these ideals configured by race, especially by Caribbean migration in post-war Britain? By examining this small portion of British popular culture and its reception, I will gain a wider understanding of fluid and dynamic ideas about gender in these crucial decades of the late 20th century.

### **Session III: Innovation: Improving our Health and our Lives I**

**Speaker's Corner, Stauffer Library**

**Thursday, March 8, 11:00-12:20**

**Moderator: Greg Bavington**

### **Yoga for Healing: An Analysis of the Effects of Yoga Practices On Military Victims of Post-Traumatic Stress Disorder**

Presenter: Meghan O'Sullivan, Psychology

Faculty Supporter: Dr. Valerie Michaelson

The practice of yoga has been associated with healing and well-being for centuries. With the recent surge in its popularity, research to yoga's healing properties have found many ways in which it can be incorporated into a wide variety of treatment programs. One area of interest is the treatment of military combat veterans with post-traumatic stress disorder (PTSD). Research into the use of yoga as supplemental treatment through its interdisciplinary psychophysical effects and mindfulness training have found it to be extremely beneficial. In this article, the psychophysical aspects of yoga and how they interact the physical and psychological symptoms of PTSD are discussed and linked with the treatment plans used for military veterans. It also addresses the issues of the specific military culture and the pressures associated with fulfilling the valorous role of the perfect soldier. Physical effects of yoga help patients with alleviating allosteric load to increase the chances of a healthy recovery and maintaining homeostasis, while the psychological effects include increased levels of mindfulness that help veterans complete trauma-focused cognitive behavioural therapy (TFCBT), as well as by regaining their sense of self-control and mastery of psychological processes. With the prevalence of this disorder in the military population along with the comorbidity of suicide, new alternative treatments should be considered to decrease the number of deaths from this devastating disorder. Thus, the psychophysical effect of yoga's mind-body connection incorporated into military culture can be beneficial to those who have done the ultimate sacrifice for the safety of our country.

## **Emergency Medical Services Response Times to Motor Vehicle Crashes Increased over the Period 1987 to 2015**

Presenter: Patrick Gravell, Mathematics and Statistics

Faculty Support/Co-Authors: Sacha Dubois, MPH and Dr. Michel Bédard, PhD

Emergency Medical Services (EMS) response time to motor vehicle crashes (MVC's) have been studied to determine if reducing the individual components of EMS response time (notification, arrival at the crash scene, and hospital arrival) may affect survival rates. It has been proposed that a reduction to 1 and 15-minute EMS notification and arrival times at the crash would result in 1.84% and 5.2% fewer fatalities. The aim of this study was to analyze the changes in EMS response times (notification, arrival at the crash scene, and hospital arrival) over the past three decades, both individually and overall. An important change in the past three decades is the increased use of cellular phones. Therefore, we hypothesized that EMS notification time would have decreased over the timeframe, yielding an overall decrease in EMS response time. Our data are based on the Fatal Accident Reporting System (FARS) using the variables: Time of Crash, EMS Notification Time, EMS Arrival Time, EMS Hospital Arrival Time. This gives a total of 248,981 valid cases following the implementation of our inclusion criteria and truncation of the dataset to the 99th percentile to eliminate unexplainable outliers. We computed the individual and overall median EMS response times for each year from 1987 to 2015. Additionally, we analyzed the response times based on four separate crash factors: weather, total vehicles involved, time of day, and state population density. From 1987 to 2015 the individual EMS response times changed; while notification time has decreased, the arrival at both crash scene and hospital have steadily increased, resulting in overall increased total EMS response time.

## **A Medical Decision Support Tool Using Text-mining Techniques with Electronic Medical Records**

Presenter: Michael Judd, Computing

Faculty Supporter: Dr. Farhana Zulkernine

Free-text clinical notes represent a vast amount of information which in the past has been un-analyzed data. In this paper we apply text-mining methods on the free-text in electronic medical records (EMRs) to define treatment options for patients with lower back pain. The goal of the project is to develop a generalized text-mining framework that can be used not only in the treatment of lower back pain, but any medical condition.

The framework takes advantage of open-source algorithms for anonymization and the clinical NLP tool Apache Clinical Text Analysis and Knowledge Extraction System (cTAKES) to form structured data from clinical notes. The machine learning algorithm uses seven years of extracted clinical notes from the primary care physician to classify 20 patients' pattern of back pain.

With the small dataset provided, the algorithm managed to achieve diagnosis accuracy of up to 100%. The twenty-patient dataset was simply too homogenous and small to make statistical claims for sensitivity and specificity. However, the system shows indicators of satisfactory performance, and we are trying to extract more data of patients who do not have back pain to be able to validate our system better.

## **Evaluation of the Effectiveness of Stepping in Place with Rhythmic Auditory Stimulation on Improving Gait in a Community Dwelling Stroke Population**

Presenter: Emma Swaffield, Biomechanics and Ergonomics Lab, School of Kinesiology and Health Studies

Faculty Supporter: Dr. Patrick Costigan

Stroke survivors often exhibit asymmetric walking patterns associated with one-sided weakness, or hemiparesis, resulting in a reduced walking ability and lower levels of independence. Rhythmic Auditory Stimulation (RAS) is an emerging strategy that uses music with a strong beat to help cue walking. RAS has successfully improved walking ability and symmetry in stroke survivors, yet the use of RAS while stepping in place has been only minimally explored. Due to limited mobility in this population, stepping in place may be a more feasible method of practicing walking patterns. The purpose of this study is two-fold: 1) to determine the immediate effects of stepping in place with RAS on kinematic walking parameters, and 2) to evaluate whether any changes in gait parameters translate to walking following a RAS session. The study is currently underway, with an objective of testing 8 to 10 participants who have experienced a stroke resulting in hemiparesis and reduced walking ability. The testing protocol is divided into two parts; part one involves an initial walking assessment to determine stepping cadence. In part two, participants complete a gait analysis and functional assessment before and after the stepping in place with RAS session. Two-dimensional analysis using a motion capture system and force plates allows for multiple spatiotemporal and kinematic outcome measures to be collected such as walking speed, step length, and joint angles. Ultimately, findings from this study will help to determine if and how stepping in place with RAS can improve gait in stroke survivors.

## **Differential DNA Methylation in Purified Human Cord and Peripheral Blood: Biomarkers of Prenatal Smoking and Allergy in Children**

Presenter: Lydia Noureldin, Computer Science (Biomedical Computing)

Faculty Supporter: : Dr. Qingling Duan

Adjusting for nonresponse, 7.7% of Canadian adults suffer from allergies. On a broader scale, Allergic rhinitis affects approximately 10 – 25% of the world population. The study analyzed data (n=185) from the Kingston Allergy Birth Cohort study, a prospective birth cohort that has recruited over 300 pregnant women to date. A skin prick tests was administered to each child to quantify the phenotype, allergies, on a binary scale. Surveys filled out by the mothers revealed that 28% engaged in prenatal smoking, the highest rate in Ontario. Methylation in the human genome is known to be associated with development and disease. The study defines the methylome as the set of nucleic acid methylation modifications in a subject's genome. With the Infinium MethylationEPIC BeadChip, the study collected DNA samples and examined over 850,000 methylation sites quantitatively across the genome at single-nucleotide resolution, to investigate the effects of allergies, and maternal smoking, on the methylome. Pre-processing steps including quality control, normalisation, data exploration, non-specific filtering, and statistical testing for probe-wise differential methylation was applied. After pre-processing and outlier removal, umbilical cord blood (n=50) and peripheral blood (n=70) was analyzed from the subjects. The study found differentially methylated sites that represent potential biomarkers that could be predictive of future atopic disease in childhood. These potential biomarkers may also serve as a more accurate method, than surveys filled out by the mothers which are susceptible to patient bias, in determining if a child was subject to prenatal smoking.

## Session IV: Science!

### Speaker's Corner

Thursday, March 8, 1:00-2:40

Moderator: Dr. Nick Mosey

### **Evolution or Extinction: Might Zooplankton Adaptively Respond to the Novel Invasive Predator *Bythotrephes longimanus*?**

Presenter: Emma Bloomfield, Environmental Biology

Faculty Supporter: Dr. Shelley Arnott

Invasive predators are a large and growing threat to species diversity and human well-being. One of the reasons invasive predators have a negative impact is that native prey species do not possess appropriate anti-predator defenses. However, rapid evolution may allow prey species to respond adaptively to introduced predators. When this occurs the impacts of invasive predators are mitigated. An invasive predator that is of concern in North America is the spiny water flea, *Bythotrephes longimanus*. It disrupts freshwater ecosystems through voracious consumption of zooplankton. Declines in zooplankton abundance and richness reduce water quality and recreational fishing opportunities. However, a species of zooplankton, *Daphnia mendotae* has been found to adaptively respond to *B. longimanus*. This adaptation is diel vertical migration, the behavioral change of occupying a lower position in the water column during the day to reduce predation risk. Despite the ecological and economic implications of this behavior in response to *B. longimanus*, it has only been studied in a few lakes. This study investigated adaptive diel vertical migration in *D. mendotae* from multiple lakes. This was done by measuring the vertical position of *D. mendotae* in artificial water columns. It was hypothesized that *D. mendotae* from lakes that have been invaded by *B. longimanus* will exhibit diel vertical migration in the presence of *B. longimanus*. If this hypothesis is supported, rapid evolution of diel vertical migration can be established as a widespread response. This would strengthen understanding of rapid evolution and allow lakes more vulnerable to *B. longimanus* to be identified.

### **The Impact of Status Differentials and Facilitated Feedback on Observer Responses to Abusive Supervision**

Presenter: Zoe Chan, Psychology

Faculty Supporter: Dr. Matthias Spitzmuller

When do third parties, individuals who are not the direct target of an act of mistreatment, choose to intervene or abstain from addressing abusive supervision on behalf of a target? Despite progress on understanding the causes and outcomes of abusive supervision, little research examines third-party reactions, and even less devotes attention to contextual factors that shape observer reactions. Given that supervisor-subordinate interactions are situated within and influenced by the broader environment that shapes individuals' interpersonal relationships and work experiences, this oversight is critical to understanding when observers of abusive supervision choose to intervene on behalf of victims. Drawing from Opatow's (1995) moral exclusion theory, this study investigates the implications of perceived utility in relation to a victim's performance and status relative to the supervisor. To narrow the gap between an observer's intended actions and actual behaviour towards addressing perceived mistreatment, this study introduces the use of facilitated feedback as a protective mechanism against the perceived status differences and risks of retaliation that may deter from expressing supervisory concerns. Through conducting a scenario laboratory experiment among 240 undergraduate students, this study offers practical insights and research implications into the contextual mechanisms that either facilitate or hinder confrontational responses towards abusive supervisors.

## **Pollinator gardens more than triple in visitation rate and diversity of flower-visiting insects than other ornamental plantings in Kingston, Ontario**

Presenter: Marika Vogelzang, Biology

Faculty Supporter: Dr. Christopher Eckert

In this study I determined the effectiveness of pollinator gardens by testing if visitation rate and diversity of flower-visiting insects is higher in pollinator gardens compared to other ornamental plantings. I observed pollinator visitation for individual plant taxa, per unit area, in three different pollinator gardens, eight ornamental gardens and eight ornamental planters on the Queen's University campus in Kingston, Ontario, Canada. Visitation was about 4- times higher in pollinator gardens compared to the other two ornamental garden types and visitor richness (the number of types of pollinators) in pollinator gardens was about 6- times higher compared to ornamental gardens, and about 3- times higher compared to ornamental planters. The results of this study conclude that the planting of pollinator gardens is an effective way of supporting pollinator populations in urban areas.

## **Impacts of Land-use Change and Management on Soil Quality on an organic farm in Seeley's Bay, Ontario**

Presenter: Claudia Wheler, Environmental Toxicology

Faculty Supporter: Dr. Neal Scott

Changes in land management can have a significant impact on soil quality, which can change the capacity of land to provide essential services to society. We explored the impact of land-use change and land management on an organic farm near Seeley's Bay, Ontario on a Gananoque Clay soil. Three replicate soil samples were collected to a depth of 40cm (10 cm increments) from a native forest (never cultivated), a field producing hay for over 10 years, and a tilled field used to grow a variety of vegetables. The soils were analyzed by the entire class (GPHY 317) for bulk density, particle-size distribution, organic matter content, pH, soil colour, microbial biomass, and microbial activity. After reviewing the results, we found the greatest decline in soil quality (using the forest soil as a "reference" for the area) was the tilled field for vegetable production. The tilled site had a higher average bulk density of 1.34g/cc compared to forests bulk density of 0.88g/cc. The forest had a higher average organic matter content of 5% versus an average of 4% found at the tilled site. Additionally, the tilled site had a higher pH (5.8 vs. 4.9) likely due to intermittent liming, and lower water holding capacity. The compilation of the results illustrates the true affects land-management has on soil quality. By understanding the impacts of different land-use methods society can modify current practices to help increase soil quality and prevent the loss of the critical services that healthy soil provides to society.

## **The Brent Crater: An Alkaline Igneous Complex**

Presenter: Drew Branson, Geological Engineering

The Brent Crater was discovered in 1951 from aerial imagery. The Crater was thoroughly investigated in the 1950s to early 1970s. The consensus throughout this period of exploration was that the crater was the result of a chondrite impact. This theory was disputed in 1971 in a paper by K.L. Currie who proposed that the crater was the result of alkaline volcanic activity within the Nipissing Alkaline Petrographic Province which resulted in geochemically and morphologically similar formations in the area of Lake Nipissing. Little research has been conducted to further verify or dispute this theory since. A 1977 national Uranium reconnaissance program followed up by a 1983 and 1984 field exploration and airborne geophysics program located a verified alkaline volcanic structure 15 km east of the crater known as the Allan Lake Carbonatite. The geophysical and geochemical data acquired from this work was processed to create a weighted probability raster of indicator elements of alkaline igneous materials. The Allan Lake anomaly

demonstrates a more significant anomaly than the anomaly present at the Brent Crater. This anomaly is proposed to be the result of higher erosional rates in the crater. This hypothesis was tested by analyzing lake sediment concentrations of indicator elements in the nearby lakes. Given the world-renowned status of the Brent Crater as an example of a chondrite impact crater, it is important to either confirm Currie's theory as a fact or disprove the theory to allow the structure to continue to act as an analogue without uncertainty.

## **Session V: Digital Detectives**

**Stauffer Library, Room 121**

**Thursday, March 8, 1:00 -2:20**

**Moderator: Mr. Jeremy Heil**

### **Digital Technology: the Answer to the Art Historical Conundrum of Accessibility?**

**Presenter:** Abigail Berry, Art History/Mathematics

**Faculty Supporters:** Dr. Ron Spronk and Ms. Jillian Sparks (W.D. Jordan Rare Books and Special Collections)

The famous anthropologist Pierre Bourdieu argued that there is an "unnatural idea of inborn culture, of a gift of culture, bestowed on certain people by Nature."<sup>[1]</sup> Bourdieu is arguing that people, who have not been born into a higher class, or who cannot receive a high level of education, are unable to appreciate and understand art. The study of art history is expensive, and often involves extremely high travel costs, thus making it inaccessible to anybody who does not enjoy the means to pursue it. How can we address this accessibility problem in the study of art history? Is there any way to bring art to the people who do not possess "inborn culture?" Bourdieu wrote his book on art and class in 1984, at a time when the computer, and its democratizing potential, was a new and little-understood invention. My research proposes that modern technology provides an answer to this problem, which has plagued the discipline of art history.

This presentation will examine three research projects that I've been working on at Queen's. Each project uses digital technologies to improve the general public's knowledge and access to art. The projects are all different: the first focuses on creating a digital model of 18<sup>th</sup>-century Canterbury Cathedral based on a book from W.D. Jordan Rare Books and Special Collections, the second project works on understanding Herstmonceux Castle and medieval England through technology, and the third involves image processing for art historical investigations. Despite their differences, each project makes art accessible to people who do not possess Bourdieu's definition of "inborn culture."

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<sup>[1]</sup> Pierre Bourdieu, *Outline of a sociological theory of art perception* (New York: Columbia University Press, 1984), 609.

## **A Finding Aid for *The Equity***

Presenter: Jeff Blackadar, History, Carleton University

Faculty Supporter: Dr. Shawn Graham, Carleton University

[Bibliothèque et Archives Nationales du Québec](#) digitally scanned and converted to text a large collection of newspapers to create a resource of tremendous potential value to historians. Unfortunately, the text files are difficult to search reliably due to many errors caused by the optical character recognition (OCR) text conversion process.

This digital history project applied natural language processing in an R language computer program to create a new and useful index of this corpus of digitized content despite OCR related errors. The project used editions of [The Equity](#), published in Shawville, Quebec since 1883.

The program extracted the names of all the person, location and organization entities that appeared in each edition. Each of the entities was cataloged in a database and related to the edition of the newspaper it appeared in. The database was published to a public website to allow other researchers to use it.

The resulting index or finding aid allows researchers to access *The Equity* in a different way than just full text searching. People, locations and organizations appearing in the *Equity* are listed on the website and each entity links to a page that lists all of the issues that entity appeared in as well as the other entities that may be related to it.

Rendering the text files of each scanned newspaper into entities and indexing them in a database allows the content of the newspaper to be interacted with by entity name and type rather than just a set of large text files.

Website: [http://www.jeffblackadar.ca/graham\\_fellowship/corpus\\_entities\\_equity/](http://www.jeffblackadar.ca/graham_fellowship/corpus_entities_equity/)

## **An Efficient Workflow for Background Masking in Small-Object Photogrammetry**

Presenter: Mitchell Gleason, Classical Studies.

Faculty Supporter: Dr. George Bevan

Modern photogrammetry software offers a relatively inexpensive and very high quality technique to produce textured 3D models of museum objects. The efficacy of this technique has already been demonstrated by Queen's students in digitizing Greco-Roman vessels from the Department of Classics' Diniacopoulos Collection, terra-cotta figurines from National Institution Stobi in the Republic of Macedonia, and wood fragments from The White Coffin held in the Art Conservation Program at Queen's. A significant bottleneck, however, in the workflow remains the removal of the background from each of the input photos when using a rotary table and tripod-mounted camera; with the object moving on the rotary and the background remaining fixed, the software becomes confused in its reconstruction of the scene and no full-3D model can be created. The process to remove the background by hand can take upwards of 10 hours for a single object. Proposed is a new, efficient workflow that uses intelligent edge-detection algorithms to automatically separate in-focus from out-focus areas in the scene. With only a small modification to the photographic parameters to reduce depth-of-field, the out-of-focus background can be removed for large datasets (>150 images) in less than 30 minutes with minimal human intervention. Further, recently released AI-based subject selection algorithms as part Adobe Photoshop promise to speed this process even further and to radically simplify the use of photogrammetry in creating interactive virtual exhibits, and 3D-printable data. Much work still needs to be done in evaluating the robustness of this AI "black-box" from Adobe in photogrammetry applications.

## **Using Haplotypes to Reconstruct Ancient Population Dynamics; a User Guide for Historians**

Presenter: Ola Pasternak, Classical Studies

Faculty Supporter: Dr. George Bevan

Recently, the analysis of haplotypes has garnered a lot of attention in both popular media, from companies such as 23andMe, and in scientific journal publications. Haplotypes, which can be thought of as DNA patterns in the chromosome, may remain unchanged for centuries and are therefore a promising new method for tracing lineages. This method could provide valuable new insights into population dynamics, specifically regarding ancient populations. However, a crucial issue is that historians are not trained to evaluate this sort of evidence, yet many publications in prestigious journals such as *Nature* and *Science* are making *historical* claims based on haplotype analysis. When analyzing this data, a few key assumptions must be made. Of particular concern are logical circularities in hypothesis generation and in sampling strategy. This is to say, that the hypotheses are often not based on “scientific” data, but are instead drawn from often outdated historical assumptions. These same assumptions then drive a sampling strategy that guide the study to a conclusion in line with the hypothesis. What is the professional historian to do? Proposed is a common-sense user guide for a non-specialist to evaluate the quality of the data and claims made with it. Several case studies will be examined from this perspective that show both the strengths and weaknesses of this new source of historical and archaeological evidence.

### **Session VI: Emancipation & Empowerment II**

**Speaker’s Corner, Stauffer Library**

**Thursday, March 8, 2:50-4:30**

**Moderator: Ms. Nathalie Soini**

### ***There’s Just No Place for a Street Fighting Man!:* Understanding the Influences of Race, Gender and Sexual Orientation in Britain’s Counterculture Between 1964-1971**

Presenter: Elizabeth Hurley, History

Faculty Supporter: Dr. Sandra den Otter

During the 1960s, young Britons began to challenge the restrictive social norms, roles and responsibilities that governed their culture and asserted their voices to promote individual expression and freedom. At the core of this youth rebellion were the Rolling Stones. Within their music, performance, appearance and fashion, the Stones epitomized the anti-establishment attitudes harboured by Britain’s young people and made the cultural shifts that were taking place in the country tangible. In this research paper, I will investigate how Blackness, sexual orientation and gender identification challenged and reshaped the Rolling Stones’s message of rebellion, nonconformity and decadence. By reviewing a diverse range of archival footage, including the Stones’s performances on *Ready Steady Go!*, Jean-Luc Godard’s short film *One-Plus-One* and *The Stones in the Park*, as well as contemporary literary sources, music periodicals, Parliamentary legislation and British feminist, queer and Black Panther activism, I will evaluate the complicated, and often obscurantist, ways in which Britain’s youth rebellion fortified the subordination of traditionally marginalized communities while simultaneously making racial, queer and gender-based injustice visible to the British public. In sum, by placing the Stones’ racial, gendered and queer imagination within a complex political culture, I believe that my research will provide a unique perspective to the complexities and nuances of the social upheaval that occurred in Britain during the 1960s.

## **Ancestor Worship in Shanghai**

Presenter: Harrison Weston, Religious Studies

This report examines different experiences of ancestor worship held by members of a younger and older generation living in Shanghai. The information used in this report has been gathered from Shanghainese and non-Shanghainese people interviewed in Shanghai. The participants were chosen based on what political era in China they grew up in. The goal of this research was to determine whether or not different generations of Chinese people held different beliefs towards ancestor worship or practiced ancestor worship differently in modern day Shanghai, and the extent of these possible differences. Over eighteen interviews, differences and disparities within ancestor worship practices became evident. Most notable were the distinct reasons as to why each generation viewed ancestor worship as valuable; while older people recognized the benefits of ancestor worship in promoting filial piety, the younger generation saw the practice as an expression of traditional Chinese culture. Results also showed that older participants mentioned a wider variety of types of offerings in comparison to those mentioned by the younger participants. There are many individual and generational disparities in the offerings and attitudes towards ancestor worship. What remains constant between generations is the participation in worship activities during significant Chinese festivals, the recognition of value of ancestor worship, the desire to teach ancestor worship to the next generation, the proportion of each generation that view ancestor worship as a superstition, the proportion that does not view ancestor worship as superstition, and the desire to make practices of ancestor worship less harmful to the environment.

## **Natural Law: How Misunderstanding Can Lead to the Creation of Hierarchy as a Social Construct**

Presenters: Matthew Wronko and Noah Crete-Woodhouse, Philosophy

Faculty Supporter: Dr. Jacqueline Davies

Natural law is the branch of legal philosophy that concerns the inherent rights embedded within humans, due to either instinct, human nature, or divine creation. A large component of this philosophy rests in how these "laws" are universally understood by every human. This proved to be problematic when the classification of humans was influenced by eurocentrism, racism, ableism and prejudice in a variety of forms.

This leads us to the question: is a misapprehension of natural law's foundation problematic? And if so, can it be linked to many of the socio-political injustices we read of in textbooks? Were injustices such as the mistreatment of Aboriginals an effect of not understanding natural law? Or were they a deliberate, malicious manipulation of common and natural law to establish a social hierarchy?

Philosophers such as Martha Nussbaum have examined this concept in works such as *The Fragility of Goodness*. Nussbaum writes about how those who are committed to justice are still vulnerable to varying factors that may influence and inhibit their "human flourishing". Similar to how constitutional law makers were inspired by natural law, they may have been influenced by prejudice, and a desire for social hierarchy that compromised a fair and just government.

Through our presentation, we hope to explore the relationship between natural law and injustices throughout society, and examine the correlation between misunderstand and prejudice.

## **Relative Movement: Investigating the Entanglement of Women's Physical and Political Emancipation**

Presenters: Alison Gallagher, Xiaoyue Gao, Kaitlyn MacDonald, Gregory Radisic, and Elaine Yuan, Languages, Literatures and Cultures (German Stream)

Faculty Supporter: Dr. Jennifer Ruth Hosek

This joint research project stems from our seminar "Contemporary Germany through Media and News". 2018 marks 100 years since women gained the right to vote in Germany and Austria and 47 years post-suffrage in Switzerland. To celebrate and assess this milestone, our course is focusing on women's suffrage now and then.

What does universal suffrage mean now, in a Germany with a female Chancellor and a Parliament containing a right-wing party; in a Europe that is regionalizing; in a world in which governments are in deficit while the richest avoid taxation and finance their chosen interests?

What did the vote mean then, during the heat of the struggles; when activists risked lives for more self-determination; when societies were organized around working-class women's double burdens and bourgeois women's matrimonial hearths?

Our materials of study include the following: two feature films that frame the period, Asta Nielsen's *die Suffragette* (1913), a perhaps ironic love story about the voting struggle in Germany, and Petra Volpe's *die göttliche Ordnung* (2017), a tale of a small Swiss town's decision for universal suffrage. These films are augmented by contemporary essays by women active in today's public landscape in Europe and texts that thematize women and movement.

We are each writing on aspects of women's physical and political mobility and aim to publish in the Anthology on Social Justice and Intersectional Feminism. By presenting at Inquiry@Queen's we hope both to share results and improve our work ahead of submission to this peer-reviewed e-journal in early April 2018.

## **Filling the blanks: How Chinese students' Study Experiences at Queen's University gave them more Complete Knowledge about their Country and Changed their View on Contemporary China.**

Presenters: Nathan Bateman, Gilbert Lee, and Songyang Zhou History, Geography and Concurrent Education

Faculty Supporter: Dr.Emily Hill

In Canada academic freedom and the right to criticize are often taken for granted. Under some more repressive regimes, however, people grow up in an education system that bans the inquiry in certain areas and imposes an official narrative on the discussion of many topics. As an international student from China (PRC) studying at Queen's, I have greater access to different perspectives on China and its history than before, and the more complete knowledge I obtained helped me to construct a more informed perception of my country. This inspired me to explore the similar change that happened to other Chinese international students at Queen's, with a focus on how their views on contemporary China's social and environmental issues, such as China's air pollution, migration workers, and left-behind children, might have been influenced by their experiences at Queen's and the chance they had to relearn their native country. Except its academic value, this project can make a difference to the Queen's community by raising attention for Chinese students, who count for 59% of international students studying at Queen's (Queen's University

2017-18 Enrollment Report) but do not have a voice proportional to the community size. Besides, the interdisciplinary nature (history and human geography) of this project means it can be developed into more in-depth researches in the future, possibly during the coming summer.

## **Session VII: Money**

**Speaker's Corner, Stauffer Library**

**Thursday, March 8, 2:30 to 3:50**

**Moderator: TBA**

### **Estimating Central Bank Reaction Functions Post 2008: USA and Switzerland**

Presenter: William Cross-Bermingham, Economics

Almost all central banks worldwide have a common goal of keeping inflation low and stable while simultaneously maintaining the health of their country's financial system. By studying the Swiss National Bank and the US Federal Reserve, this paper investigates whether a single model can be used to capture these two mandates – both in times of economic stability and in times of crisis.

Ultimately, using differences between market interest rates as a "barometer of fears of bank insolvency" the model presented in this paper is able to detect when a crisis is occurring. Furthermore, it is able to describe the change in central bank behaviour associated with said crisis.

The value of the model is in its simplicity, it only uses four macroeconomic variables to provide accurate forecasts. Furthermore, monetary economists are highly interested in simple models to determine the optimal interest rate. Such types of models are associated with the "Great Moderation" – a time period from the 1980s – 1990s where a reduction in the volatility of the business cycle was linked to a strict rule-based approach to monetary policy. Insight into these rules can ultimately improve the welfare of all citizens by allowing central banks to handle economic crises more effectively.

### **Blood Economy: The Failure of the Developed World to End Conflict Minerals in the Congo**

Presenter: James Andrew Guest, Political Studies

Faculty Supporter: Dr. J. Andrew Grant

Conflict minerals have long been among the leading causes of violence in part of the Global South. For many years there was little attention to the issue despite an enormous dependence on conflict minerals by advanced and emerging economies. In recent years however it seems that countries of the Global North have finally begun to take notice. Despite this attention efforts rarely equal success and the attempts by the developed world to end or reduce the trade in conflict minerals are no exception. The Kimberley Process, arguably the most successful effort so far, has generally been decried as ineffective and unproductive by several NGOs and some governments. This paper examines the issue of conflict minerals, their relationship with war and violence, and their role in the global economy in order to explain the failure of the developed world to end the trade of conflict minerals. The paper seeks to understand the lack of international attention to some of the worst atrocities since the holocaust and explores recently attempted solutions and the obstacles therein. The Democratic Republic of the Congo is used as a case study as the Second Congo War and the continuing violence in the country illuminate the murky complexities of the conflict mineral trade, from raw minerals to finished products.

## **Quest for the Middle Kingdom: the Political Effects of China's Ambitions in the Belt and Road Initiative**

Presenter: Matt McGregor, Political Studies

Faculty Supporter: Dr. Sherman Lai

The Belt and Road Initiative (BRI) is Chinese President Xi Jinping's brand for economic infrastructure development and investment. The BRI offers significant strategic advantages to the PRC and many benefits to partner countries, and is intended to situate China at the centre of international trade. At the same time, unintended consequences of investment will impact local populations in key areas, including population displacement, environmental degradation, corruption, political upheaval, exploitation and violent conflict. While the BRI offers significant opportunities to both China and its partner countries in the initiative, relative Chinese military weakness, the limits of economic activity, underdeveloped soft power authority, energy dependency, terrorism and domestic politics will all either inhibit the BRI or remain vulnerable aspects of the Chinese national interest as projects move forward. The BRI has the potential to reshape the economic relations of the world, however the strategic limitations of the project do not indicate a short or mid-term upheaval of the international system in favor of China or an end to China's political challenges at home and abroad. This essay views the realist and constructivist schools of international relations theory as the most useful way to understand the motivations and consequences of the BRI. The long term effects on the global balance of power will also be examined, especially in the context of Xi's vision for China in 2050.

## **The Use Case of the Sustainable Development Goals for Impact Investment Measurement**

Presenter: Trevor Schonewille, Economics and Global Politics, Carleton University

Faculty Supporter: Dr. Minjoon Lee

Investing private capital in projects designed to promote sustainable development is no new concept. Several models have been deployed such as social responsible investing, venture philanthropy and others. In 2007, a new system emerged called impact investing, which has three conditions to it. For-profit investments are made seeking financial returns. The ventures invested in must have positive impacts on society and/or the environment. These impacts need to be quantifiable and measurable. A framework to quantify the social and environmental impact created has yet to be developed. This paper will analyze how the United Nations Sustainable Development Goals (SDG) can be used as a resource to help develop an impact measurement system for impact investors. To examine the validity of the SDG indicators for impact investors, this project matches the SDG indicators with impact reports released by impact investment firms and associated businesses, as well as other impact measurement systems. The scope will cover a diversity of impact investment firms to test the flexibility of the SDGs. The current research surrounding impact investing focuses on defining impact investing, use cases, measurement strategies and implementation. For the SDGs, there is material that focuses on the validity and their practicality. This report will build on these theoretical frameworks for the specific case of using the SDGs to measure impact investing, and how a new framework can be developed out of the SDGs to create an effective impact measurement system for impact investors. This will help legitimize impact investing, bringing it to the forefront of sustainable development.

## Session VIII: Innovation Improving our Health and Lives II

Speaker's Corner, Stauffer Library

Friday, March 9, 9:00 – 10:40

Moderator: TBA

### **DEVS OS (Discrete Even Visualization and Simulation Operating System)**

Presenter: Adnan Hajar, Software Engineering, Carleton University

Faculty Supporter: Dr. Gabriel A. Wainer

The use of traditional approaches to teach Operating Systems usually lacks the visual aspect. The following research investigates the novel use of DEVS (Discrete Even Visualization and Simulation) in simulating the operation of an operating system. Cd boost++ was the framework of choice for this project. The simulation successfully mimicked the work of an operating system by simulating multiple cycles of program requests. This simulation is capable of further enhance the explanation of how an operating system works. The cases studied in this work include: 1- two processes running concurrently doing multiple IO's, 2-four processes running concurrently based on a first come first serve scheduling algorithm, and 3- 20 processes running concurrently using highest priority scheduling algorithm. Output observation of the last case show promising results of successful use of DEVS and cd boost++ as a framework to build an operating system.

### **An Analysis of Orientation Bias: A Comparison Between Visual and Pictorial Space in Virtual Reality**

Presenter: Dean Rosen, Psychology

Faculty Supporter: Dr. Niko Troje (Biomotion Lab)

If participants are asked to orient a face half way between frontal view and profile view, they typically choose an angle somewhere between 30 and 40 degrees. In this study, we demonstrate this phenomenon called orientation bias, and we test the hypothesis that it is directly related to presenting the face in the pictorial space of the flat screen rather than in the egocentric visual space of the observer.

Participants were required to use a keyboard to rotate a 3D rendering of a human head to orient it at 45 degrees, that is, half way between frontal and profile view. Employing a repeated-measures design, participants completed two blocks in counterbalanced order. Both viewing conditions were implemented in virtual reality. In the first, participants saw a columnar pedestal with a head mounted on top of it in the visual space before them. In the second block, the very same scene was recorded with a fixed camera and projected on a virtual computer screen.

The results indicated that the mean angle estimations in visual space ( $M = 43.01$ ,  $SD = 5.96$ ) and pictorial space ( $M = 37.40$ ,  $SD = 6.99$ ) differed significantly,  $t(15) = 5.13$ ,  $p < .001$ .

These differences could be a result of depth compression, which has been previously described in the context of distance perception. Given that interpretation, our results imply that depth compression might be a result of the flatness of the picture plane which is perceived in a "twofold" way alongside the depicted contents of the image.

## **Gene Expression Analysis in Critically Ill Patients**

Presenter: Mary Hoekstra, Computing

Faculty Supporter: Dr. David Maslove

Nosocomial infections are associated with increased morbidity and mortality in intensive care units (ICUs) and remain an important target for intervention. Several studies have explored bovine lactoferrin as a potential tool for preventing infection and modulating the immune response. One clinical trial, the PREVAIL study, investigated the efficacy of lactoferrin in preventing nosocomial infections in critically ill, mechanically ventilated patients. A subset of patients in this study had blood samples collected at up to 6 different time points during their stay in the ICU, which were used to extract RNA for gene expression profiling. The resulting gene expression data were analyzed to determine the impact of lactoferrin on gene expression. Differential expression analysis was performed using both a single-gene approach and weighted gene co-expression network analysis (WGCNA). A single-gene analysis revealed that there was an increased number of differentially expressed genes in the lactoferrin group at all time points, including genes associated with the inflammatory response. Results from WGCNA revealed that groups of genes associated with innate immunity and defence response to virus were significantly differentially expressed over time in the lactoferrin group. These results contribute to our understanding of critical illness at the molecular level and provide evidence that lactoferrin has a biological effect.

## **The Political and Revolutionary Implications of the Mysterious History of Parquet Flooring**

Presenter: Katharine McCoy, Political Studies/Art History

This presentation seeks to ask about the potential political implications of the history of parquet flooring. This is to prove that while politics indeed shape art, art also has a hand in shaping politics; and it is more symbiotic than generally assumed. Using empirical quantitative and qualitative research, I traced the origins of parquet flooring to the Palace at Versailles. This is where wood and the techniques of marquetry were first used to replace a marble floor in the King's bedroom. The marble was too cold, and as the King's Bedroom had a number of issues with drafts, it added to the health risk to keep the marble floor. Changing the marble to wood, but keeping the pattern of a marble floor allowed for the aesthetics of marble without the hazard.

This presentation will look at the history of parquet flooring and apply it to the political climate of pre-revolutionary France. It will first address the research required to find the origins of the flooring. It will then argue the necessity of parquet flooring, along with other later features of the palace, as symbolic of the flaws of absolutism. Finally, the presentation will show how this symbolic art fits into the complicated relationship between politics and art.

## **Comfort while Dying: a Transnational History of Pediatric End of Life Care**

Presenter: Emilie Hill-Smith, History, Carleton University.

Faculty Supporter: Dr. Dominique Marshall, Professor and Chair of History, Carleton University

Through an in-depth analysis of current and historical literature, this thesis explores the question: what is hospice and end of life care for children? I will dissect the various dimensions of children's hospice care and how it has evolved over time. Also in my thesis, I will draw from my personal experiences in volunteering at a children's hospice to discuss the support and care that volunteers receive. Through this literature review I hope to bring to light to a subject that is often overlooked or too difficult for people to discuss. I will propose plans to better the care for children and families who are facing the end of life. My thesis will

summarize the current literature available about the type of care that children receive worldwide and how this care affects families and children's well-being. There has been minimal research done on children in end of life due to the topic's sensitive nature. My goals is to inform the public of an under discussed but important topic in paediatric medicine.

### **Session IX: Social Media, Human Behaviour**

**Stauffer Library, Room 121**

**Friday, March 9, 9:00 – 10:40**

**Moderator: Dr. Jenn Stephenson**

#### **Why we Act Irrationally**

Presenter: Zohaib Ahmed, Political Studies/Philosophy

Faculty Supporter: Dr. Mark Smith

Psychologists, cognitive experts, and philosophers alike have long been interested in why people go against their better judgement: why do people do *y* when they know all things considered *x* is better to do? Why does a student go out rather than working on his/her essay; the completion of which they know to be their top priority. The purpose of the presentation is twofold. First and foremost, it hopes to make digestible to the everyday thinker the philosophical research that has been conducted on this matter. Oftentimes when philosophers release ground-breaking work their paper is too dense and prose-filled to be comprehensible by non-philosophers. Secondly, this presentation hopes to locate not only the source of irrational action, which it finds to be *the passions*, but also present a solution to the problem of irrational action, which it argues is *self-reflection*. It is by having an honest and open conversation with oneself about 1) one's goals, aims, and ambitions and 2) one's values [what kind of person they want to be], that one is able to turn away from weakness and to act rationally. Moreover, this paper argues that acting rationally is an ongoing process, where the individual must continually assess their actions to ensure they are falling in line with their aims and values.

#### **Children of the Revolution: Looking Towards a Future of Altruistic and Prosocial Media**

Presenter: Rory Clark, School of Journalism and Communication, Communication and Media Studies, Carleton University

Faculty Supporter: Dr. Merlyna Lim

The first generation of social media natives, those who grew up with smartphones and social media, are now coming of age. It may not be incidental that questions probing the broader, weightier, possibly detrimental implications of social media, are beginning to be asked—not just by academics, not just by the public at large, but even by the architects of the phenomenon themselves. New mediums—TV, radio, the Internet—have generally taken approximately a decade from wide-spread availability to mass adoption for the full breadth of their influence, for better or for worse, to come to fruition. We are now at that juncture with social media. This research intends to examine this phenomenon and the disruptions currently taking place, how social media natives fit into this narrative, and what a path towards a more *prosocial* media might look like. Keeping in mind social media was originally intended to simply digitize social connections, communities and communications, not incite policy change, sway elections, or topple regimes, this research will examine the potential of a technology designed for the former to facilitate the latter, as well as social capital and bonding. Ultimately, this research aims to frame the entry of social media natives into the adult world as part of a paradigm shift and envision how social media with a more intentional, built-in functionality to facilitate altruistic and prosocial actions, in a more tangible fashion, as well as mitigating

its capacity to foment malice, might operate.

### **The Golden Age of Stealing: An Analysis of Queer Appropriation and Exploitation in 21<sup>st</sup> Century Popular Culture**

Presenter: Adrian Deveau, Art History/History

Faculty Supporter: Dr. Jennifer Kennedy

Popular media is a series of appropriations and citations of cultural productions, refurbishing past ideas to fit the mold of the present. Representation of art works and cultural products influence the visibility of the groups who produce for popular culture. While social media and contemporary art allow for the rapid spread of ideas through the internet and advertisements, too often are ideas stolen for profit for large companies by exploiting the artistic integrity of uninitiated groups. Queer culture often appropriates historical methodologies for a reclamation of the past to create representation for the future. Queer artists produce landmark aesthetics in visual culture, shaping contemporary fashion trends and artistic movements in the 21<sup>st</sup> Century. While appropriation as a methodology is not inherently problematic, exploitation develops when artists are neglected credit for works which are exploited for capitalist gain.

The research paper *The Golden Age of Stealing: An Analysis of Queer Appropriation and Exploitation in 21<sup>st</sup> Century Popular Culture* analyzes the relationship between the appropriation and exploitation of Queer art, using the 1980's and 90's club kids as a platform for queer aesthetic production. The paper outlines the dichotomy between representation of queer peoples in the 1990's and the aesthetics produced to question popular representations and roles within a western consumer society. Using queer performative theories including utopianism, performativity, and disidentification, the paper distinguishes why the stealing of queer art for profit is inherently dangerous and regressive for the queer community, silencing queer voices and perpetrating a heteronormative narrative of cultural production.

### **Pics or it Didn't Happen: A Theatrical Examination of Definitions Truth, Reality and Authenticity in Twenty-First Century Post-Reality**

Presenter: Iliana Klassen, Concurrent Education (Drama and History)

Faculty Supporter: Dr. Jenn Stephenson

'Pics or it didn't happen': if it's not on social media, did it really happen? This colloquial phrase, which became popular in 2017 gives a helpful glimpse into concept of post-reality. Post-reality in this context refers to the idea that something is only considered true or real when it is affirmed by other people. Though post-reality is a recent phenomenon, an engagement with questions of the nature of truth and reality can be found throughout theatre theory. Theatre theorist and philosopher Plato defines truth and reality in *The Republic* (373 B.C.) while Denis Diderot reflects on truth on stage in *Conversation on 'The Natural Son'* (1757) and *The Paradox of Acting* (1773-1778), and Walter Benjamin reflects on the nature of authenticity in *The Work of Art in the Age of Mechanical Reproduction* (1935). While these theorists are by no means the only three theatre theorists examining truth, reality and authenticity, the way in which they define their terms has significant implications for how we live in a post-reality society in Canada in 2017. This paper places these three theorists in conversation with each other within the context of post-reality: a conversation which has significant implications for the theatre and world of post-reality in 2018.

### **The Wandering Eye: An Eye Tracking Approach to Mind Wandering**

Presenter: Jessica Schnabel, Psychology

Faculty Supporter: Dr. Daryl Wilson

Mind wandering, or “daydreaming,” is a shift in the contents of a thought away from a task and/or event in the external environment, to self-generated thoughts and feelings. This research seeks to test the reliability of eye tracking as an objective measure of mind wandering using the Wandering Eye Paradigm, as well as examine the relationships between mind wandering and individual characteristics. Fifty participants will be recruited for two appointments a day apart, on each day on each day completing two eye tracking sessions following a moving target. In this task, participants will be instructed to press the space bar if they feel they are mind wandering, and then answer three questions about their episode content. Questionnaires measuring mind wandering, procrastination, mindfulness, creativity and personality (in particular conscientiousness) will be completed between eye tracking sessions. By comparing the eye tracking data in the period prior to the spacebar press we can determine quantifiable indicators of the onset and duration of mind wandering episodes by analyzing gaze location in relation to the target location. It has been hypothesized that severity of task performance failures (losing track of the target) should correlate with the “depth” of the mind wandering episode content. Additionally, we expect the frequency of mind wandering episodes to correlate with individual characteristics, and that these measures will be consistent across trials. This research would provide a novel objective way to identify and measure mind wandering, and would help further advance the understanding of its behavioral and subjective dimensions.

### **3 Minute Thesis: “One slide, no props, 3 minutes”**

Speaker’s Corner, Stauffer Library  
Friday, March 10, 10:45- to 12:00

Student participants present their research and its wider impact in 3 minutes or less to a panel of non-specialist judges:

Presented by the Alma Mater Society

### **Session X: Pizza with Posters**

See poster abstracts beginning on page 32

### **Session XI: Music and Theatre Magic**

Union Gallery, Stauffer Library  
Friday, March 9, 1:30 to 2:50  
Moderator: Dr. Stephanie Lind

### **The Magic Circle: An Exploration in Immersive Theatre**

Presenter: Amanda Baker, Drama and Computing  
Faculty Supporter: Dr. Jenn Stephenson

When discussing theatre, most people will imagine a traditional audience-actor relationship, likely in a proscenium setting; the actors on stage inhabit the world of the story while audience members remain passive bystanders. Immersive theatre challenges this convention by bringing the audience into the world of the story. Comparable to being immersed in water, the audience members are fully submerged in this new world; senses are engaged and heightened, and curiosity is peaked. The audience becomes a part of the story world alongside the actors as the border between the real and the fictional becomes blurred. In the world of games and digital media, this border is known as the “magic circle”, a space with unique rules

and values separate from day-to-day reality. Though this metaphor was created to describe a game space, it can be argued that audience members in immersive theatre performances have become “players” themselves.

In this project, I explore the “play” aspect of immersive theatre, with a particular focus in the area of pervasive gaming. This project includes research from a variety of theatre practitioners, theorists, and game designers including Janet Murray, Josephine Machon, Katie Salen and Eric Zimmerman. Inspired by that research, I am creating a pervasive game designed to be played in and around the city of Kingston. The goal of this project is to further understand the ways in which theatre and gaming are intrinsically linked while experimenting with form and pushing the boundaries of the magic circle.

### **Divided Kingdom, 561: Gamification of the Early Middle ages**

Presenter: Max Cronkite, History, Carleton University

Faculty Supporter: Dr. Marc Saurette

Gamification has been a growing trend as a tool for pedagogical use. Incorporating game-design elements into a non-game context not only has the potential to amplify student motivation and interaction, but allows for the exploration of a new way to learn, teach, and understand history. Gregory of Tours' *Historia Francorum* provides us with an interesting viewpoint into the world of 6th century Frankish Gaul. Understanding the motivations behind the characters in Gregory's work and their relationship with the religious and political atmosphere of the 6th century can be difficult for modern readers. My project uses elements of role-playing to better engage students in interacting with the text. Students inhabit the role of a historical character from *Historia Francorum* and play out a narrative 'campaign' of multiple sessions as that character. Through research and primary source reading they will develop an understanding for their character, the world they inhabit, and their role within that society. Students engage with other students, prepare and give speeches, all in their prescribed roles. This, along with continual feedback on their actions given by the instructor, will cultivate a unique and more engaging learning atmosphere for students. My goal for this undergraduate research project is to develop an alternative approach to understanding the dynamics of early medieval Frankish society. By turning Gregory's work into an inhabitable space, the large body of text becomes approachable and engaging to students. The final phase of the project which is underway, is testing it in a third year undergraduate history course.

### **In Search of 'Good' Theatre: Historical Ideals of Quality in Contemporary Times**

Presenter: Madison Lymer, Global Development Studies/Drama Medial

Faculty Supporter: Dr. Jenn Stephenson

The success of a play or work of theatre is based largely upon the reactions of audiences. Audiences collectively decide whether a play is 'good' or 'bad' and this dictates what shows are produced and who with. If audiences hold the power to say what experiences and who is tolerable on stage, then they also have the ability to dictate who is intolerable. This ability is capable of creating an exclusive environment where some stories are not told, and some people are less welcome than others on the stage. These ideals of 'good' are based on long standing value systems derived from theatre history and theorists. Plato, Émile Zola, and Denis Diderot all held strong ideals of what was authentic and therefore tolerable on stage. Plato believed the act of representation to be the key to authenticity, Zola was concerned with the authenticity of voice itself, and Diderot with the stories being told. In considering all three aspects of authenticity this presentation will consider contemporary Canadian theatre examples in comparison to select Shakespearean examples that uphold and subvert the historical conventions. Ultimately, the examples ask how these long-standing values fit in a multicultural Canada, and further within the age of immense globalization.

## **True Noise: Defining Scenes in Toronto's Underground Music Community**

Presenter: Jeremy Kerr, School of Drama and Music

Faculty Supporter: Dr. Margaret Walker

Underground music refers to genres which are not mass disseminated in the same way as mainstream styles, often due to their abrasive and lo-fi aesthetic. In large cultural centres, such as Toronto, underground music listeners develop their own communities and infrastructure – the framework of musical scenes – and seek out likeminded music fans both locally and virtually. Scholars such as Will Straw, Sarah Cohen and Holly Kruse have all developed theories concerning the development and definition of musical scenes which, while helpful, do not sufficiently examine how scenes are created and interact beyond geographically shared space. To address this gap, I have developed a theory which posits all musical scenes can be placed in one of two categories: local scenes, which are based around a specific locality and the infrastructure available for local scene participants, or super-local scenes, which are not bound by any one locality and can consist of multiple local scenes as well as independent participants. This presentation defines the Toronto underground scene as a super-local scene comprised of several smaller music scenes in the GTA. I will analyze the interactions between these local scenes, as well as with non-local participants, touring international acts, the mass media and the city authorities in order to model the structure of the super-local Toronto underground music scene. I suggest this framework will be useful to other scholars, even those outside of musicology, who are studying similar types of communities.

### **Session XII: Human Rights**

**Speaker's Corner, Stauffer Library**

**Friday, March 9, 1:00 to 3:00**

**Moderator: Ms. Nathalie Soini**

## **Targeted Killings in International Law: Considering Extra-judicial Killings on Canadians Abroad**

Presenter: Karina Esmail, Political Studies

The use of targeted killings has become more typical since the US declaration of a "Global War on Terror". States such as the US and Israel have employed targeted killings as a means to combat the growing threat of international Islamic terrorism; the US has transitioned from a law enforcement paradigm to a law of war paradigm, through the Congress' Authorization on the Use of Military Force. Although the legality of targeted killings is still contested in the international community, I argue that while the law enforcement paradigm is ineffective at containing the growing threat of terrorism, the law of war paradigm disregards international law and risks the protections of civilians unnecessarily. More constraints are needed through international law in order to maintain the core principles of the international humanitarian framework, while still combating terrorism and expanding the existing framework to cover non international armed conflicts such as that between al-Qaeda and the US. This can be done through the establishment of a new paradigm, called the continuous hostilities paradigm. If the existing international principles such as distinction, proportionality, military necessity and humanity are considered, targeted killings can be legal under international law. However, the indiscriminate killing of suspected terrorists by States cannot be considered legal, and it is crucial to consider the necessity of the protection of civilians.

## **Countering Violent Extremism in Canada and Abroad**

Presenter: Nora Abdelrahman Ibrahim

Faculty Supporter: Dr. Stéfanie von Hlatky

Terrorism and violent extremism have undoubtedly become among the top security concerns of the 21st century. Despite a robust agenda of counterterrorism since the September 11, 2001 attacks, the evolution of global terrorism has continued to outpace the policy responses that have tried to address it. Recent trends such as the foreign fighter phenomenon, the rampant spread of extremist ideologies online and within communities, and a dramatic increase in terrorist incidents worldwide, have led to a recognition that “traditional” counterterrorism efforts are insufficient and ineffective in combatting these phenomena. Consequently, the focus of policy and practice has shifted towards countering violent extremism by addressing the drivers of radicalization to curb recruitment to extremist groups. Within this context, the field of countering violent extremism (CVE) has garnered attention from both the academic and policy-making worlds.

While the CVE field holds promise as a significant development in counterterrorism, its policy and practice are complicated by several challenges that undermine the success of its initiatives. Building resilience to violent extremism is continuously challenged by an overly securitized narrative and unintended consequences of previous policies and practices, including divisive social undercurrents like Islamophobia, xenophobia, and far-right sentiments. These by-products make it increasingly difficult to mobilize a whole of society response that is so critical to the success and sustainability of CVE initiatives. This research project addresses these policy challenges by drawing on the CVE strategies of Canada, the US, the UK, and Denmark to collect best practice and lessons learned in order to outline a way forward.

## **Mock Research Proposal on Unregistered Syrian Climate Refugees in Jarraheih Camp of Bekaa, Lebanon**

Presenter: Sari Ohsada, Global Development Studies & School of Environmental Studies

Faculty Supporter: Dr. Villia Jefremovas

Climate change is one of the greatest challenges of the 21st century, displacing a global annual average of 26.4 million people due to climate-related disasters. Currently, over 1.1 million Syrian refugees have fled to Lebanon due to climate-related drought and subsequent war, with 320,000 who remain unregistered by the UNHCR. Unregistered refugees are restricted from accessing services, shelter, and financial means for survival and risk arrest, detention, and deportation by Lebanese authorities for not having proper documentation and paid residency fees. These consequences are felt the most in refugee camps along the Syrian-Lebanese border region such as Bekaa, Lebanon. Despite the presence of humanitarian aid, refugees in camps are left in legal limbo, deprived of accessing the right to have rights. Specifically, for climate refugees, international treaties or future mitigation mechanisms are lacking, exacerbating their vulnerability. Therefore, this research questions the physical and social experiences of unregistered Syrian climate refugees in the Jarraheih camp, Bekaa, Lebanon. The intention is to determine how these refugees, without official status, are impacted and coping with current federal and international legislative measures. By working with the refugees and key local actors, this research aims to understand how solidary and community organization can be formed within the current legal system to facilitate smoother adaptation and resettlement for climate refugees. Using participatory observation, focus groups, semi-structured interviews, and archival research, the practical outcome is a solidarity group that is established, run, and evaluated by a sample of unregistered Syrian climate refugee men and women aged 18-65.

## **The Future of Jewish Education in Canada: Experiential Learning in an Informal Educational Setting**

Presenter: Erin Silverberg, Psychology and Jewish Studies

Faculty Supporter: Dr. Valerie Michaelson

Traditionally, most Jewish Canadian families have preferred private religious day schools as the primary source of Jewish education for their children. However, enrollment in Canadian Jewish day schools is declining, likely due to costs, competition, and lack of interest. Experiential learning in informal educational settings may be a successful alternative type of Jewish education in Canada. Experiential learning involves learners actively constructing knowledge from direct experiences, and are typically more effective in informal educational settings such as summer camps, youth groups, and travel programs. There are several cases of this type of learning experience being successful with Jewish American youth, however there is less documentation on this type of Jewish education in Canada. Research with Jewish American youth suggests combining experiential learning with informal settings is effective because characteristics of these informal settings help to facilitate complex, meaningful learning, sometimes referred to as “teachable” and “click” moments. Therefore, experiential learning in an informal educational setting may have the potential to be a viable substitute for a traditional religious school education. However, given that most research on this topic has been done on Jewish American youth, more work must be done to determine if this type of education will have the same success in Canada.

## **Bitter Dudes Leaking Nudes:**

### **An Analysis of the Laws Targeting Revenge Pornography in Ontario**

Presenter: Erica Morassutti, Law

The non-consensual sharing of intimate images on the Internet presents a uniquely invasive and perpetual kind of privacy invasion. It occurs when a photograph or video depicting nudity or sexual activity – often consensually taken and shared privately with one individual – is then distributed online without the victim’s knowledge or consent. Often intended by a spurned ex-partner to humiliate the victim, the practice is referred to colloquially as “revenge porn”. This paper analyzes recent legal responses to revenge pornography in Ontario.

## **Rejected and Dejected: The Fallen Woman in Nineteenth-Century Literature**

Presenter: Shermara Suthan, English Literature, University of Toronto

A prominent literary figure during the nineteenth century, the “fallen woman” was one who lost her chastity—and thus, her virtue—falling from an ideal state of feminine purity. A woman’s corrupted sexuality or perceived promiscuity equated to a loss of dignity, as a morally respectable woman confined such relations to marriage alone. The fallen woman’s prominence reflected major concerns about the moral state of societies, of which women’s sexual morality was considered to be fundamental. Despite the stigma surrounding fallen women, central authors of the time (mainly Victorians) displayed a nuanced understanding of such women’s situations through sympathetic depictions. Along with relevant historical discussion, this analysis explores this feared and fascinating literary figure in diverse authors and works: in Nathaniel Hawthorne’s *The Scarlet Letter*, Elizabeth Gaskell’s *Mary Barton*, Thomas Hardy’s *Tess of the d’Urbervilles*, and Christina Rossetti’s *Goblin Market*. Examining the conduct and situations of literary women who defied crucial norms reveals the importance of women’s sexuality to their identities and reputations. The dramatic consequences these women face for flouting these expectations expose their gender-specific vulnerabilities to having relations out of wedlock—from bearing illegitimate children to being left financially destitute without a husband. Finally, these literary depictions reveal the complexities

of judging fallen women definitively: despite their fallen statuses, many of them have redeeming moral qualities. This ultimately suggests that a fallen woman's entire moral worth should not be based on her lapses; she should generally be a figure of pity rather than disdain.

### **Session XIII: Breakout**

**Stauffer Library, Room 121**

**Friday, March 9, 1:30 to 3:10**

**Moderator: TBA**

#### **Caleb Wing and the Ninth Miniature: An Investigation into a Copied Manuscript Leaf and the Bibliophile Community in 19<sup>th</sup> Century England**

Presenter: Abigail Berry, Art History/Mathematics

Faculty Supporter: Dr. Mathew Reeve

Buried within the famous *Isabella Breviary*, on the recto of page 37, there is a depiction of the circumcision of Christ. The miniature depicts Joseph and Mary on their knees, watching the circumcision of Christ being performed by a priest and another unrecognizable religious figure. Saying that this page is unknown to art historical scholarship is an understatement—the circumcision illumination in the breviary has never been referenced in scholarly writing.

Yet buried in an art collector's house in the small city of Kingston Ontario, there is a beautifully detailed copy of the basically unknown circumcision leaf from the *Isabella Breviary*. The copy underwent chemical testing and it was revealed that the leaf was created in the 19<sup>th</sup> century. How did a copy of this unknown leaf end up in a small Canadian city? Who created this copy, and why? This presentation will explore the history, iconography and provenance of the Kingston Leaf. Although the Kingston Leaf is an almost direct copy of the original leaf in the *Isabella Breviary*, the small differences between the two pages provide clues that I believe connect the Kingston Leaf to the famous manuscript copier, Caleb Wing. But more importantly, the provenance reveals a community of 19<sup>th</sup> century English bibliophiles and art dealers, who were thinking about and evaluating medieval art. Their trades and deals surrounding the Kingston Leaf, and the *Isabella Breviary*, provide insight into the Gothic revival, and the Victorian romanticism of medieval art.

#### **Capturing Conquest: 20th Century Colonial Photography in the Philippine Islands and its 21st Century Musical Legacy**

Presenter: Kalila Dahm, History/Political Science (Carleton University)

Faculty Supporter: TBA

It is a common tool of empire to use racial othering to justify conquest of both land and body. Yet in spite of achieving independence twice, once from Spain in 1898 and again in 1946 from the United States, suggesting the end of colonial discourse, the question remains: why do Filipinas remain hyper-sexualized and fetishized today? The purpose of this project is to examine the tools of empire as a means of justifying an American colonial agenda in the Philippine islands. Particular attention is paid to musical representations and colonial photography to situate the hyper-sexualization, and eventual fetishization, of Filipinas in contemporary American society and 20th century American empire. To date, somewhat limited English literature exists on the topic of 20th century American colonial photography. And yet, sexualized representations of Filipinas are not limited to photography, nor did this view of Filipina bodies,

and by extension Filipinas, suddenly stop after independence; problematically suggesting that consequences of empire, including race-based and/or sexual hierarchies, no longer exist. This paper hypothesizes why this imagery remains relevant in the 21st century through an examination of contemporary musical lyrics, suggesting that the hyper-sexualization of Filipinas is rampant in contemporary American society as a product of residual colonial discourse. Then, this paper attempts to retrace the start of American presence in the Philippines at the end of the Spanish-American War of 1898 by examining representations of Filipina bodies as a tool of empire, justifying American imperialism until the mid-20th century, marking the beginning of colonial rhetoric.

### **Ignorance is Bliss: Memorialising Indigenous History in the United Kingdom**

Presenter: Emily Fung, English Language and Literature

Faculty Supporter: Dr. Laura Murray

As Britain strives to take more pride in its history and promote 'British' values in its schools, its role in North American Indigenous history has been left off the curriculum, resulting in an education that lacks any awareness of the societies whose land it colonised. After four months of studying Indigenous history and culture for the first time, this final project sought to find a way to memorialise Indigenous people and their culture in one of the countries that was most responsible for their suffering – a country that is now so able to turn a blind eye to events that didn't occur within its shores. In doing this, this project considered the implications of memorialising events that occurred an ocean away, and the wilful or naïve ignorance of the British public. After considering various forms of memorials, this project focused on designing a memorial garden, serving partly to increase the visibility of Indigenous people to British citizens, and partly to begin educating on aspects of their culture. This resulted in research on plants, wildlife, and symbols important to Indigenous societies, and careful consideration of all features of the garden, proposing a way for Indigenous stories to be told. The final design emphasises the importance of water, nature, and community, and is proposed as a way to begin eroding the ignorance of the British public to events that should be considered part of their history, and the cultures they affected through them.

### **When it is Appropriate to Racially Appropriate: Reverse Colonial Miscegenation in Bram Stoker's *Dracula***

Presenter: Cole A. Harrison-Priddle, English Language and Literature

Faculty Supporter: Dr. Andrew Bretz

This presentation uses Victorian science to examine the racial conflict between Dracula and England in Bram Stoker's novel *Dracula*. The novel's horror situates itself in the context of Late Victorian England and its contemporary fear of Reverse Colonization: the fear that England's empire, already in its onset of decline, will be invaded and colonized by an uncivilized other people. The development of evolutionary theory stimulated concern that the opposite of evolution – degeneration – was not only possible, but already in effect. Stoker expresses England's decline in accord with degeneration theory by portraying English men as weary. He establishes fear of Reverse Colonization by portraying Dracula to possess the animalistic vitality England lacks. Dracula invades and disrupts notions of English identity by mirroring the nation's intelligence and consuming its women's blood. Blood symbolizes racial identity, political allegiance, and, according to persisting medieval medical theory, semen. Thus, Dracula effectively consumes English racial identity, causes his victims to politically defect, and proliferates the vampire race through rape when sucking women's blood. The lattermost invasion tactic is facilitated, according to contemporary studies of craniology, by women's latent sexuality and criminality. Despite critics' assertions that *Dracula* portrays miscegenation (the interbreeding of different races) as racial annihilation, the birth of Quincey Harker from mixed racial inputs at the novel's end symbolizes the revitalization of the English race. The novel thus responds to contemporary degeneration theory by proposing miscegenation (with vital races and in which England remains the dominant racial input) as a solution to Late Victorian decline.

**The Duplicitous Nature of the Familiar Urban Object: the Shopping Cart at Bennett's Food Market, *Where Food Buying is Most Satisfactory***

Presenter: Ella Mackay Singh, English Language & Literature/Art History & Art Conservation

Faculty Supporter: Dr. Laura Murray

When Sylvan Goldman invented the first shopping cart in the 1930s, it is unlikely he envisioned its eventual entrance into the rivers and swamps. Though advertised as a solution for the arm-weary shopper, the function was no doubt two-fold in truth: while the explicit function of the shopping cart was to ease the load for supermarket shoppers, the more implicit function was to ease them into buying more. However, the customers at Bennett's Food Market in Kingston, Ontario – at the corner of Charles and Bagot through the early 1900s to the early 2000s – helped to turn those expectations upside down. Through an extensive collection of oral history interviews, The Swamp Ward and Inner Harbour History Project has catalogued the neighbourhoods' long-standing relationship with carts, but also the long-standing relationship with the grocery store that provided them. By focusing in on what first appears as a familiar urban object and considering it specifically in the context of Bennett's Food Market, the shopping cart is revealed as far more than a basket on wheels. Shopping carts can nurture people not just by being filled up with food that's then bought and consumed, and they can support a weight that's not just of groceries, but that's human.

## Session X: Poster Presentations

Queen's Learning Commons, Stauffer Library

Presenters will be present at posters Friday, March 9, 11:30-1:00

Posters will be on view March 8 & 9

### **1. Investigating the Link Between Kinematic, Kinetic and Muscular Symmetry in Young Adults 12 or More Months post-ACL Reconstruction**

Presenter: Rachel Allen, Kinesiology (Biomechanics)

Faculty Supporter: Dr. Pat Costigan

Anterior cruciate ligament (ACL) injury after primary reconstruction and return-to-sport clearance is common. Since research indicates asymmetry as a valid predictor of injury, it is proposed that inter-limb asymmetry following ACL reconstruction contributes to the elevated incidence of re-injury in this population. Current return-to-sport protocols include objective tests such as joint laxity and strength tests, as well as single leg hop and drop landing tests. Since these assessments are based on visual observation, or simple kinematics measurements, it is unclear how visual asymmetry reflects the underlying joint forces and muscular effort responsible for the performance in these tasks. This study aims to assess the asymmetry present at the kinematic, kinetic, and motor control levels to clarify the after-effects of ACL reconstruction. This pilot study will help us appreciate if additional work exploring screening measures as effective tools for predicting ACL injury following primary reconstruction is warranted. Standard techniques will be used to measure the kinematics, joint kinetics and muscle activation during this 25-repetition squat protocol. Correlations will compare the left and right lower limbs for joint angular displacement, joint angular velocity, joint power, vertical ground reaction forces, and muscle activation amplitude.

### **2. Speaking of God in the Post-Human Era: An Examination of Radical Life Extension in Relation to Key Theological Concepts and Narratives**

Presenter: Kaitlyn Barton

Rapid advancements in radical life extension technologies contribute to humanity's ever-changing world. The normalization of radical life extension technologies would signify that the present era in which biology and evolution act as dictators of human life and health would come to an end, thereby ushering in the age of the post-human. The purpose of this paper is to engage in a theological analysis of how and to what degree the ways in which humanity speaks about God could be changed or influenced if radical life extension becomes normative within society. It is likely that this powerful technology would have a significant impact on many facets of culture, including the way in which humanity engages with religion, in particular Christianity. To accomplish this, the technology that could potentially support radical life extension, namely nanotechnology and cybernetic immortality, will be explained in terms of their relevance and function. Subsequently, the affects of radical life extension for human life will be addressed. Specifically, the implications of the partial or full eradication of human biological and psychological suffering and death through the use of cybernetic immortality and nanotechnology will be considered. From there, the core theological concepts and narratives will be analyzed in the context of the potential actualization of radical life extension technology. A focus will be placed on the ethic of loving thy neighbour, Christ's suffering on the cross, the hope of salvation and the Christian hope of entrance into heaven after death.

### **3. Ottawa through the Eyes of Refugee Children**

Presenter: Rosalynn Berti, Child Studies, Carleton University

Faculty Supporter: Dr. Nimo Bokore

The objective of this research was to expand our understanding of the lived experiences of refugee children arriving in Canada. For this study, I collected drawings from thirteen recently arrived refugee children living in a transitional house in downtown Ottawa, Ontario. The children were prompted to draw a picture of their experience of arriving in Canada. Nine of the thirteen drawings portrayed a narrative of journey through the drawing of flags and various forms of transportation. Five of the children included a drawing of themselves, their facial expressions conveying how they felt about arriving in Canada. Six of the drawings portrayed positive emotions, the children expressing thankfulness or eagerness to be in Canada. Four of the drawings did not present a clearly distinguishable tone, suggesting neutrality or avoidance of the task. Three of the drawings portrayed negative emotions, including fear and grief. These drawings demonstrate that the experience of arriving in Canada is complex, not easily simplified to broad generalizations. The participants told unique stories and expressed an array of emotions ranging from excitement to grief, justifying an approach focused on the individual lived experiences. This research project provided space for thirteen children to tell their stories, stepping out from behind the veil of statistics-directed, adult-directed, or outsider-directed narratives and personalizing the refugee resettlement process.

### **4. Problematic Overlap of Algonquin Park Eco-Tourism and Most Suitable Habitat for the Protection of Black Bear Biodiversity**

Presenters: Celeste Barsony, Elise Bishop, Jill Mulveney, and Aasif Patel, Environmental Studies, Physical Geography, and GIS

Faculty Supporter: Dr. Ryan Danby

The purpose of our study is to identify problems arising or that have arisen within the biodiversity of the Algonquin to Adirondacks (A2A) region caused by ecotourism. Our full study will include examining three different species preferred habitat ranges and the possible anthropocentric impacts imposed on these habitats and biodiversity. Specifically, we look at the black bear (*Ursus americanus*) within the region of the Highway 60 corridor in Algonquin Park during the busiest months of the park (spring and summer). The main methodology for this study is using Geographic Information Systems (GIS) conduct a suitability analysis for each species, and then identify areas of overlap with Algonquin Park Eco-Tourism. By studying the impacts of Eco-Tourism on the bear populations, and their most suitable habitat regions, we hypothesize that ecotourism will have dangerous impacts on their habitat ranges and biodiversity potentials. To correct this, we will suggest specific times in the season to avoid using the said Eco-Tourism campsites, portage routes, trails and outpost cabins.

### **5. The Effect of Climate Variability on Lake Water Balances and Water Quality in the Apex River Watershed, Baffin Island, Nunavut**

Presenter: Hannah Boomer, Geography

Faculty Supporters: Dr. Melissa Lafrenière and Dr. Scott Lamoureux

Iqaluit, Nunavut is currently facing a water shortage as its population rises, and its drinking water reservoir, Lake Geraldine, is increasingly insufficient. The City of Iqaluit is currently looking into alternative sources of drinking water to supplement this reservoir. This study investigates the effects of inter-annual climate variability on the water chemistry of twenty Arctic lakes in a continuous permafrost region, and the potential implications of these changes on drinking water availability. The twenty lakes are located in the Niaqunguk (Apex) river watershed, Baffin Island, Nunavut (which is adjacent to the Lake Geraldine

watershed at Iqaluit) were sampled annually during late July between 2014-2017. Ion concentrations and stable isotopes were measured for each lake annually throughout the study period to compare variability between lakes and between years. Water chemical and physical properties are used to gain insight into the inputs and outputs of each lake, and the changes in estimated water balance between years. This information will be used to determine the impact of different hydrological conditions on water chemistry. Results of water isotope tracers of the twenty lakes indicate that there are important year-to-year changes in the water stable isotopes, indicating inter-annual variations in evaporation rates, suggesting that these lakes are sensitive to changes in summer climatic conditions. Preliminary analyses of the ionic concentrations of the lakes suggest that ion concentrations generally decrease throughout the study period, and largely vary together, signifying the hydrological processes controlling the lake water balances are related to climate variability. This research will provide insights into the hydrologic response of lakes in a continuous permafrost region to long-term climatic change.

## **6. Chinese Papercut Poster Collection**

Presenter: Qi Fu, Economics Department; Digital Humanities Volunteer at W.D. Jordan Rare Books and Special Collections

Faculty Supporter: Jillian Sparks

*Qi Fu's 'poster' will be presented on the mobile touch screen adjacent to Room 121.*

For the past five months, I have been working on researching and digitizing a set of twenty-four Chinese papercut posters at W.D. Jordan Rare Books and Special Collections. Using the web publishing platform Omeka, the project combined the digital images of the papercut posters and all the metadata including title, translation, historical background and dimensions. This set of papercuts reflects the history of the Chinese revolution from the founding of the Chinese Communist Party to the establishment of People's Republic of China. This set includes the most representative events in all stages of the revolution creating a microcosm of the history of the Chinese people seeking liberation. Among these historical events, the majority of them were also displayed in the film "The East Is Red" which is a "song and dance epic" filmed in 1965 for celebrating the 15th anniversary of the founding of the People's Republic of China. The Chinese papercut posters online collection preserves and increases accessibility to these rare materials of which there is only one other collection online. By accessing to this site, more scholars can study this unique collection without time and location limitation.

Website Link: <http://postercollection.omeka.net/collections/show/1>

## **7. Jimi Hendrix: London Life in the 60's**

Presenter: Jena Hudson, Gender Studies

Faculty Supporter: Dr. Christian Lloyd

If you count back, 50 years since the Summer of Love of 1967 has passed. It has also been 50 years since Jimi Hendrix famously opened a show at the Saville Theatre in London with his rendition of the Beatles' *Sgt. Pepper's* title track, which was released just three days previous, all while The Beatles sat in the audience. This is the same summer when his first album, *Are You Experienced?* spent 33 weeks on the charts and Hendrix set fire to his guitar at the Monterey Pop festival. I spent 12 weeks in Brighton, England learning about Hendrix and the London that he lived in. I had the opportunity to interview interesting characters and work with primary texts, but the main source I worked with is a newspaper call the International Times, most commonly known as IT. IT was known for its 'police baiting' small ads page, making this an incredibly interesting primary source to work with. In this project, I examined the Summer of Love, Hendrix and IT newspaper through the lenses of sexism, racism and consumerism, exposing areas where the hippies in swinging London were not as progressive as they thought. Using examples from IT,

Hendrix's life and texts from the 60's, my project aims to highlight how instances of sexism, racism and consumerism occurred within the hippie community. In London, hippies were unable to reach unified ideas and maintained some oppressive tendencies from the dominant culture they so wished to reject.

## **8. Chromebooks vs. Printed Books – Exploring Influences on Students' Reading Comprehension and Dictionary-use**

Presenter: Stacie Kerr, Child Studies, Institute of Interdisciplinary Studies, Carleton University

The digital age is an era beginning in the 1980s in societies wherein the retrieval, management, and transmission of information using digital technology is a principal activity (Flewitt, Messer, & Kucirkova, 2015). In recent years, digital technology has been rapidly incorporated into Canadian schools, inspiring a debate concerning how educators should use newly emerging digital technology in the classroom, and ultimately whether digital media platforms should be accepted as a replacement for print-based media platforms at all. This research project uses quantitative methods and a within-subjects research design to compare fifth grade Eastern Ontarian students' frequency of dictionary-use and reading comprehension scores when reading a Chromebook and using an online dictionary, in contrast to when reading a printed book and using a printed dictionary. It was hypothesized that students would achieve higher reading comprehension scores and demonstrate more frequent dictionary-use when reading with a Chromebook and online dictionary than when reading a printed book and using a printed dictionary. This was due to the reportedly more ergonomic nature of digital media platforms (Dundar & Akcayir, 2012), and to the unique set of skills acquired by many children growing up during the digital age (Steeves, 2014). It was found that the participants used the online dictionary significantly more frequently than the printed dictionary, but no significant difference was found between participants' reading comprehension scores in the two conditions. The results of this research project may have implications for the pedagogical tools and practices used in local Eastern Ontarian elementary school classrooms.

## **9. The Colonization of Intersectionality**

Presenter: Kenya Longsworth, Philosophy  
Faculty Supporter: Dr. Jacqueline Davies

It has become a trend, adopted by postsecondary institutions to strengthen their commitment to 'diversity' and 'inclusion'. With growing attention to issues of social and systematic marginalization, intersectionality is an unavoidable term within campus discourse. Though the term's increasing popularity is welcomed both in curricular and co-curricular settings, there still exists considerable confusion concerning what the concept actually means and how it can or should be applied in feminist inquiry. This poster demonstrates my exploration of how feminism as a political site for whiteness, with no room to make sense of the experiences of women of colour has misused the term intersectionality. In doing so, I have differentiated between intersectionality as theory of oppression and power, and intersectionality as a theory of difference. I have responded to the issue of whether the use of intersectionality in contemporary feminism, as a theory of difference is still useful in framing the oppression of women of colour or whether it has become a dangerous shortcut, made in order not to continue the process of deeply reflecting on our complicated relations. The conclusion drawn is that intersectionality, as understood as simply a theory of difference creates forced categories of identity, displacing and further marginalizing members of minority groups. My findings mean that though the intended use of the term was a powerful critique by women of color about systems blind to their oppressions, it has been repurposed by contemporary feminists to group the experiences of women of colour in contrast to dominant white female identities.

## **10. Religious Commitment as a Positive Health Asset for Children: A Secondary Analysis of Qualitative Data**

Presenter: Frances MacVicar, Religious Studies

Faculty Supporters: Dr. Sharday Mosurinjohn and Dr. Valerie Michaelson

"During the summer of 2017 Frances Macvicar worked with Dr. Sharday Mosurinjohn and Dr. Valerie Michaelson on a project about religious commitment as a positive health asset for young people. She performed a secondary analysis of qualitative data from over fifty adolescent boys and girls from across Canada. While, as expected, overall religious commitment was not important to many young people, for those who did find it important, its protective effects were strong. Currently, Frances Macvicar, Sharday Mosurinjohn, Valerie Michaelson, and colleagues from the Department of Public Health Sciences are co-writing a paper that treats this data in conjunction with quantitative data from another much larger study. Further directions suggested by the project include exploring ways to account for the relationships between religion, spirituality, and health in educational settings."

## **11. The Gender Wage Gap of Recent University Graduates**

Presenter: Annabel Thornton, Economics

Faculty Supporter: Brant Abbott

The purpose of this research was to question whether the behavioural tendencies of men and women could help explain the gender wage gap of recent university graduates. It was conducted after discovering that a 2013 study found that even once accounting for observable characteristics such as age, experience, industry, occupation, and field of study, female graduates were still earning 6-14% less than their male counterparts. Using the willingness of a graduate to gamble a current job offer for a potentially better job offer in the future as a proxy for risk, this research investigates the impact risk preferences have on the gender wage gap. More specifically, it attempts to calculate how much of the observed wage gap can be attributed to the greater risk aversion of women.

Our data was from the National Longitudinal Survey of Youth 1997. Using a McCall Job Search model and an MLE, we found that women take approximately 4.5 fewer weeks to accept a job, accept significantly lower starting salaries, and are systematically offered lower salaries than their male counterparts. Furthermore, we found that women have an Arrow-Pratt coefficient almost 1.25 times that of men. These results suggest that women are more willing to accept lower wage positions offered to them today because they are less willing to gamble that a higher wage position will come along tomorrow. Moreover, they propose that this female unwillingness to gamble can explain up to a quarter of the difference in the wages accepted by men and women.

## **12. "The Case of the Castle": An Application of Experiential Learning at the Bader International Study Center (BISC) in Medical Education**

Presenter: Grace Yin, Department of Experiential Learning

Faculty Supporter: Dr. Ruth Cereceda, Bader International Study Centre, UK

It has been internationally recognized that medical education in higher-education institutions must adapt to equip healthcare professionals with skills that meet the changing demands of patient-centered care (General Medical Council, 1993). Experiential learning is a teaching strategy based on Kolb's Learning Theory (KLT) that encourages learners to proactively consolidate information through practical applications, self-directed reflection, and critical appraisal of evidence. Based on a descriptive phenomenological research design, the lived-experiences of both students and faculty at the Bader International Study Center were analyzed qualitatively through observation and interviews, and

quantitatively through Likert scale surveys. Conditions identified by previous publications as conducive to experiential learning were tested, and thematic and factor analysis were conducted respectively on subsequent data. Results of the analysis found that students consolidated information best when new knowledge presented built upon their prior understandings of the phenomenon. Thorough understanding of learning goals prior to the experiential learning opportunity encouraged learner ownership, and subsequently facilitated self-directed, professor-facilitated learning. Retention of information was highest when students were presented with reflection assignments that prompted them to critically apply prior knowledge in a low-risk environment. The implications from experiential learning for the advancement of medical education therefore can be summarized in the following points: learner-directed instead of professor-directed PBL scenarios may encourage learner responsibility and increase knowledge retention. Encouraging active reflection and subsequent experimentation through PBL and in realistic 'life scenarios' may increase transferability of professional skills as dictated by the General Medical Council.

### **13. A Navigated Intelligent Knife for Breast Cancer Surgery**

Presenter: Mark Asselin, School of Computer Science

Biomedical Computing Group

Faculty Supporters: Drs. Gabor Fichtinger, Andras Lasso & Tamas Ungi

When a woman is diagnosed with breast cancer, several treatment options are considered including breast conserving surgery. In this type of surgery, the goal is to completely remove the cancer while leaving as much healthy breast tissue as possible. This is a clinical judgement of high consequence since resecting less tissue is cosmetically appealing but increases the chances of leaving cancer cells behind, known as a positive margin. Conventionally, this operation is performed with an electrocautery – imagine it as an electronic knife – which seals tissue as it cuts and produces small amounts of surgical smoke in the process. In most operating rooms today this smoke is treated as a by product, and it is discarded with no further consideration. But this smoke is rich with useful information; it contains traces of the molecules the knife passed through when the smoke was generated. The intelligent knife (iKnife) analyzes this smoke to determine the pathology of tissue the surgeon's knife has passed through – whether the tissue is cancerous or not. We have coupled the iKnife with an electromagnetic position tracking system to create a three dimensional spatially resolved malignancy map showing where the surgeon's knife has encountered cancerous tissue. We have developed a functional prototype and have approval for a first clinical safety and feasibility trial. We hope the spatial map will help surgeons to successfully remove the entire malignancy with the smallest amount of healthy tissue while maintaining negative margins – a successful surgical outcome for the patient.

## 14. Radiation Therapy Planning for Skin Cancer: Using 3D Surface Scanning to Localize Tumour

Presenter: Anna Ilina, School of Computing  
Biomedical Computing Group  
Faculty Supporter: Gabor Fichtinger

Orthovoltage radiation therapy (ORT) is a non-invasive treatment often used for patients with skin cancer, which is characterized by shallow tumours visible at the surface of the skin. Currently there is no commercially available treatment planning system for ORT. The first step of treatment planning is localizing the tumour in a computed tomography (CT) scan of the patient. We propose using 3D surface scanning to obtain a coloured and textured image of the patient, from which the tumour can be identified. The contour of the tumour can then be overlaid onto the CT image, for planning delivery of radiation therapy. This process was demonstrated using a male mannequin model, with a red sticker on the nose representing a skin tumour. A coloured and textured image of the face was obtained using a handheld 3D surface scanner [Figure 1]. The surface scan was aligned to a CT image of the mannequin head using a two-step registration process, with a resulting error of 0.25mm. The tumour could then be easily segmented from the coloured surface scan by following the outline of the lesion. The tumour contour was extended in depth to 1cm, to encompass subdermal cancerous tissue in the treatment volume, and saved with the CT image for treatment planning [Figure 2]. This workflow is the first step to an open-source treatment planning system for ORT, which will allow physicians to deliver more precise treatment using ORT. This project was done in collaboration with the Kingston General Hospital.

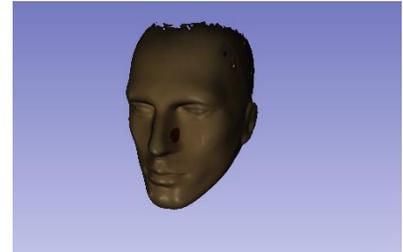


Figure 1: 3D Surface scan of mannequin head, with sticker on nose representing a skin lesion.

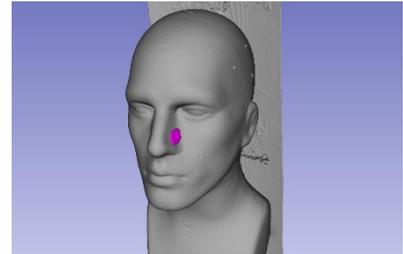


Figure 2: Tumour is localized and overlaid on top of CT image of head and neck, for use in treatment planning.

## 15. Assessing Microsoft HoloLens for Basic Suturing Skill Training

Presenter: Hillary Lia, School of Computing  
Biomedical Computing Group  
Faculty Supporter: Gabor Fichtinger

Suturing is a basic skill required across several specialties. Medical students are most often taught this skill in a workshop setting with one faculty instructor demonstrating the technique. Often, students do not receive sufficient exposure and practice to reach proficiency during these sessions. As a result, there has been increased interest in self-directed suturing practice. Augmented reality, which involves the projection of virtual images in a user's real environment, is an emerging tool in medical education. We sought to design and evaluate a training module, Suture Tutor, which combines video instruction with holography and voice control for self-directed suturing practice. We assessed the usability and effectiveness of Suture Tutor in a study conducted with 36 second-year medical students. The students were assigned to the Suture Tutor group or the control group. The Suture Tutor group used the training module on Microsoft HoloLens while the control group used the same instructional material on a laptop. Participants were asked to practice for seven minutes with their assigned training method. Then, they replicated a suturing pattern where their performance was video-recorded and evaluated. The Suture Tutor group completed a survey assessing the usability of the training module. It was found that the Suture Tutor was a user-friendly and helpful adjunct. Additionally, the Suture Tutor group interacted with the instructional material significantly more than the control group did ( $p = 0.0175$ ), suggesting the use of Microsoft HoloLens

increased access to training material. We were unable to make conclusions about the effectiveness of Suture Tutor.

## 16. Optimizing Neurosurgical Drill Placement using the Microsoft HoloLens

Presenter: Emily Rae, Electrical Engineering

Biomedical Computing Group

Faculty Supporter: Gabor Fichtinger

**Purpose:** Tracked navigation systems require large carts of equipment, specialized technicians, and are impractical in bedside neurosurgical procedures. For bedside procedures like an opening of the skull for removing pressure caused by internal bleeding, navigation could improve the accuracy of the drill placement. We use the Microsoft HoloLens to display a hologram floating in the patient's head to mark a drilling location on the skull. The accuracy of this placement is assessed to determine the feasibility of using the HoloLens to mark a drilling location within a clinically acceptable range.

**Methods:** A 3D model of the head is created from CT scans and imported to the HoloLens. The hologram is interactively registered to the patient and the drilling location is marked on the skull (Figure 1). 3DSlicer, Unity, and Visual Studio were used for implementing the software. The system was tested by 7 users. They each performed 6 registrations on phantoms with markers placed at 3 plausible drilling locations. Registration accuracy was determined by measuring the distance between the holographic and physical markers.

**Results:** Users placed 98% of the markers within the clinically acceptable range of 10 mm in an average time of 4:46 min.

**Conclusion:** It is feasible to mark a neurosurgical drilling location with clinically acceptable accuracy using the Microsoft HoloLens, within an acceptable length of time. This technology may also prove useful for procedures that require higher accuracy of location and drain trajectory such as the placement of external ventricular drains.

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## **Acknowledgments**

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