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1A Global Challenges and Global Solutions: Health and the Environment

Effect of different resistance mechanisms on bacterial killing and regrowth of Pseudomonas aeruginosa in response to meropenem

Alice Terrill, *Monash University Australia*

Multidrug resistance in bacteria has developed over years of antibiotic use. Pseudomonas aeruginosa is one of the top three critical pathogens when resistant to carbapenems according to the World Health Organisation. Traditional indices linking the response of pathogens to the exposure of antibiotics must be further explored for influencing factors like the resistance mechanisms present. Further understanding this relationship will help provide appropriate dosing of antibiotics with minimised possibility of resistance emerging. Isogenic P. aeruginosa with different resistance mechanisms or combinations of mechanisms were used. The minimum inhibitory concentration (MIC) of each strain was determined. Then they were exposed to meropenem (1-64 mg/L) in static concentration time kill studies over 72 hours. The results showed that bacterial killing and regrowth was not solely determined by MIC, as traditional indices suggest. Some strains required 4 times their MIC before regrowth was inhibited, while others only needed 1 times the MIC.These findings suggest that traditional pharmacodynamic indices do not tell the full story when explaining the relationship between antibiotic exposure and bacterial response. It is possible that the mechanisms of resistance present, or some other factors, also play a role. Further research, using dynamic models, that can better mimic the human system of bacterial growth and antibiotic dosing should be performed. Other classes of antibiotics should also be considered. Ultimately, this can be applied to provide patients with bacterial infections with better dosing regimens.

Morphological Analysis of Dendritic Arborization Neurons in the Larval Yellow Fever Mosquito, Aedes aegypti

Maryann Rogers, *University of British Columbia*

Very little is known of the peripheral nervous system of the larval Yellow Fever Mosquito, Aedes aegypti. Here, we sought to morphologically analyze the peripheral nervous system of Ae. aegypti larvae. Specifically, we sought to analyze the dendritic arborization neurons of Ae. aegypti larvae to determine if they display four neuronal classes of differing complexity and neuronal tiling like that of Drosophila melanogaster larvae. Through immunohistochemistry and a genetic cross, we imaged the dendritic arborization (da) neurons of 4th instar Ae. aegypti larvae. We found that Ae. aegypti larvae display four da neurons per each hemisegment: two on the dorsal side and two on the ventral side. These da neurons were most similar to that of class IV da neurons in Drosophila larvae, the most complex class with large areas of innervation and high order branching. We also observed a group of non-da neurons which surrounded the da neurons in each hemisegment. These non-da neurons had a singular dendrite which terminated at a seta and are assumed to function in mechanosensation, the typical functions of class I, II, and III neurons in Drosophila larvae, potentially explaining the absence of these classes in Ae. aegypti. This work has potential to generate novel strategies for disease control of the numerous diseases carried by Ae. aegypti as a vector through further understanding of their larval nervous system.

1A Global Challenges and Global Solutions: Health and the Environment

Ow! What bit me? Using DNA barcoding to identify mosquito species in British Columbia

Joshua Chen, *University of British Columbia*

There are approximately 3570 known species of mosquitoes, 53 of which have been recorded in British Columbia (B.C.), Canada. Most disease vectors belong to the genera Anopheles, Aedes, and Culex. These mosquitoes can transmit arboviruses, bacteria, and parasites to humans and other animals during blood-feeding. Mosquito-borne diseases such as malaria, dengue, chikungunya, Zika, yellow fever, and West Nile Virus affect hundreds of millions of humans globally every year. Since only certain mosquito species are disease vectors, and since those vectors are competent for specific pathogens, accurate species identification is important for applying geographical distributions to disease surveillance in a public health context. DNA barcoding is a technique that uses standardized short regions of DNA, such as the mitochondrial cytochrome oxidase subunit I (COI) gene and the internal transcribed spacers (ITS) found in ribosomal DNA, to accurately identify species. This study aimed to build a high-quality library of reference DNA barcodes of the mosquitoes of B.C. from adult mosquito field-caught specimens, which will be uploaded to Barcode of Life Data System (BOLD) and GenBank. The second objective of this study was to develop a molecular identification technique identify blood-meal host species, which will allow for a better understanding of mosquito niches and predict potential disease vectors. The reference library generated by this study will allow us to identify the mosquitoes of B.C. and the blood-meal host species of Ae. togoi and other mosquitoes of B.C. accurately and rapidly. More broadly, this research will aid mosquito distribution monitoring and disease surveillance.

Investigating Inbreeding and Genetic Management of the Cotter Macquarie Perch population in Southeast Australia

Nadja Schneller, *Monash University Australia*

Due to human habitat alterations, the Macquarie Perch population in the Cotter River has become isolated and evidence of inbreeding has been found. In order to help the population regain genetic diversity and make it more resilient, fish were translocated from a historically connected population in the Cataract Dam and released to the Cotter River to interbreed with the local inbred population. We analysed the effects of the genetic rescue action using Single Nucleotide Polymorphisms to infer whether interbreeding has commenced, whether admixed fish show higher genetic diversity and if there were indications of dispersal barriers along the river. There were two cross-types found which are inferred offspring of translocated and local fish showing higher genetic diversity than even the rescue source population. Isolation by distance appeared to have reduced over time, correlating with construction of fishways. Our findings suggests that interbreeding has started to occur between the Cataract and Cotter fish and the facilitation of gene flow has a positive effect on the adaptive potential of the interbred Cotter population. Furthermore, the improvement of connectivity between river sections is likely to improve gene flow and reduce inbreeding depression. The genetic rescue of the Cotter Macquarie Perch has shown early signs of success, but further monitoring is needed to confirm the effectiveness of the management action. Low contribution of the translocated fish to the recruitment in the Cotter River thus far suggests that an alternative population from a more similar water body might be a more suitable source.

2A Health and Wellbeing

How Might Trends in Aboriginal and Torres Strait Islander Maternal Characteristics Have Influenced Their Perinatal Outcomes?

Sophie Nunn, *Monash University Australia*

Babies of Aboriginal and Torres Strait Islander mothers are at greater risk of perinatal death (PND) than their non-Aboriginal counterparts. However, Victoria has displayed recent reduction in this disparity. This study aimed to explore whether changes in key socio-demographic characteristics among Victorian Aboriginal and Torres Strait Islander mothers could have contributed to this improvement in perinatal outcomes. We conducted a retrospective population-based cohort study of all births in Victoria from 2000 to 2019. We graphed trends over time for key maternal characteristics and our primary outcome PND. We calculated relative risk ratios with 95% confidence intervals to determine relationships between these characteristics and PND. We observed that trends in certain key maternal characteristics may have contributed to improvements in Victorian Aboriginal and Torres Strait Islander PND. However, several stagnant unfavourable characteristics may have hindered further improvements. In identifying that certain socio-demographic characteristics displayed potential to influence Aboriginal and Torres Strait Islander perinatal outcomes our findings contribute to the growing body of literature evidencing the role socio-demographic factors play in the health outcomes of this population. Further, our results could assist in directing funding, initiatives and research to further improve Aboriginal and Torres Strait Islander perinatal outcomes. They support continued focus on factors that likely contributed to recent advancements and highlight factors that may be hindering further progress and require greater efforts and research to be meaningfully addressed. For example, the extremely high maternal smoking rates observed provide impetus for collaborative research to effectively and holistically address this health crisis.

Predicting Discharge Status in a Post-Rehabilitation Stroke Population using a Cognitive Model, Stroke Characteristics and the FIM

Natalia Bereznicki, *University of British Columbia*

Stroke is a leading cause of death and disability worldwide; the lasting impacts can affect individuals in their daily functioning. A portion of stroke survivors enter inpatient rehabilitation after primary care, and their level of disability and recovery varies, determining their discharge status. The current study considered the predictive value of neuropsychological measures, stroke characteristics (i.e., stroke type, lesion location, marital status), and the Functional Independence Measure (FIM) in relation to patients' discharge status post-stroke rehabilitation. The study was a partial replication of the study by Leitner, Miller & Libben's (2019). Based on the literature, we predicted that a blended model consisting of cognition (visuo-spatial construction, memory, and executive function), stroke characteristics, and the FIM will most reliably predict where patients with stroke will reside post-discharge. Data from a previous study from KGH's Psychology Department was assessed with multinomial logistic regressions, with a sample of 72 participants. It was found that stroke characteristics were the most statistically reliable predictors, especially stroke type and marital status. The neuropsychological measures and the FIM did have some clinical significance. A blended model of all variables underperformed each model independently. Limitations and suggestions for future research were discussed, while also speculating that this research will aid health-care settings by isolating which factors can prove most informative in assessing rehabilitation success.

2A Health and Wellbeing

Sex-Based Differences in Forces Applied to Handrails During Balance Recovery

Catarina Rodriguez, *University of British Columbia*

Falls are one of the leading causes of accidental injury globally. Well-designed handrails help prevent falls by supporting the user's body mass. However, current design standards for handrails do not consider differences between males and females. Knowledge of sex differences in the forces applied to handrails during balance recovery is important for guiding inclusive design standards to better prevent injurous falls in different populations. In this project, we used statistical analysis including repeated measures ANOVAs to test the hypothesis that males and females apply different forces to handrails when recovering balance. Fifty young adults (25 females, 25 males) recovered from forwards and backward falls using an adjustable-height handrail equipped with sensors to measure forces. Forwards and backward falls of increasing difficulty were simulated at Toronto Rehab using an accelerating robotic platform to disrupt balance. We found that when preventing a fall males applied significantly higher forces than females in six directions for all tested handrail heights. Males applied higher overall, forward, downward, upward, and medial (toward the body) forces when falling forward, with mean differences of 5.7%, 3.4%, 2.3%, 3.9%, and 2.9% bodyweight. Additionally, males applied 8.4% higher mean upward forces when falling backward. Our findings can provide guidance for the development and regulation of portable and structural assistive devices. By considering sex differences, these devices can be created with users in mind to better prevent injurious falls. Further research should include heavier and stronger participants who would likely apply higher forces, and explore the underlying causes of the observed sex differences.

Medicine And Minorities: Combating The Global HIV Epidemic With LGBTQ+ Immigrants

Nok Hang Li, *Monash University Australia*

From globalisation to the refugee crisis, the surge in international population movement galvanises interactions between cultures but also gives rise to global health risks. Among this population, immigrants identifying with the LGBTQ+ community are further marginalised and vulnerable. Their identities, which predispose them to intersectional inequalities as a queer and cultural minority, are found contributive to a significantly higher HIV rate compared to native residents. This paper questions the reasons for the health outcome discrepancies, and solutions to closing the HIV rate gap between LGBTQ+ immigrants and natives, particularly men who have sex with men (MSM). Secondary qualitative data on HIV rates as well as HIV prevention for immigrants are examined in a geographically and culturally diverse context. This paper also explores the causes of a significantly higher LGBTQ+ immigrant HIV rate and the effectiveness of solutions in combating the global HIV epidemic through peer-reviewed literature evaluation. This paper argues that de-stigmatising sexual minorities socially, culturally, and legally is the most powerful determinant to reducing the risk among MSM immigrants and curbing the spread of HIV. Structural interventions in education, legal protections and reforms should be also adopted simultaneously to improve health outcomes. This paper is highly relevant to sexual minorities, migration, and the global health crisis. It summarises the findings in different countries, and calls for collaborative efforts by healthcare systems and governments in societal and legal reforms to improve health equity for minorities.

2B COVID-19: Lessons to be Learned

Fighting the enemy without harming ourselves: How efficient, practical and safe are the disinfectants used during SARS-CoV-2 pandemic?

Chenuli Halgamuge, *Monash University Australia*

The World Health Organization (WHO) declared Severe Acute Respiratory Syndrome two (SARS-CoV-2), also known as COVID-19, a pandemic on March 11, 2020. It is of high priority to search for the most appropriate disinfectants that can be used to clean both public places as well as homes. The SARS- CoV-2 virus is a microscopic parasite that can spread in many ways. Disinfectants are chemicals that can inactivate viruses on non-living surfaces. With the broader use of disinfectants by the public, there are concerns for safety as well as practicality considerations requiring attention. This study seeks to understand the effect of the primary, active ingredients in disinfectants targeting SARS-CoV-2 virus on consumers using three essential requirements: efficacy, practicality and safety. A combination of quantitative and qualitative methods was adopted, and a comprehensive literature review was conducted. Additionally, measurable data like concentration levels needed, time of exposure required and the impact the application of the chemical had on the targeted virus were collected from articles and statistics were used to analyse further and explain this data. After in-depth statistical analysis focusing on three active ingredients infrequently used disinfectants, it was concluded that ethanol or propanol-based disinfectants are the most suitable considering all three essential criteria and over a hundred reported laboratory data entries. While this study has determined generally what the most efficient, practical and safe disinfectants are, the relative importance of these criteria changes according to the setting or context. Further research could also examine the effect of other active ingredients.

Teachers' Facilitation of Student Learning Engagement in Online Classes

Chen Min, *Nanyang Technological University*

Current research studies on student learning engagement in physical classes have consistently been reported (Doussett, 2015; Watson, Timperio, Brown, Best, & Hesketh 2017) but there is limited research on the K-12 online student learning engagement. However, it is gaining more attention during the COVID-19 pandemic (Barbour, 2013). Guided by three research questions, this study surveyed on students' learning engagement experienced in their online classes, strategies used by their teachers, and the extent of help-seeking behaviors that the students perceive to be critical in supporting their online classes. The response format of the survey of 47 items was a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Students rated on their level of engagement, methods that will better engage them in online classes, their level of class participation, and the technical difficulties faced during online classes. The survey was administered to 66 Secondary Two school students from the western part of Singapore. A one-hour focus group interview of eight randomly chosen students was conducted after the administration of the survey. This study focuses on the experiences of a small group of students at a single secondary school. Hence, to determine the prevalence of teachers on students' learning engagement, a quantitative investigation with a larger sample size is required to ascertain whether our findings may apply to other modes of lesson delivery such as hybrid teaching and learning or other educational institutions globally. Future studies could incorporate the students' suggested favourable learning engagement strategies. This is to innovate online teaching and learning practices, teacher facilitation and student engagement for the global community.

2B COVID-19: Lessons to be Learned

Medications and population health in the era of COVID-19: Knowledge, attitudes, and practices toward medication use and safety among Asian population

Celine Jing Xi Ng, Felicia Yee Sin Lai, Wan Bin Neo, Ying Ying Choy, *Nanyang Technological University*

Despite all the benefits of medicines, improper use of medicines can bring potential health hazards and evidence continues to mount that adverse reactions to medicines are common, yet often preventable causes of illness, and even death are evident. Unfortunately, the irrational use of medication is prevalent among the Asian communities, and there is a paucity of literature regarding medication use and safety in Malaysia with no measures taken to address this problem. Thus, the current study aims to evaluate the level of knowledge, attitude and practice (KAP) toward medication use and safety among the Malaysian population during the COVID-19 era. A questionnaire-based, cross-sectional study was conducted in Malaysia. A validated and translated questionnaire consisting of 81 questions was adopted to achieve the study objectives. It was disseminated to Malaysian adult citizens without healthcare backgrounds through social media platforms. The data collection took place from February to May 2022 with 521 participants. The correlation between KAP levels and sociodemographic data was determined by statistical analysis. The results displayed a statistically significant association between sociodemographics (e.g. education level, gender, marital status, primary residence, age, race) and KAP components. Most of the participants presented with good knowledge, but only an average attitude and practice that did not reach the expected level for optimal patient safety. This indicates that they did not apply the knowledge they have to achieve optimal medication safety. Hence, the development of educational interventions and regulatory policies are encouraged to advocate the safe and appropriate use of medications. Future research can focus on strategies and policies to address any public misconceptions and their cost-effectiveness.

Problematic internet use amidst a global pandemic: The effects of actual and perceived isolation

Vanessa Chan, *Nanyang Technological University*

The socio-economic challenges arising from the COVID-19 pandemic have spurred greater reliance on the internet for essential activities. Along with this trend, several studies have revealed a spike in problematic internet use during the pandemic. Past literature has shown that isolation is associated with problematic internet use. However, these studies mainly focus on perceived isolation, a subjective measure, and not the more objective actual isolation. Prior studies have shown that it is important to distinguish between the two as they can occur independently. Additionally, stay-home orders and safe-distancing measures implemented during the pandemic have led to physical, actual isolation that may account for the rise in problematic internet use. Situated in Caplan's model of problematic internet use, the present study aims to examine the independent effects of perceived and actual isolation on the preference for online social interaction. Following the model, this then leads to deficient self-regulation of internet use and subsequently, negative outcomes of problematic internet use. Data was collected via a two-wave panel survey, with a final sample of 689 Singaporean respondents. Structural equation modelling revealed a positive relationship between both actual and perceived isolation and the preference for online social interaction. These findings extend Caplan's model to include the new variables of perceived and actual isolation. They also inform governmental and educational policies in countering problematic internet use by reducing social isolation - in particular, actual isolation stemming from the pandemic.

3A Materials, Manufacturing and Health

EEG Channel and Sampling Rate Reduction for Brain Computer Interfaces

Maziyar Dowlatabadibazaz, *University of British Columbia*

Currently existing brain-interface frameworks built for children with neurological disabilities require extensive set up and are heavy. The main inconvenience comes from the many signal points that are required for the headset to work, and we believe that we can reduce these points. By reducing the number of signal points, the tasks of the brain interface would work as before but are now much easier to use for children, with less discomfort and clean-up. The approach will be to use the brain-interface device to collect data from all the signal points, and then this data will be processed which will indicate the strongest signal points. Some of this data is pre-existing, however, a new sample will also be collected. This data will be processed via machine learning, which takes the data and will provide the individual accuracy of all the signal points, which will then help us reduce the number of points. Analysis of this data is expected to help reduce the number of signal points, without significantly affecting the accuracy and the functionality of the device. Based on the hypothesis, with the reduction of the total signal points, the device will not only be more accurate but more accessible for users. The data could also be used in the research of improving accessible technology or innovative gaming headsets, and can further help make contributions in these fields. If these devices are more lightweight, they can be integrated into the daily lives of children and provide higher functionalities.

Anti-radiation jackets to reduce radiation exposure in male coal miners

Jennifer Vo, *Monash University Australia*

Leukemia is a rising blood cancer that has significantly increased from 12,294 cases in 2009 to 13,174 cases in 2016, in Australia. Leukemia affects more males than females in Australia, 2021 (3005 vs. 1898 cases). Male coal miners also exceed female coal miners who only make up 16% of Australia's mining workforce. Male coal miners may experience radiation exposure which may be a potential risk factor for leukemia. Although the Australian government mandates coal miners to wear personal protective equipment such as respiratory masks and goggles, Work Health and Safety laws have not directly mandated the wearing of anti-radiation jackets. Australia's increased migration and urbanisation resulted in an increased demand for coal miners creating underground tunnels for public transportation and vehicles. Mohner's case-control study found that male uranium miners in Germany who worked for more than 10 years were exposed to higher levels of radiation and therefore had a significantly elevated risk of developing leukemia (p-value <0.001). Hence, prolonged radiation exposure is an important consideration for long-term coal miners who have an elevated risk of developing leukemia. However, it was not mentioned if the cases or controls wore anti-radiation jackets to reduce radiation exposure. Results indicate that further research is required to determine if anti-radiation jackets can reduce the risk of radiation exposure and leukemia in coal minders. We will conduct a 10-year prospective cohort study to determine if the number of coal miners who are already exposed to anti-radiation jackets than miners unexposed to anti-radiation jackets is significantly less likely to develop leukemia. Work safety guidelines will then be updated to mandate coal miners to wear anti-radiation jackets.

3A Materials, Manufacturing and Health

Electrical Layer in Two-dimensional Stretchable Material

Teck Fatt Daniel Low, *Nanyang Technological University*

Wearable technology refers to an integrated electrical system with sensors seamlessly embedded in a stretchable material that can be worn on body parts. It has evolved rapidly and become one of the leading technologies in recent years due to its high level of flexibility and sensitivity. However, the main challenge is to maintain the interconnection and electrical conductivity of the system in a highly stretchable material. The material selection and structural design play a significant role in determining the feasibility of stretchable electronics. Studying the buckling process of a thin layer induced by a compressive strain is important for the development of stretchable electronics. Past studies have demonstrated the buckling process of a thin strip induced by the pre-strained elastomeric substrate. Thus, in this research, we aim to explore the method to control the buckling process of the thin film in a compressible substrate without pre-strain. We have found out that the method of using the laser etching technique to control the wavelength of the thin strip by varying the gap width between the etched lines are not so effective. Besides, we also focus on developing the structure of a thin film that can expand and contract freely in a two-dimensional stretchable material without debonding. We have studied the Miura-folded origami because it is capable of transforming a large area into a small compact structure. Nevertheless, Miura-origami failed to compress bi-directionally when embedded in a two-dimensional stretchable substrate despite repeated experiments with different materials.

Social robot co-creation with older adults living with dementia and care partners

Jaya Kailley, *University of British Columbia*

Social robots, devices designed to support users through social interaction, have the potential to improve the independence and quality of life of older adults and people living with dementia (PLWD). Despite their benefits, social robots are not readily adopted. This may be due to a lack of alignment between social robot technologies and the needs and priorities of older adults and PLWD. One way to address this barrier is to engage end-users in social robot development. We designed online co-creation workshops for older adults with and without dementia and care partners of PLWD in collaboration with a lived experience expert group (6 older adults). Content analysis was performed on the 7 workshop transcripts. Participants discussed what emotional range they would want a social robot to display and key design considerations to produce emotionally aligned responses to the user. Considerations around using a robot in public were also discussed, including the potential for stigma. These findings reveal new knowledge around social robot emotionality and stigma from the perspectives of older adults with and without dementia and care partners. Incorporating these results into the development of future social robot technologies will result in meaningful and beneficial devices for these populations. Currently, these results are being integrated by researchers and technology developers to create and implement ethical and effective technologies that are readily adopted by older adults, PLWD, and care partners. Future research should aim to measure the quality of end-user experiences when adopting newly developed social robots.

3B Health and Wellbeing

Identifying Genetic Factors Contributing to Chemotherapy Resistance in DLBCL Patients

Varsheni Vijay, *Nanyang Technological University*

Diffuse Large B-Cell Lymphoma(DLBCL) is a type of cancer that begins in the B-cells of the immune system. Its primary treatment is chemotherapy, and doxorubicin is the principal drug used. However, only 50-60% of patients are completely cured even after the treatment, as the tumour cells are prone to developing chemotherapy resistance. The purpose of our research is to identify genes that are associated with resistance or no response to doxorubicin in DLBCL patients. After observing gene expression levels in multiple cohorts, we show 118 genes which were uniquely upregulated(highly expressed) in DLBCL cells. One interesting gene whose high expression linked to poor survival of patients was SPHK1. We show that doxorubicin-resistant cells increased SPHK1 expression by four times in response to doxorubicin exposure, indicating that the gene could be linked to the cells' resistance. The expression of SPHK1 in DLBCL tumour cells was also found to be significantly higher than normal B-cells. This implies that reducing SPHK1 expression in cells would affect only DLBCL cells and not healthy B-cells, as healthy B-cells show low expression of the gene. SPHK1's function is to catalyse the formation of sphingosine-1-phosphate(S1P). The injection of S1P into human cells has been previously recognized to confer resistance to chemotherapeutic agents. In the future, SPHK1 could be used as a prognostic target to prevent progressive disease after R-CHOP treatment in DLBCL patients. Future experiments could infer the potential mechanism of action of SPHK1 pathways to further understanding of how resistance to chemotherapy drugs is achieved.

Time from Surgery to Chemotherapy for Ovarian Cancer Patients: A Single Centre Retrospective Audit

Melanie Battershell, YiJie Neo, *Monash University Australia*

Ovarian cancer is the deadliest cancer of the female reproductive tract, killing 23 women every hour worldwide. The mainstay of treatment is surgery, followed by chemotherapy, but the optimal timing for chemotherapy is unclear. We aim to explore the impact of delayed chemotherapy on survival outcomes to promote evidence-based treatment of a lethal condition affecting women globally. We reviewed the data of all ovarian cancer patients treated with surgery at a single Australian hospital from 2010-2020 who then received chemotherapy at any centre (190 women in total). We compared baseline characteristics and survival outcomes between those receiving chemotherapy within 28 days (as per current Australian guidelines) and those waiting longer. There was no statistically significant difference in survival, but women treated in public hospitals were more likely to experience delays to chemotherapy than those in private hospitals. Our sample size was too small to identify any difference in survival, highlighting the need for further research to delineate the ideal time between surgery and chemotherapy. However, the delay to chemotherapy for public compared to private patients highlights the need to explore barriers to timely treatment and address healthcare inequities adversely affecting vulnerable women. Future studies should be conducted with larger cohorts and more complex statistical analyses to ascertain the optimal treatment timeline and maximise women's chances of survival. As a devastating cancer with a poor prognosis, it is paramount that evidence-based treatment recommendations are established to ensure women around the world, regardless of socioeconomic status, can access best-practice care.

3B Health and Wellbeing

Therapeutic macromolecules on the future of clinical treatments for hepatocellular carcinoma and other malignant cancers: A study on alternative cancer treatments

Chen Ying Quah, *Monash University Malaysia*

Cancer was known to account for nearly 10 million deaths in 2020. The number of cancer patients and deaths were shown to have an overall increasing trend from 2016 to 2020 even under the intervention of current treatments. Likewise, patients suffering from malignant cancers, particularly with hepatocellular carcinoma had higher mortality rate. This signified the importance in research to investigate the properties of hepatocellular carcinoma and identify possible alternative treatments to inhibit malignant cancer growth. The methodology involved the systematic search of primary peer-reviewed research published between 2016 to 2022 from databases such as Monash Library and Google Scholar. Current treatments of hepatocellular carcinoma involved the surgical removal of affected areas and the administration of drugs during early stages. But however, hepatocellular carcinoma was often diagnosed in late stages, this resulted in the prevention of early treatment for patients. Likewise, research showed that therapeutic macromolecules could inhibit cancer growth effectively. Moreover, the findings suggested that therapeutic macromolecules could reduce the progression of hepatocellular carcinoma and become a new alternative treatment option to treat hepatocellular carcinoma and other related cancers. This helped to contribute to society by providing alternative treatment option for people diagnosed with hepatocellular carcinoma and other malignant cancers. Lastly, the application of therapeutic macromolecules on malignant cancers were relevant in the field of oncology. This brought new lines of research for effective treatments for patients with late-stage hepatocellular carcinoma or other malignant cancers. Future research involved determining the efficiency of different therapeutic macromolecules on different malignant cancer types.

Functional analysis of GANAB in renal cyst formation using gene-edited kidney organoids

Wei Ze Soon, *Nanyang Technological University*

Autosomal dominant polycystic kidney disease (ADPKD) represents one of the most common genetic kidney diseases, with an approximate occurrence of 1 in 1000. ADPKD is characterised by the formation of fluid-filled cysts in the kidneys, and typically results from mutations in the PKD1 or PKD2 gene. Recently, whole exome sequencing has identified GANAB, the gene encoding glucosidase II alpha subunit, as a novel gene associated with ADPKD. However, the functional contribution of GANAB to ADPKD pathogenesis remains to be demonstrated. This project aims to employ state-of-the-art stem cell-derived kidney organoids as a model for investigating the functional contribution of GANAB to renal cyst formation in ADPKD pathogenesis. CRISPR-Cas9 gene editing tool was utilised to achieve homozygous knockout of both GANAB alleles in human embryonic stem cells (ESC), which were then differentiated into GANAB-/- kidney organoids. Kidney organoids established segmentally patterned nephron-like structures and a vascular network. Intracellular cAMP stress paradigm yielded a more severe cystic phenotype in GANAB-/- kidney organoids compared to wild type kidney organoids. GANAB deletion did not affect the gross morphology and distribution of primary cilia, suggesting that the resultant renal cyst formation may not be directly related to cilia-specific downstream signalling pathways. Our study demonstrates a direct causal relationship between GANAB knockout and renal cyst formation which supplements existing clinical observations in patients carrying GANAB mutations. GANAB-/- kidney organoids hold great potential in unravelling the disease mechanism of ADPKD and in drug screening for candidate ADPKD drugs.

4A Innovation in our Societies

Targeted Muscle Reinnervation Surgery: Efficacy on Motor Rehabilitation in Upper Extremity Amputees

Ernest Zhi Yu Tay, *Monash University Australia*

Limb amputation causes reorganisation of the motor cortex (M1) and reduced activation at regions associated with the affected limb. Maladaptive reorganisation can lead to poor control of prostheses and phantom limb pain. To minimise this, clinicians have introduced Targeted Muscle Reinnervation (TMR), where spare muscle groups in the residual limb or chest are de-innervated and re-innervated with nerves from the amputated limb. This study investigates whether earlier TMR better preserves motor cortex activation and hence recovery success. Of the 10 TMR patients at Alfred Health, 4 were acute TMR patients (TMR during amputation), while 6 were delayed TMR (months-years post-amputation). Between 6-24 months post-TMR, patients were scanned via MRI while performing 4 tasks on each limb. The images were pre-processed, modelled, and analysed. The largest M1 cluster was selected, and its extent and maximum strength was recorded. The values from the unaffected limb were then subtracted from the affected limb, giving an index. We expect all indexes to be negative (less activation with amputated limb versus residual limb), but for the difference to be smaller in acute TMR patients. Results showed that only the strength index for fist clench was significantly negative, which correlates with findings from Serino et al. However, there were no significant between-group differences for any task. This implies that earlier TMR does not significantly improve the extent and strength of motor cortex activation. To explain why acute TMR patients attain better functional outcomes (eg. phantom limb pain), future research can look towards other brain regions, recruiting more participants, alternative analyses methods and decreasing time variation between TMR and scanning.

Metamaterial Photonics: Camera Metalens

Darren Yao Lim Chin, *Nanyang Technological University*

A metalens is a 2D flat lens of sub-wavelength thickness, made of metamaterials which are sub-wavelength periodic structures engineered to have unique electromagnetic properties. While conventional lenses require thickness much larger than the wavelength to exploit refraction and induce phase delay, the unit cell geometry of metalens can be arbitrarily tuned to introduce the desired phase shift. In addition to the high degree of freedom, metalenses can produce abrupt phase changes and shape wavefront at subwavelength resolution. With the promise of optical devices capable of manipulating amplitude and polarization, various fabrication method have been employed to demonstrate metalenses that exhibit exotic properties such as near-unity numerical aperture (NA); which was previously precluded due to the existence of diffraction orders in conventional optical components (COCs). While COCs require a stack of lens elements to correct for chromatic aberration, an equivalent system can be modelled using a single metalens. In addition, metalens generally has better CMOS compatibility due to its small transverse dimension; essential in integrating its fabrication into the manufacturing process of on-chip systems such as phone cameras. In this paper, an emulation of lens elements as single metalenses and the miniaturisation of the entire phone camera lens stack as a single metalens are performed. Simulation models utilised the finite-difference time-domain solver (Lumerical Inc.) whereas the spatial spectral analysis was completed using MATLAB. The latter is based on the angular spectrum theory. This research aims to deepen the theoretical and computational basis for designing metalenses based on the phase profile and farfield intensity profile while providing a proof of concept for emulating a camera lens.

4A Innovation in our Societies

Electrical Layer in Two-dimensional Stretchable Material

Teck Fatt Daniel Low, *Nanyang Technological University*

Wearable technology refers to an integrated electrical system with sensors seamlessly embedded in a stretchable material that can be worn on body parts. It has evolved rapidly and become one of the leading technologies in recent years due to its high level of flexibility and sensitivity. However, the main challenge is to maintain the interconnection and electrical conductivity of the system in a highly stretchable material. The material selection and structural design play a significant role in determining the feasibility of stretchable electronics. Studying the buckling process of a thin layer induced by a compressive strain is important for the development of stretchable electronics. Past studies have demonstrated the buckling process of a thin strip induced by the pre-strained elastomeric substrate. Thus, in this research, we aim to explore the method to control the buckling process of the thin film in a compressible substrate without pre-strain. We have found out that the method of using the laser etching technique to control the wavelength of the thin strip by varying the gap width between the etched lines are not so effective. Besides, we also focus on developing the structure of a thin film that can expand and contract freely in a two-dimensional stretchable material without debonding. We have studied the Miura-folded origami because it is capable of transforming a large area into a small compact structure. Nevertheless, Miura-origami failed to compress bi-directionally when embedded in a two-dimensional stretchable substrate despite repeated experiments with different materials.

Prediction of 2D Materials' Electronic Properties Using Tailored Machine Learning Tools

Jiwoo Seo, *Nanyang Technological University*

MXene, a family of 2D materials, offers excellent properties that are being developed for applications in a variety of fields, such as heterogeneous catalysis, energy storage, and optoelectronics. However, little is known about how to tune its properties for direct industrial application accurately. This is because first-principal methods such as density functional theory (DFT) used to calculate its properties are very computationally intensive and expensive to use across billions of possible MXene arrangements. Herein, a series of machine learning models are presented to predict the electronic properties of MXenes. These machine learning tools are data analysis methods capable of rapidly discovering complex patterns. Firstly, basic statistical analyses were conducted to evaluate the distribution and anomalies. Then, diverse machine learning tools, such as the compressed sensing method, AUTOFEAT feature generation method, and ensemble method, were customized and used. These models exhibit low root-mean-square-error, which performs better than the previously used models in MXene academia. All models were trained rapidly, in under 2 minutes, in a standard M1 chip MacBook. The results also selected several physical and chemical properties important for evaluating a MXene’s applicability. These models and insights can help experimentalists fasten their workflow and design a more efficient and versatile MXene by quickly identifying tailored MXenes of interest and bringing these MXenes into the industries where energy reduction and sustainability is crucial. For improvement, further research could take place, such as investigating property prediction under different pressure and temperature.

4B Teaching and Learning

Teachers' (de)Motivating Styles: An Autonomy-Supportive Teaching Intervention

Luo Ming Chan, *Nanyang Technological University*

Autonomy-supportive intervention programs boost psychological need satisfaction in schools. By self-determination theory principles, this boost translates to greater intrinsic motives towards learning for students and improvements in student, teacher, and classroom outcomes. Teachers who undergo such interventions should therefore experience similar intrinsic gains and become more autonomous-supportive in their motivating teaching style. Hence, this study investigates the extent an autonomy-supportive intervention program, grounded in self-determination theory can influence teachers' classroom autonomy-supportiveness and controlling level to improve teaching-learning quality. 46 secondary school teachers (22 control; 24 experimental) participated and taught over a 10-week intervention period. The experimental group underwent a three-part intervention and learned to incorporate autonomy-supportive instructional behaviours in classrooms. Using the 'Situations-in-School' questionnaire, teachers' self-reported autonomy-supportive and controlling level scores were measured pre- and post-intervention. Mixed ANCOVA and independent t-test analyses revealed that the intervention significantly increased teachers' sense of autonomy-supportiveness but did not decrease their controlling level while teaching. The intervention facilitated 'intervention-enabled growth' in teachers. Specifically, it prompted a behavioural change in teachers as they perceive themselves as becoming more autonomy-supportive and moderately less controlling in classrooms. With the adoption and maintenance of an autonomy-supportive motivating teaching style such as autonomy-supportive instructional behaviours, teachers can build greater motivational resources intrinsically to teach students more effectively. Moreover, intervention-going teachers demonstrated conscientious efforts towards improving themselves professionally, and could, in turn, acquire tools to build a more motivating learning environment for students. As the quality of students' education is dependent on the quality of teaching, school leaders should consider introducing and implementing school wide intervention for teachers.

How do teachers' experiences of mandated collaborative lesson planning teams impact their professional practice?

Jessica Binion, *Monash University Australia*

This project aims to determine how teachers' experiences of collaborative planning teams, in an environment where it is encouraged and mandated by leadership, impacts their professional practice. Teaching is often seen as an isolated profession. Pre-service teachers are entering the profession, after being encouraged to collaborate with their peers, mentors and professors throughout their degree, and being faced with planning for their lessons mostly in isolation. Previous research shows that this can have an impact on not only teacher's classroom practice and wellbeing, but also student outcomes. This case study has been conducted via in-depth interviews with teachers currently working in a school with mandated collaboration. This research has found that teachers believe that collaborative lesson planning has positively impacted their professional practice, but that it is dependent on the levels of commitment to the collaborative process from members of their teams. Additionally, teachers are of the opinion that without school leadership facilitating collaboration it would not be as effective. This research aims to discover how mandated collaborative planning environments in a primary education setting can impact a teachers professional practice in the classroom. This research could additionally be applied to other settings where planning in collaboration is required. The results of this research shows a personal insight, from those who are experiencing it first hand, into how mandated collaborative planning impacts teacher wellbeing and classroom practice. Further research should be conducted into the potential benefits of collaborative planning. An experimental design comparing collaborative and solitary planning should be used to determine the effect on both student outcomes and teacher professional practices.

4B Teaching and Learning

Parent-Child Questioning in an Informal Learning Context

Joy Tan, *Nanyang Technological University*

Children only spend about 20% of their time in school, but learning can happen anytime, everywhere. For instance, informal learning contexts, such as museums and libraries, can provide great learning opportunities for children; though parental guidance is often needed for children to take full advantage of these opportunities. In partnership with the Singapore Science Centre, this study aims to examine how activity kits can be used to promote parent-child interaction and whether they can help children in their learning and exploration in informal learning contexts. Parent-child dyads were invited to explore KidsStop at the Singapore Science Centre, an attraction aimed at teaching children about science and the environment. The dyads were randomly assigned to one of two conditions: Control and Experimental. Those in the control condition were told to explore the exhibitions at KidsStop as they normally would; whereas those in the experimental condition were provided a "Saving the Earth" KidsStop Trail Kit, which is designed to promote parent-child interaction on topics regarding conservation. For both conditions, the child completed a pre- and post-visit survey that included questions on conservation. The conversations which the parent had with their child during the visit were also recorded and coded. Preliminary findings show that children in the experimental group improved more between the pre- and post-visit surveys as compared to those in the control condition. If the final findings confirm our hypotheses, they may shed light on how to better promote parent-child interaction and children's learning in informal learning contexts.

A Survey of University Students' Experiences of Online Learning: A Preliminary Comparison Between Students with Special Educational Needs (SEN) and Typically Developing Students

Yung Ting Lim, *Nanyang Technological University*

Before the COVID-19 outbreak, online learning has been utilized to complement traditional classrooms. Despite online learning becoming more pervasive recently, little research has been done to understand the experiences of university students with special educational needs (SEN). Therefore, our study seeks to understand their experiences and how their experiences might differ from their typically developing peers. An online survey was designed to gather insights from full-time university students at Nanyang Technological University (NTU), Singapore. Fifty typically developing university students (mean age = 22; 29 females) and 31 university students with SEN (mean age = 22; 15 females) participated in our survey. Results revealed that compared to before the COVID-19 outbreak, both groups reported significant increase in the proportion of online learning after the outbreak. Both groups reported being moderately positive about their online learning experiences, with no significant difference between the groups (either before or after the outbreak). For both groups, Learning Activity Management System (LAMS), pre-recorded lectures, online finals/quizzes, live lectures, online assignments, and online tutorials were the common online learning formats. Laptop or desktop was the primary device used, and Zoom was the most preferred online learning software. The SEN group reported higher usage of technical accommodations. Accessibility was the top advantage of online learning reported by typically developing students while for students with SEN, it was flexibility. Lower social interaction was the top challenge encountered for both groups. These findings would be useful in making online learning more inclusive for everyone in university settings.

5A Health and Wellbeing: Understanding Ourselves

Perceptions and experiences of emergency nurses' when caring for patients with mental health issues in emergency departments: A qualitative study

Eddie Robinson, *Monash University Australia*

Despite 309,657 patients with mental health issues presenting to Australian emergency departments (EDs), little is known about how emergency nurses perceive and experience caring for them. Aim: to explore emergency nurses' perceptions and experiences of caring for patients with mental health issues in the emergency department. Using Braun and Clarke's thematic analysis framework, seven semi-structured interviews with emergency nurses were conducted. Interviews were video and audio recorded which were transcribed verbatim, enabling analysis through a recursive process to uncover emergent sub-themes and themes. Ethics approval was obtained. Seven sub-themes were grouped into three themes: Firstly, Challenges of care; some participants identified their care could induce trauma for patients with mental health issues and believed patients' lack of awareness of their legal rights was used to prevent them from leaving EDs. Secondly, Fear of not knowing; participants were concerned about their knowledge gaps, with most wanting more training to therapeutically care for patients with mental health issues. Finally, Communication problems whereby communication between professionals was acknowledged as an important issue; patient care was negatively affected by communication issues between disciplines in and outside of EDs. Providing care for patients with mental health issues in the emergency department was often challenging. Participants wanted to minimise trauma by better understanding how to provide therapeutic care for these patients while respecting their legal rights. Such care could only be provided if interdisciplinary communication impediments were overcome. Findings have implications for emergency nursing education and practice that require further exploration.

Same same but different: Practical assessment of children's emotion regulation in Australia

Joseph Atkinson, *Monash University Australia*

Emotion regulation is someone's ability to monitor, evaluate, and modify their emotions. In children, it predicts mental health, academic achievement and life satisfaction 30 years later. To effectively provide interventions to the children who need them, practitioners must assess a child's ER accurately. Literature has identified multiple different ways to make these assessments; however, no study has examined how or why Australian health practitioners assess children's ER in the field. Therefore, the study aimed to explore how health practitioners assess children's ER. To integrate research findings into practice and develop best practice for assessment. Seven qualitative semi-structured interviews were conducted with health professionals who assess children's ER; the conversations focussed on how and why they assessed ER. Applied thematic analysis revealed that practitioners assessed children's ER in various ways. They used observations, questionnaires and discussions. The specifics of assessment varied, and stemmed from each practitioner's different understanding of ER and unique work context. Practitioners emphasised the importance of treating the child as a unique individual and considering the other adults in the child's life. When assessing, practitioners were challenged by time limitations and access to multiple perspectives on the child. The study looked broadly across practitioners with varied training and experience. Future research should focus on individual practitioner groups and assessment types. Similarly, researchers should consider co-designing assessment tools to work within practitioner's limitations. This could allow for more accurate and less time consuming assessment, improving treatment plans and allowing more time for treatment. These may improve life outcomes and reduce the risk of children developing mental health issues.

5A Health and Wellbeing: Understanding Ourselves

An Exploration of Bullying among Binational Emiratis in the United Arab Emirates

Zahra Alsuwaidi, *Zayed University*

A recent newspaper article published in the UAE described the lived experience of a mixed (binational) Emirati who got bullied because his mother was Filipino (Nasir, 2017). Reading this article as a part of a class assignment was the genesis of the current research project, which is a qualitative study that explored bullying among binational Emiratis, which means people who come from an Emirati father but a foreign mother. Although the law provides the children of Emirati women passports, they do not have the privileges that children of an Emirati father have because the UAE is a patriarchal society. Also, since there are no studies that address this issue in the UAE, it's important to address whether binational Emiratis get bullied or not. The researcher answered the research question by recruiting participants using snowball sampling and then conducting in-depth semi-structured qualitative interviews with 8 participants. The findings that I believe to find 1) That bullying happens to both genders 2) Verbal bullying is the most common type of bullying among females and males 3) The extent of bullying differs depending on the nationality of the mother. From a safety perspective, it should be taken into account that participants might still face bullying to this day, so they should be given the help that they require if needed. While this study was conducted in the UAE with a specific sample, the findings may also be applicable in other contexts with similar populations. So, the findings may be able to be applied worldwide.

The Cultural Perspective Of Sleep Paralysis In The United Arab Emirates (UAE)

Sarah Alhashimi, *Zayed University*

Given the lack of existential research on sleep paralysis in the UAE, this descriptive research pilots in focusing on the cultural interpretations of the condition. Sleep paralysis is a feeling of being conscious but with an inability to move. It could occur between wakefulness and Rapid Eye Movement (REM) sleep. The experience of sleep paralysis comes in various forms that include being awake but unable to move, sensing an evil presence, feeling a crushing weight on the chest while gasping for breath, or an out-of-body experience. The Unusual Sleep Experiences Questionnaire (USEQ), a structured self-administered online survey, and a focus group were used to collect primary data for this study in order to understand the UAE's cultural beliefs about sleep paralysis, whether those who suffer from sleep paralysis seek treatment, and to compare the UAE's cultural beliefs to the medical knowledge. The results of a snowball sampling of 41 individuals from a survey and a focus group demonstrate that most people have no understanding of what causes sleep paralysis and that some believe in the medical components of sleep paralysis as well as religious ideas that has evolved into the culture. Results also show that there is no association between having a sleep paralysis episode and seeking treatment, which further demonstrates that seeking medical care for sleep paralysis is influenced by culture, as several studies have suggested. x^2 (1, N = 41) = 4.84, p = 0.436. Consequently, the lack of existential study on the accuracy and etiology of the science of sleep paralysis contributes to distinct perceptions of the condition. Therefore, it is critical to thoroughly research cultural perspectives in order to provide the best possible care for people suffering from sleep paralysis.

5B Technology and Society

Virtual ED: The role of telehealth in safely reducing ED presentations

Christopher Thuring, *Monash University Australia*

The COVID-19 pandemic has forced our world to change and placed immense pressure on our healthcare systems, especially ambulance services and Emergency Departments (EDs). Telehealth is a way to virtually connect patients with a doctor via a tablet computer, used previously to improve access and convenience. While this is common in medical clinics, its use in the emergency setting has not been thoroughly explored. This project assessed the pilot-program of Alfred Health's "Virtual Emergency Department" in safely reducing physical ED presentations by assessing patients with ambulance services before they arrived at the ED. This was achieved by retrospectively analysing medical records to assess how many patients were diverted from physical ED, how many re-presented within 7-days, and how safe the program was at follow-up. We found that the virtual ED was able to divert over three-quarters (76%) of patients to other medical services such as local General Practitioners, and 22% re-presented to ED within 7-days. Importantly, 97% of all patients advised to avoid ED were clinically stable or improving at follow-up. This highlighted the potential utility of telehealth to significantly reduce the load on ambulance services and EDs while providing safe and stream-lined care for patients. More research will be completed in this field to assess the scalability, and longer-term safety of this exciting technology.

Mapping the Virtual Space of Artificial Intelligence

Zoe Deborah Tauro, *Nanyang Technological University*

With the increasing development of artificial intelligence (AI) generated worlds, we need to consider the inaccessibility and underlying biases that could affect the popular use of virtual and mixed reality platforms and how the values imbued in our physical spaces (measured objective environment) influence the places (an environment shaped by human action) generated by an AI. Hence, this research considers the creative capacity of an AI by examining the human value imbued in the input and training data on physical spaces as well as the biases that arise from the transformation of space into place. This paper explores the interactive and immersive quality of procedurally generated virtual spaces in episodes from Star Trek, the game No Man's Sky by Hello Games, Ross Goodwin's 1 the Road, "Photographic Image Synthesis" by Qifeng Chen and Vladlen Koltun and Replica by Facebook researchers. The research finds that the transformation of space into place shows the AI's creative capacity through its exacerbating of biases in presenting details of the procedurally generated place and the interpretation of the virtual space as most resembling lived places. These virtual spaces reveal economic value over other human values to influence how we construct physical spaces and hence, the biased and inaccessible virtual space generated. Relevant to the development of mixed reality spaces that rely on AI such as Facebook's Metaverse, this research identifies the creative capacity of and human values in AI-generated content however, future research can highlight the impact of algorithmic bias on marginalised communities.

5B Health and Wellbeing: Understanding Ourselves

Learning In A New World: Social Media for Learning

Jona Chin, *Nanyang Technological University*

The increasing integration and interactivity of technology have blurred the boundaries between professional and personal life, spotlighting the budding prominence of edutainment. In recent years, social media platforms have popularised content sharing anytime, anywhere, spearheading their use as online classrooms. This study uses a survey to investigate the participants' use of social media and their exposure to educational content on the popular apps Reddit, TikTok and Spotify. The survey was created and distributed through the Qualtrics platform and utilised an array of Likert-type and multiple-choice questions to uncover the types of content that 98 social media users aged 21-65 years old sought and were exposed to. Participants were then surveyed regarding their perceptions about common affordances across the platforms to investigate their effects on learning attitudes and continuance intentions of using social media for learning. The scales used were adopted from previous literature on learning attitudes. Preliminary results revealed that Spotify was the most popular social media platform, with 88.8% of participants being users. However, more than half of them did not seek or encounter educational content despite spending a daily average of more than four hours on it. Instead, users were more likely to seek or encounter educational content on Reddit and TikTok. Social networking features were cited as the most helpful affordance in aiding participants' use of both platforms as educational resources. The majority of users agreed that these apps increased learning curiosity and learning efficacy. The survey results, which were further analysed on SPSS, will help researchers and educators to better understand how social media and entertainment platforms can guide pedagogy.

Complaint Management by Companies on Twitter

Xinran Liu, *Zayed University*

Consumers are increasingly taking to online channels to voice their dissatisfaction. Given so, it is important for companies to learn how to deal with customer complaints on social media. Past studies have examined how customers make complaint decisions and how complaint management can affect customer (dis)satisfaction. However, there is limited research on the influence of initial customer sentiment and the presence of other customers in the complaint conversation with large-scale data analysis. The aim of the present study is to explore the effects of initial customer sentiment, the presence of other customers, and company response on the customer's change of sentiment. We analyzed 169,473 conversations from 12 companies obtained from the 'Customer Support on Twitter's Kaggle dataset. Sentiment analysis was performed using Syuzhet and Vader library followed by regression analyses using R. Results using both packages follow a consistent pattern. Specifically, in the absence of other customers, positive and faster company response increase customer sentiment. Those who start with negative sentiment show a larger increase in sentiment. However, surprisingly, when complainants start with a negative sentiment, (a) a more positive company response can limit the change in customer sentiment and (b) the presence of other customers can increase the change in sentiment. These results offer insights for companies to pay more attention to the role of the other customers who are active in the customer support platform and tone down when the customer has a negative initial sentiment. In the future, we will use experiments to understand the causal relationship of the variables and identify the underlying mechanism of the observed patterns.

5C Health and Science: the Brain

Exploring how the brain processes numbers under different task demands

Shih Yang Ngieng, *Nanyang Technological University*

Numerous studies conducted on individuals with brain lesions have indicated the presence of hemispheric specializations in number processing. In right-handed individuals, the left hemisphere tends to be the default pathway for verbally mediated tasks, whereas the right hemisphere appears to be more specialized in processing the quantitative meaning of numbers. However, few studies have specifically examined the hemispheric specialization in normal functioning individuals, although neuroimaging findings indicate such a possibility. As such, this study aims to investigate whether hemispheric differences in number processing occur in normal right-handed individuals (N = 28) by adopting the divided visual field paradigm (information presented to the left or right visual field is processed on the contralateral side of the brain) and utilizing both a number magnitude comparison task, where participants were required to identify if a two-digit number presented is larger or smaller than that of a target number (55) and a digit detection task, where participants were required to identify if the two-digit number presented contained a target number (5). Results revealed that there were no significant hemispheric advantages in accuracy and response times present in either task. However, exploratory analyses of interaction among response hand, visual field, and task provided some insights into possible hemispheric differences between tasks. While the results do not indicate any hemispheric advantages, the trends observed from the exploratory analyses may support the notion of some hemispheric asymmetries between tasks as opposed to a lack of hemispheric difference.

Mapping the Cerebellum to the Neural Network of Reading in Bilinguals

Zoe Deborah Tauro, *Nanyang Technological University*

With the increasing development of artificial intelligence (AI) generated worlds, we need to consider the inaccessibility and underlying biases that could affect the popular use of virtual and mixed reality platforms and how the values imbued in our physical spaces (measured objective environment) influence the places (an environment shaped by human action) generated by an AI. Hence, this research considers the creative capacity of an AI by examining the human value imbued in the input and training data on physical spaces as well as the biases that arise from the transformation of space into place. This paper explores the interactive and immersive quality of procedurally generated virtual spaces in episodes from Star Trek, the game No Man's Sky by Hello Games, Ross Goodwin's 1 the Road, "Photographic Image Synthesis" by Qifeng Chen and Vladlen Koltun and Replica by Facebook researchers. The research finds that the transformation of space into place shows the AI's creative capacity through its exacerbating of biases in presenting details of the procedurally generated place and the interpretation of the virtual space as most resembling lived places. These virtual spaces reveal economic value over other human values to influence how we construct physical spaces and hence, the biased and inaccessible virtual space generated. Relevant to the development of mixed reality spaces that rely on AI such as Facebook's Metaverse, this research identifies the creative capacity of and human values in AI-generated content however, future research can highlight the impact of algorithmic bias on marginalised communities.

5C Health and Science: the Brain

Exploring the effects of ageing on brain endothelial cells

Nhi Nguyen, *Monash University Malaysia*

Aging is among the most important known risk factors for vascular cognitive impairment and dementia. Brain endothelial cell (BEC) are cells forming the inner lining of blood vessels in the brain. BEC dysfunction, which has been observed in normal aging and disease-associated neurodegeneration, can lead to increased blood-brain barrier (BBB) permeability, and eventually reduce the blood supply capacity in the brain. BEC phenotypes depend on both the brain region in which they reside, as well as their zone along the arteriovenous axis. Our project aims to address the consequence of aging on the functional heterogeneity of BECs, and the zonation-dependent effect of aging on BECs at different brain regions. Single-cell RNA sequencing (scRNA-seq) provides a snapshot of each cell transcriptome to uncover rare and complex cell population. We performed scRNA-seq analysis on datasets of the whole brain, cortex, and hippocampus of aging mice. From the whole brain dataset, we found an increase in vascular remodelling BEC and a decrease in BBB-contributing BECs in aged mice. This redistribution of BECs subtype indicates a shift in function. In cortex and hippocampus datasets, the proportion of BEC with mixed phenotype associated both arterial/venous had significantly increased in old mice, while the proportion of capillary associated BEC had decreased. To understand how these changes play out molecularly, we will explore the differentially expressed genes (DEGs) in aged relative to the young mice. Resolving the transcriptional shifts in BEC in response to aging can further explain the pathological pathways of vascular dementia. Findings could support the development of biomarkers for neurodegenerative diseases and therapeutics to BEC dysfunction in aging individuals.

Healthcare Professionals' Recommendations for a Dementia Plan for Malaysia: A Qualitative Study

Tian Xin Soh, Xin Er Yaw, Yi Xuan Loo, *Monash University Malaysia*

In 2019, an estimation of 8.5% Malaysians aged above 60 years has dementia, yielding a dementia population of 260,345. Unlike international initiatives, national dementia plans (NDPs) address dementia issues tailored to the cultural heterogeneity and demographics of each country. To date, fifty WHO member states have a dementia plan; but 65% of them are high-income countries. Yet, there is no NDP in Malaysia that addresses the needs of people with dementia (PwD) and their caregivers. Current clinical practice guidelines and policies for the elderly do not specifically address issues and rationalise action areas for dementia care. This study explored healthcare professionals' perception of the best treatment, care and support that have been and should be provided to PwD, and their recommendations in developing an NDP for Malaysia. Semi-structured interviews were conducted with 21 healthcare professionals (medical doctors, occupational therapists, pharmacists, nurses, nutritionists and psychologists). Transcripts were thematically analysed using NVivo 12, generating four themes: (1) active participation of stakeholders; (2) support for family members; (3) improve nursing homes' quality; (4) increase dementia awareness and knowledge. A gap exists between the need for prevention, treatment and care for dementia and the actual provision of these services. Findings will guide NDP development, especially highlighting expansion in the health and social care workforce with appropriate skill mixes along with available interventions and services essential to prevent, diagnose, treat and care for PwD. Our future work aims to work closely with the health and social care system, other government sectors and stakeholders to identify and agree on our national priorities.

6A Gender and Social Inequality

'Us' and 'Them': Representations of Muslims in Australian Media During the End of the War in Afghanistan

Filment Ho, *Monash University Australia*

This research is interested in examining how the Australian media represents Muslims in its news coverage during the end of the US war in Afghanistan. The 'War on Terror' is a common type of rhetoric normalised in the Western media, framed through discursive oppositions of 'us' and 'them'. This study examines how the press utilises the process of 'religious Othering' as a strategy of exclusion and how it intersects with political partisanship, shaping the latent language in news discourses. Through the theoretical framework of political parallelism, the study also interrogates how political bias influences the framing of news discourses in the Australian media while integrating social constructionism theory to understand how language in journalistic works is constructed as a 'communicative vehicle' for assumptions and ideologies in the context of 'War on Terror'. It adopts a quantitative content analysis of 40 articles in two major broadsheet newspapers – The Age and The Australian. Using the Runnymede Trust's Islamophobia Index as a foundational guide and establishing the political orientations of the broadsheet newspapers, it found that political biases in journalism had a limited effect on the latent language used in the news coverage, suggesting that Islamophobic sentiments have been somewhat normalised in the dominant news narrative and newsroom practices. Lastly, this research also provides insights into the relationship between political partisanship with the representations of Muslims in the mainstream news discourse. However, to further substantiate this study, discourse analysis can be undertaken to appropriately analyse the multi-faceted and complex nature of the language in relation to the broader social context.

"Killer Feminists from Hell": Anti-Pornography Feminism and its place in the Women's Liberation Movement in the UK

Carla Hills, *University of Warwick*

This research analyses the place of anti-pornography feminism in the history of the Women's Liberation Movement in the UK. This remains an underdeveloped field of study; despite the vast amounts of literature feminists have produced on the topic of pornography, the majority addresses the philosophical debate over the ethics of porn rather than the history of the movement itself. This research questions the role of anti-pornography feminism in the wider history of Women's Liberation. By applying Carolyn Bronstein's concept of a "long view" to anti-pornography feminism in the UK, the origins of the ideology are contextualised in the wider anti-violence movement. The primary source base consulted was self-produced regional Women's Liberation Newsletters accessed from the Feminist Library, along with some national publications and published writings by key anti-pornography feminists. The written word was crucial to the production of feminist theory and is key to this research. This research challenges narratives that relegate anti-pornography feminism to a simple factor in the decline of the Women's Liberation Movement, resituating it within the broader context of the 'anti-violence' movement and honouring its varied goals. By implementing a reconsideration of periodisation, the complexities of the anti-pornography movement can be better understood. Research on anti-pornography feminism as part of the wider 'anti-violence' movement remains relevant just as the issue of violence against women persists. Future research should focus on diversity within anti-pornography feminism and the disproportionate risks women of colour faced participating in direct action.

6A Gender and Social Inequality

Histories of Transing Gender: Instability and Changeability

Abigail Hughes, *University of Warwick*

Transgender narratives are occupying an increasingly visible and contentious place in media and culture. In this light, it is useful to re-examine Victorian and Edwardian literatures, to better understand the literary heritage of transing gender. Literary critics have examined stories about transing gender within the study of queer literatures, but typically related them to feminism or homosexuality rather than to transgender lives. This has contributed to the erasure of transgender narratives within academia and culture, and therefore merits renewed study. I examine primary materials including George Moore's 'Albert Nobbs', a 1918 novella about transing gender, and nineteenth century newspapers which captured the reaction to anatomically female people discovered living publicly as married men. Secondary material includes Judith Butler's seminal theory on gender performance, detailed in Gender Trouble; which demonstrates that these primary materials resonate with our conceptions of gender today. I found that rigid understandings of gender as immutable and binary, like those that we often associate with Victorian and Edwardian society, were fallible and unstable in their own time. Disseminating research that combats the harmful public misperception that moving between genders is a new or unnatural phenomenon helps to destigmatise trans experiences. This also contributes to a growing research base that re-examines Victorian and Edwardian cultural production to better understand the history of transing gender. All of this firstly helps to assert the existence of transgender narratives, and complex or fluid relationships with gender, across British history. Secondly, it prompts re-examination of texts which have been subsumed under queer literatures about sexuality, to instead consider the subversive potential of the gender dimension.

6B Exploring the Body: Health and Medicine

Exploring the Body: Health and Medicine

Moyin Emanuel, *University of Leeds*

G protein coupled receptors (GPCRs) are a large family of cellular receptors which influence many biological processes. GPCRs primarily influence cell activity through interactions with G proteins. Whilst knowledge of GPCR signalling remains incomplete, historical evidence reinforces GPCRs as effective therapeutic targets. Currently, a third of available prescription drugs have targets within the GPCR family. This project aimed to reproduce a model of detecting GPCR signalling, the NanoBiT G protein dissociation assay (as found within: Illuminating G-Protein-Coupling Selectivity of GPCRs, Inoue et al,2019.) The NanoBiT system is based on tracking when a complete G protein splits into its constituent components - Gα and Gβγ - following GPCR activation. To do this, Gα and Gβγ are tagged with fragments of a light producing enzyme, where changes in luminescence can be observed depending on G protein activation state. As typical in reproduction experiments, no functional changes in luminescence signal were observed when testing the conditions used within the reference paper. Through optimizations of this protocol, an inhibitory NanoBiT G protein dissociation assay was successfully performed. With a successful proof of concept, this protocol can be further developed to screen activation across a range of G protein subfamilies. In particular, this project lays the foundation to develop a methodology for the study of the poorly understood G protein signalling pathway, G12/13. G12/13 signalling holds important as a potential signalling mechanism in diseases such as Cancer, Rheumatoid Arthritis, and Diabetes.

Artificial Intelligence (AI) in assessing Tumour markers for Gliomas

Henschel Freduah-Agyemang, *University of Leeds*

The assessment of the Ki-67 proliferation index (a tumour marker) is a proven prognostic factor for gliomas. As digital pathology reviews supplant conventional methods, the use of artificial intelligence to evaluate pathology specimens is likely to become adopted. Hence it is imperative to continuously evaluate the use of AI in diagnostic and prognostic pathology. This project compared digitally (AI generated) estimations of Ki-67 index with manual quantification methods and evaluated reasons for the possible discrepancies between digital estimation and manual quantification. Forty-two Ki-67-stained cases with digital assessments were identified to meet the inclusion criteria. Conventional manual counting methods were employed to generate a mean manual quantification for each case. A Mann-Whitney Test was conducted to evaluate whether the mean differences between the average manual and digital counts were significant. The cases were stratified into four grades and the same statistical test conducted to observe for significance in variations between reporting by the two methods. The results showed the differences in the reporting of Ki-67 index between digital and manual quantification methods were not significant. This concurs with current findings and builds confidence in the use of AI as an evaluative tool. When stratified, the greatest difference between the methods occurred in grade three tumours. However, the small sample size of 3 offers little confidence in the result. Concordance between digital and manual quantification was present in all other grades. This research has found no reason to doubt the use of AI in estimation of Ki-67 proliferation index.

6B Exploring the Body: Health and Medicine

Lymphatic Delivery of Orally Administered Drugs: A Review

Erica Henschke, *Monash University Australia*

Most small molecule drugs are given by mouth, whence they are absorbed from the digestive system into the bloodstream and filtered through the liver before circulating around the body and reaching their site of action. A major limitation of this process is liver metabolism, which reduces the amount of active drug available to reach the site of action. However, drugs can also be absorbed from the digestive system into the lymphatic system rather than the bloodstream, thus bypassing the liver. As a result, there is growing interest among pharmaceutical companies and researchers in drugs and delivery systems designed to increase the lymphatic uptake of orally administered drugs. This review describes the lymphatic system and explains the strategies for increased lymphatic uptake, namely the utilisation of the chylomicron and microfold pathways, through the design of pro-drugs and lipid-based drug formulations. Discoveries and innovations within this space have been gradual and the underlying mechanisms of lymphatic uptake are not yet fully understood. More research into the physiology of the lymphatics of the gut will be beneficial to research in this area and has the potential promote further innovation. Regardless, targeted lymphatic delivery of pharmaceuticals taken by mouth remains a promising and active area of inquiry and innovation.

Functional Highly Porous Polymer Scaffolds as Simple Mimics of the Human Bone Marrow Niche

Anisa Aliju, *Vrije Universiteit Brussel*

Mature blood cells arise from hematopoietic stem cells (HSCs) via a stepwise differentiation process termed hematopoiesis, occurring in specialised porous three-dimensional niches located in the bone marrow. Recent studies show that tumours (such as progressive lung tumours) can impact hematopoiesis to support tumour progression and resistance to therapy. Attempts to study and recapitulate hematopoiesis in vitro with standard planar cell culture systems have often led to uncontrolled cultures with reduced and/or distorted expansion of blood cell lineages. To come to terms with this unmet biomedical need, polyHIPE scaffolds (polymerized high internal phase emulsions) have been developed to support HSC culture through mimicry of bone marrow niche. PolyHIPEs are developed by an emulsion templating technique by which the oil-based phase of the emulsion is polymerised with aqueous phase droplets. This yielded a highly porous foam material yet, led to exhaustion of hematopoiesis after continued culture. By tailoring morphological and mechanical properties, second-generation polyHIPEs are being developed to enhance the ex vivo expansion capacity for HSCs. Specifically, these scaffolds are functionalised by attaching bio(macro)molecules that facilitate NOTCH-signalling to better biomimic the bone marrow niche. In this project, the properties of newly developed polyHIPEs will be investigated and will be tested in the future for HSC culture. The scaffolds will be used to co-culture HSCs with lung tumour spheroids and allow the investigation of their respective cross talk ex vivo. As such we aspire to deliver a novel biomedical tool to evaluate clinically relevant interactions between the understudied bone marrow niche and progressive lung tumours.

6C Explorations in Pathology and Prognosis

Comparing common viral myocarditis with vaccination-associated myocarditis: a study of morbidity and mortality

Zhao Feng Liu, *Monash University Australia*

Myocarditis is an inflammatory disease of heart muscles that is most often triggered by a viral infection. Young adults are most at-risk from developing myocarditis, with the condition responsible for upto 10% of sudden death in young adults. Recently, myocarditis has been recognised as a rare complication of COVID-19 mRNA vaccinations. Thus, there is a growing need to characterise the disease course of vaccination-associated myocarditis, providing evidence to inform new protocols on monitoring and management. The present study aims to compare the disease course of viral myocarditis with vaccination-associated myocarditis. A systematic review following PROSPERO guidelines will be conducted on peer-reviewed, English language studies that investigated the mortality and morbidity of viral and vaccination-associated myocarditis. Data on patient demographic, mortality rate, length of hospital stay and cardiac function recovery will be extracted from eligible studies. Available data-points will be analysed using SPSS software to identify the presence or absence of statistically significant differences. It is hypothesised that viral and vaccination-associated myocarditis will follow a similar and benign disease course. The review will help elucidate the characteristic and progression of vaccination-associated myocarditis, thus identifying critical time-points for management and monitoring. Moreover, knowledge obtained from this review will contribute to increased public understanding of the disease, addressing irrational fears on vaccination. Future research into diagnostic tests and treatment modalities for vaccination-associated myocarditis will enhance early detection and treatment. Hence, further translational research will be required to adapt present findings to inform the development of new clinical guidelines.

A simplified method for the characterisation of resistance in Staphylococci

Farron Brooks, *Stellenbosch University*

Staphylococci are bacteria that occur normally in humans and the environment and can cause infections. They can become resistant to antibiotics such as methicillin which is used to treat staphylococcal infections. Resistance occurs when they acquire the mecA gene carried on a transferable piece of DNA, SCCmec (Staphylococcal cassette chromosome mec). The structure and composition of SCCmec can be used to distinguish between different groups of resistant staphylococci. SCCmec types I-XIII have been described in Staphylococcus aureus, the most common pathogenic species, but SCCmec typing of other staphylococci is difficult due to high variability of these SCCmec elements. S. aureus SCCmec types are commonly characterised using methods described by Kondo et al., 2007 (Kondo) and Milheiriço et al., 2007 (Milheiriço). Kondo involves six multiplex PCR reactions, while the simpler Milheiriço has only one. The aim of this study was to establish the utility of the Milheiriço mPCR for typing SCCmec elements in Staphylococci other than S. aureus (SOSA). Milheiriço and two of the Kondo PCRs were performed on forty SOSA to assess their ability to distinguish between different types of SCCmec elements. The methods produced genetic fingerprints (profiles) based on the composition of SCCmec. Milheiriço did not identify previously described S. aureus SCCmec types, but was able to identify components of SCCmec types I, II, III and V. These results suggest that Milheiriço can distinguish SCCmec profiles sufficiently to be used as an SCCmec screening tool to sub-select SOSA, which may transfer resistance to more pathogenic bacteria, for genome sequencing.

6C Explorations in Pathology and Prognosis

Ignored and under-valued in public health: a systematic review of health state utility values and disability weights associated with syphilis infection

Patrick Miao, *Monash University Australia*

Syphilis is a sexually transmissible spirochete which, without timely treatment, can cause severe cardiovascular and neurological disease and even death. Global incidence of syphilis and congenital syphilis is rising and represent a significant burden of morbidity and mortality. Policymaking for syphilis screening and treatment programs should be informed by up to date, accurate and well-designed economic evaluation studies. No systematic reviews have been performed assessing the quality-of-life indices which form the foundation of cost-effectiveness analysis for syphilis. We conducted a systematic review searching six databases for economic evaluations and primary valuation studies related to syphilis. Health state utility or disability weights, including identification of primary sources were extracted. Fifteen economic evaluations reported outcomes as disability-adjusted life years (DALYs) and six studies reported quality-adjusted life years (QALYs). Almost all, 93% (14/15) of the economic evaluations using DALYs used the same source for health state utility values from the original Global Burden of Disease study. For the six QALY-related economic evaluations a minority (n=2) adapted weights from other conditions or created new weights (n=1) for QALY-based studies. We found a limited evidence base for the valuation of health states for syphilis, a lack of transparency for the development of existing health state utility values, and inconsistencies in the application of these values to estimate DALYs and QALYs. This highlights the need for further refinement and transparency in the development of quality-of-life weights so that policymakers have access to accurate and well-informed economic evaluations.

Validation Study on Height Estimation Methods Compared to the Gold Standard in the Tygerberg Hospital Setting

Meaka Garland, Megan Lee, Chloë Morris, Thandeka Sibanda, *Stellenbosch University*

In clinical nutrition, patients' accurate height measurements are crucial for determining body mass index, nutritional requirements and malnutrition risk. However, many patients with severe disease or are unconscious or immobile are exempt from the gold standard method of measuring height: the stadiometer. This validation study aimed to compare the results obtained from measuring height with a stadiometer to alternative height prediction methods. All measurements were performed using standardised methods, on 303 adult participants (56.8% female; 53.5% mixed race; 38.3% black; 7.3% white) at Tygerberg Hospital, South Africa. Bland-Altman plots and appropriate inferential statistics were performed. Minor differences in height compared to the gold standard were only observed for demi-span (1.63cm) and knee height (1,03cm). Age had a moderate positive correlation to knee-height ($r=0.436$, $p<0.01$). Gender showed important differences for arm span ($p=0.03$), demi-span ($p=0.02$) and knee height ($p<0.001$). Ethnicity was an important factor in the differences in height, therefore strengthening the argument that height prediction equations should be race-specific. These results indicate that a single perfect height prediction method cannot be validated for the South African hospital population, using current regression equations. However, by determining the degree of accuracy between the gold standard and alternative height prediction methods, it provides insight on the order of best use in males and females, which can deliver improved patient management. Further investigation is required to create population and gender specific equations for standardised height prediction methods.

6D Health and Science: on a cellular level

Investigating the composition of coronavirus particles using fluorescent microscopy

Reanna Gregory, *University of Warwick*

Coronaviruses are a diverse family of viruses that cause disease in humans as well as a wide variety of animals and birds. The emergence of the novel SARS-CoV-2 virus at the end of 2019 has resulted in an ongoing global pandemic that has infected millions of people and caused worldwide social and economic disruption. The exact protein composition of these virions is unclear; the aim of this research project is to investigate the composition of coronavirus particles using fluorescent microscopy. Fluorescent antibodies will be used to specifically label these viral proteins within coronavirus particles, and the viruses will be imaged using both dSTORM and FISH. dSTORM is a localisation-based super resolution imaging technique that uses fluorescent dyes to provide images at extremely high resolution (~20 nm). FISH is a rapid method that can specifically localize the viral genome within virions. It uses an array of short fluorescent DNA probes to brightly label single RNA molecules. Understanding the structure of coronavirus particles is important to further our understanding of this important pathogen and develop novel ways to treat and diagnose it. This work could contribute to a research paper or a conference talk, which would benefit the scientific community both locally and globally. Additionally, working with coronaviruses is extremely relevant in the current climate so the project results will provide useful knowledge to further diagnostics and treatment for this disease.

Preliminary study on the anti-allergic properties of Kelulut honey using an in-vitro model of mast cells.

Yi Teng Lau, *Monash University Malaysia*

Allergy is a group of hypersensitivity diseases, such as asthma and hay fever. It affects millions of individuals worldwide and is the fifth leading chronic disease in the United States. The treatments for allergic symptoms include corticosteroids, which comes with serious health effects such as adrenal insufficiency and osteoporosis. This prompts the search for alternatives with lesser side effects. Kelulut honey is a stingless bee honey naturally produced by the stingless bees from the Melipona and Trigona spp. in Malaysia. It has been shown to contain high anti-inflammatory properties, yet its anti-allergic potentials are still unknown. Therefore, human mast cell model was cultured and pre-treated with Kelulut honey before mast cell activation. Then, the decrease in mast cell degranulation was detected, using enzyme-linked immunosorbent assay (ELISA) for the measurement of cytokine release as the indicator of mast cell degranulation. Pre-treatment of mast cells with Kelulut honey showed a significant inhibition of mast cell degranulation, indicating its anti-allergic potentials. With the establishment of the anti-allergic effects of Kelulut honey, the treatment options of allergic individuals will be expanded, while the reliance on prolonged corticosteroids administration can be gradually reduced or tapered out. Further investigation on the optimal dosage of Kelulut honey for its anti-allergic effects as well as its bioavailability in humans is much required. Future studies on the possible mechanisms of the anti-allergic effects of Kelulut honey are also highly recommended to reinforce the ongoing research for allergy mechanisms and a possible allergy cure.

6D Health and Science: on a cellular level

Cell Free Protein Synthesis in combating Antibiotic Resistance by genome mining RiPPs

Ansh Nimeshkumar Parekh, Maeesha Farzana Seraj, *Monash University Malaysia*

Antibiotic/Antimicrobial resistance is a global concern as posed by the WHO's Integrated antibiotic resistance surveillance has shown dire conditions of evolving superbugs and its reduced efficacy to current therapeutics. The demand for new antibiotics in the last few decades has risen with slow development of new efficient drugs against bacterial infections. Over 2.8 million bacterial infection cases alone in the USA have shown antibiotic resistance. Recent studies have shown bacterial by-products called antimicrobial peptides (AMPs) pose antimicrobial properties. AMP is a class of small peptides that exist in nature and have produced many antibiotics for different strains in the past that inhibited microbial growth. AMP production is usually strenuous when using typical in vivo systems that utilise microorganisms such as E coli. Therefore, the solution to overcome this issue is to utilise genome mining techniques to mine antimicrobial peptides (AMPs) and instead use Cell-free protein synthesis (CFPS) systems. Cell-free protein synthesis (CFPS) systems or in vitro protein synthesis is a simple biotechnological tool that devoid of living cells can help produce any proteins such as antibiotics or other therapeutics by only using necessary biomolecules/substrates. CFPS helps overcome the challenges of producing desired proteins that could be otherwise difficult to produce in vivo due to limitations. Discovery of new antimicrobial peptides using cell-free protein synthesis for production of potent and efficient antibiotics can help overcome global antibiotic resistance threat on health care.

BIN1 Protein Mutations in Centronuclear Myopathy: A36E, ΔK21, and R24C

Yuet Yee Yvette Loh, *Stellenbosch University*

Centronuclear myopathy (CNM) is a group of rare genetic neuromuscular disorders characterized by muscle weakness and wasting. Its BIN1-related form is an autosomal recessive disease caused by mutations to the amphiphysin 2 (BIN1) gene. BIN1 protein was found to be involved in the formation of plasma membrane invaginations in muscle cells (i.e. t-tubules) that allow penetration of action potentials into muscle fibres for contraction. Various BIN1 mutations have been identified in CNM patients, yet the mechanisms by which they cause CNM are still unclear. This paper aims to study whether 3 CNM BIN1 mutations (A36E, ΔK21, and R24C) alter the protein's ability to interact with actin-bundling protein Sac6, hence the ability to remodel membrane, through the humanization of yeast cells. Yeasts were transformed with the mutated human BIN1 genes and subsequently subjected to colocalization tests by fluorescence microscopy. To confirm the expression of BIN1 protein in the yeasts, protein extracts were prepared through TCA precipitation and ran in a western blot. It was found that the mutations do not cause particular BIN1 interaction with Sac6 that alters yeast's membrane remodelling capacity. In addition, human BIN1 protein expressed by yeast may have low stability and high susceptibility to degradation when freeze-thawed. Thus, human BIN1 protein should be freshly extracted in future studies to ensure optimal protein integrity.

6E Exploring Environmental Innovations

Battery Augmentation using fast-charging NLV (Non-Linear Voltammetry) algorithm

Nandini Verma, *University of Warwick*

Lithium-ion Batteries are rechargeable batteries used increasingly in the field of electromobility due to their high energy density, low self-discharge rate and economical associated costs. A robust fast-charging protocol NLV (Non-Linear Voltammetry) has proven to rapidly charge Li-ion cell in targeted time. A battery is augmented if its discharge capacity exceeds its nominal (or charge) capacity. This can mitigate or even eliminate access to charging facilities during a predetermined trip which requires slightly more power than the battery usually provides. However, battery augmentation might elevate cell temperature and deteriorate its functioning by damaging its internal stability. Upon experimentation, it is observed that NLV augments Li-ion cells. The magnitude depends on cell utilization (age) and specified cut-off capacity. As the cell ages with use, a decline in augmentation was noticed. However, if specified cut-off capacity is more than nominal capacity, the effect of cell age is subjugated. Cell age has an upper hand over cut-off capacity when it is specified lower than the preset nominal cell capacity. Temperature remained under 50°C which is significantly below the 60°C limit. This scrutiny regarding battery augmentation can enhance route planning, optimize travel time and cause widespread adoption of Li-ion batteries in battery electric vehicles. This research was conducted on single Samsung INR21700 30T cells with 40 minutes as target charging-time. Further investigation involving other lithium-ion cells in series and/or parallel combination can be performed to ascertain the universal applicability of NLV fast-charging protocol. Research can be also extended into the effect of different target charging-times, such as 30, 20 and 15 minutes, on the amplitude of augmentation.

Earthlings – Children of The Earth

Xinying Guo, Yaoxuan Wang, Fuguo Xue, *Nanyang Technological University*

Our team have developed a two-player environmental computer game, Earthlings. It addresses the differences and similarities of various creatures and how they are related in the nature. In the game, two players will play the role of a human and an animal respectively. They need to cooperate with each other to complete the given tasks in each stage. The idea of this game comes from a thought that all living things are children of the Earth. Due to the differences in biological and physiological structures, humans and other living creatures would have different views of the environment and their unique attributes, which would contribute to a good gameplay. For game development, we first worked on the theme of the game. Then we brainstormed the game mechanism and built a prototype with a storyboard. Next, we implemented the core mechanics and explored other sub-features that can be included. For example, we designed and created the tile map, implemented player-item interactions, and added sound effects. After testing the game within the team, we made improvements and completed a beta version of the first level of the game. We believe that Earthlings can promote ecological consciousness and make players reflect on the relationship between humans, other creatures and nature.

6E Exploring Environmental Innovations

Synthesis and mechanical testing of simulant nuclear wasteforms

Alex Mason, *University of Sheffield*

This project investigates the physical durability of 3 different ceramic wasteforms. The samples were first batched, milled and sintered. Next, the samples were characterised ,using electron microscopy and x-ray powder diffraction, to check for impurities and defects and to understand the micro-structure that controls the observed mechanical behavior. Next mechanical tests, including hardness and strength tests, were carried out with the aim to compare the durability of the different samples. Understanding the durability of these wasteforms is important as durability is key for their use in aggressive geological environments. All the wasteforms tested are options for real world use, their performance must be compared in all aspects before potential use, durability is one piece of the puzzle. After this, further research could be done on a greater range of wasteforms or looking at the effect adjusting the compositions on the mechanical properties.

Environmental Impacts of River Sand Mining in the Mekong River: A Review

Yeo Jeanne, *Nanyang Technological University*

Sand mining has intensified in the last decade due to rising demand brought about by rapid urbanization. Despite negative impacts being increasingly highlighted, relevant authorities have executed inadequate efforts at curbing sand mining practices. This lack of management is especially prominent in developing countries where growth is prioritised over environmental protection, exacerbating negative environmental and social impacts. However, the extent and scope of these negative impacts have yet to be extensively studied in a comprehensive manner. This literature review, therefore, aims to analyse the impacts of river sand mining thoroughly to establish a detailed list of sand mining's key impacts. For the review, the Mekong River was chosen as the focus. This river was specifically selected as it runs through six rapidly developing countries, and is geomorphologically favoured to produce a large amount of sand. Both factors make Mekong River an ideal location for sand mining to occur. Following, over fifty papers were then found by entering a series of common words such as "sand", "mining", and "Mekong" into Google Scholar, and sorted by citation count. Papers on every page were evaluated until two consecutive pages did not contain papers related to river sand mining in the Mekong River. Eventually, the papers were reviewed and the key takeaways from each paper were consolidated. Overall, the review highlighted that river sand mining has resulted in more significant costs than gains. Key issues include a loss in river connectivity, increase coastal and inland erosion, and a loss of riverine biodiversity. To counteract these impacts, feasible strategies have been suggested towards the end of the review.

6F Society and Behavioural Science

Understanding Online Behaviour: Affordances of Social Media Platforms

Rong Hui Tan, *Nanyang Technological University*

Affordances refer to action possibilities an individual can perform in a given environment. With the rise in social media usage today, many scholars have explored affordances of social media platforms. However, while affordances have been used to explain differences in behaviour across social media platforms, the lack of validated scales to measure social media affordances has resulted in limited empirical evidence of the affordance-behaviour relationship. Hence, this paper aims to investigate users' perceptions of social media affordances by proposing a validated scale while determining its factor structure and convergent validity. We constructed the Social Media Affordances Scale to measure six perceived affordances: Persistence, Flexibility, Accessibility, Interactivity, Connectivity and Identifiability. An online survey was administered to users of Facebook, Instagram and YouTube. SPSS was used to analyse the reliability and validity of the scale. The final Social Media Affordances Scale had 21 items and measured three perceived affordances: Interaction, Restriction and Accessibility. Notably, while moderately high validity and reliability were observed, the revised scale only accounted for a low level of variance. Our study lays the groundwork to develop a predictive system for forecasting receptivity towards new platforms or websites, which companies can leverage on to reach their target audience more effectively. Further, our findings contribute to understanding the factors that lead to problematic online behaviour such as cyberbullying, where more preventive measures can be implemented on platforms perceived to be higher on affordances linked to cyberbullying. Future studies can apply the revised scale to other platforms, or explore the impact of individual differences such as personality or gender.

Body Positivity vs. Body Neutrality: Can women's mental wellbeing be improved with a new social media movement?

Tori Husband, *University of Warwick*

The 'Body Positivity' movement has recently grown, involving social media that encourages acceptance of all body types. Academic literature highlights the benefits this movement has on women's wellbeing, improving mood and body acceptance. However, an under-researched finding is that 'body positive' media content raises self-objectification, increasing how much women view themselves as objects that need to be evaluated. This research questions whether 'Body Neutrality' could combat this finding, a movement discussed in popular media but not academic literature. Participants undertook a questionnaire on mood, body appreciation and self-objectification, before and after exposure to body neutral, body positive or control images, then differences in means for each group were analysed. Body appreciation increased significantly after viewing body positive content, but not body neutral or control images. This concretes previous findings, and highlights the benefits that initially popularised the body positivity movement. Although not statistically significant, body neutral content had a similar positive impact on mood as body positive content, and again, although not statistically significant, resulted in lower self-objectification scores than body positive content. Consequently, body neutrality is worth considering as a beneficial social media movement, and worth investigating further through different experimental methods. The changes in scores highlight the potential positive consequences of viewing different types of media online. This research could benefit a range of people who implicitly or explicitly are impacted by social media; personalising social media content based on studied advantages could strongly improve the wellbeing of many if incorporated, perhaps encouraged by social media platforms, practitioners, and schools.

6F Society and Behavioural Science

Investigating the role of collectivistic and individualistic orientations on covid-19 related psychiatric symptoms

Mafalda Duarte, Meghana Mohan, *University of Warwick*

Loneliness, defined as the discrepancy between desired and perceived social relationships, appears to be one of the outcomes of social distancing policy (Jeste et al., 2020) which is linked with a variety of mental consequences. Our extension study of Palgi et al. (2020), which found an negative association of age with anxiety and depression and various predictor of depression and anxiety, attempts to explore whether similar results would be seen a year and a half after the outbreak of the pandemic and whether people's individualistic and collectivistic orientations are risk factors for depression and anxiety. We recruited participants via opportunistic sampling focusing on collecting data from three nationalities – British, Indian and Portuguese (n = 232, age range = 18-79) via a Qualtrics questionnaire. Interestingly, our findings imply that self-rated health was the biggest predictor of anxiety (r(232 = -.425, p<.001) and depression (r(232) = .-441, p<.001) alongside individualism as a significant predictor of depression. These findings matter as individualistic orientations appear fairly common in today's world and self-rated health being a stronger predictor of psychiatric symptoms than the diagnosis of a medical condition. Focused intervention studies to identify whether reducing extreme individualistic views would make individuals less likely to develop psychiatric symptoms and research identifying specific role of self-rated health on other psychiatric symptoms like OCD or ICD which may have occurred as a result of the pandemic.

Islamic Prayer and Coping with Stress

Alyaziah AlShamsi, *Zayed University*

The religion of Islam has a following of 1.8 billion worldwide. Religiosity has been previously shown as being positively correlated with the management of emotional dysregulation and stress. The purpose of this study is to explore the relationship between mindful Islamic prayer, specifically, and stress management among university students. The variables that will be measured are as follows: frequency and quality of prayer, frequency of experiencing stress, causes of stress, and preferred stress management techniques. The study population consists of Zayed University students across both campuses, with no regard to gender. A consent form will be available on the first page of the online questionnaire, informing participants of all the necessary information before proceeding to the questions, by clicking agree, participants are indicating that they agree to participate in the study. The instrument consists of a combination of 2 reliable scales to measure the objectives of the study along with a few modified questions to fit the subject at hand, the Perceived Stress Scale (PSS) and the Mindfulness in Salah Prayer Scale (MSPS). The best method of data collection is an online survey mainly due to convenience and to obtain the largest number of participants possible. The inspiration behind this study was to illustrate the operant difference between Islamic prayer that is approached with mindfulness and one that is not. This research will soon commence data collection and therefore, results will be discussed at the conference.

6G Reduced Inequality

Black Lives Matter: Perceived (Ir)relevance to Understanding Race Issues in Singapore

Shantini Rajasingam, *Nanyang Technological University*

Amidst the Black Lives Matter (BLM) protests after George Floyd's death, many Singaporeans, especially racial minorities, took to social media to lend support to BLM and verbalise their lived experiences which challenge taken-for-granted notions of 'multiracialism,' and 'racial harmony' locally. Citing the vastly different contexts, others were critical of this. As BLM only entered the worldview of everyday Singaporeans relatively recently, literature exploring this phenomenon remains scant. Yet, the sheer number of race-related conversations generated illustrates the importance of investigating how connections were drawn and refuted with this U.S.-based movement. Guided by the Diffusion Theory, this paper explores: (1) What is the perceived (ir)relevance of BLM in understanding local race issues to Singaporean youths? (2) How has social media mediated the impacts of this larger transnational movement on local race discussions? Through 20 in-depth interviews with youths of various races, including the Black diaspora, this paper illuminates how transnational solidarity was formed around the core value of social justice for marginalised groups, though more nuance is needed in how we relate to BLM and its accompanying concepts like 'Chinese privilege.' While the role of social media in transnational solidarity formation was recognised, concerns remain about its transitory nature, role in performative activism, and echo chamber effect. Though insightful, as a preliminary study with a relatively small sample size, findings are not generalisable. Moreover, largely absent are African Americans whose unique position may have provided additional insights. Prominent Singaporean youth activists on social media during that period could have also been interviewed to understand first-hand the role and challenges of social media in transnational solidarity formation.

The UN's Sustainable Development Goal 10 in Chile: The legacy of Pinochet's economic policies

Hannah Bradford, *Pompeu Fabra University*

Chile has earned the distinction of having one of the most aggressive patterns of inequality in Latin America with its origins tracing back to the nation's neoliberal economic model, implemented under General Augusto Pinochet's military dictatorship (1973-1989). Pinochet completed a series of radical free-market reforms based on liberalizing markets, privatizing state-controlled industries, and reducing the state's role in the economy. Embedded in the 1980 constitution, neoliberalism has continued to dictate the nation's economy. Referred to as 'the Chilean Miracle,' liberalization and privatization led to massive economic growth. However, this author argues that the miracle did not happen for most Chileans, rather, it happened at their expense. A historiography of the Chilean economy and social policies illustrates that the constitution's continuation of the neoliberal model created widespread economic inequality that has persisted decades after the regime's end. Contributing to the growing discussion on neoliberalism's social welfare, the Multidimensional Inequality Framework is used to show that these income disparities have dramatically increased social inequalities. Through a comparative analysis of Chile's income, education, health, and pension indicators against OECD averages, it is demonstrated that neoliberalism created two Chiles; one where the rich can afford the high-quality systems, while the rest struggle to afford essential social services. After a series of mass protests in 2020, Chileans earned the right to rewrite their constitution. To conclude, this author provides constitutional and policy recommendations addressed to the Chilean government. If Chile seeks to accomplish the United Nations SDG 10, its new constitution must address Pinochet's legacy: the neoliberal economic model.

6G Society and Behavioural Science

Exploring the Funds of Knowledge of Undergraduate Engineering Students in Singapore: A Cross Generation Study

Shamita Venkatesh, Ibrahim H. Yeter, *Nanyang Technological University*

This study explores the sources of knowledge, which may influence first-generation and continuing-generation college students in Singapore's engineering learning. This study aims to determine how and which sources of knowledge may aid a first- and continuous-generation university students in adapting to the engineering course, seeking aid from friends and people around them, and putting into practice skills learned in the industry. Current engineering education curriculum may not adequately equip students with the necessary skills to face the 21st century. This study employs a validated survey based on the eleven constructs: tinkering knowledge from home and work, connecting experiences, networks from family members, college friends, colleagues, and neighborhood friends, perspective taking, reading people, and mediating capability, and engineering performance and competence beliefs. A quantitative method of research was used to examine the constructs. Certain constructs had positive correlations while others had negative correlations. Based on the nonparametric analysis, with a sample size of 46, there were no significant statistical differences found between students' gender, college generation, or level of education. The results gained from this study seek to understand how engineering students learn, which enables educators to use the gained knowledge to enhance teaching methods and materials for engineering learning experiences. Furthermore, the results from this study provide empirical evidence to suggest a change in the K-12 curriculum in Singapore. This study includes theoretical and practical implications along with future directions.

The United Nations' Sustainable Development Goal 10 in Russia: Tackling inequality through the welfare state

Marta Verano Sánchez, *Pompeu Fabra University*

This dissertation examines the role of the Russian welfare state in addressing economic inequality since 2008 through the lens of the UN's SDG 10, and target 10.4., which urges states to "adopt fiscal, wage, and social protection policies that reduce inequalities". To this effect, it examines the most relevant welfare reforms implemented since the 2008 crisis in the sectors of pensions, education, healthcare, and family benefits, as well as taxation, and determines how these have fared in the face of a more unequal society and unstable economy. Further, it examines the potential for reform in the country's welfare system under the current political regime and provides policy recommendations for a more efficient welfare system. It concludes that the Russian welfare system is inefficient at reducing inequality and has reduced its role in providing social security to its citizens over the last decade. Finally, it deems that the potential for reform under the current status quo is very low, as social policy is dependent on high energy prices, and the very treatment of welfare policy within Russia's government does not prioritize tackling inequality.

7A Advancing in Finance

Inflation in 21st century crises: implications of the Basel III regulatory framework on inflation in the European Monetary Union

Paolo Romanengo, *University of Warwick*

This paper aims to estimate the impact of capital requirements, introduced with Basel III (2010), on inflation across the European Monetary Union with a dynamic panel generalised method-of-moments estimation (GMM). The paper's main contribution lies in identifying the transmission mechanism of the effect of capital requirements on inflation. Transmission relies on the theoretical framework that capital constraints can affect inflation through affecting lending from capital markets to the real economy, which in turn affects output and inflation. The first two stages of the transmission mechanism were already assessed empirically.The paper concludes that transmission can be extended to the third stage: the effect on inflation. Capital requirements are found to have a deflationary effect in the medium run (1-2 quarters) for sufficiently financially integrated countries. Intuitively, the credit market and the industrial frame- work act as multipliers of the effect of regulatory requirements through lending and output. The main results are robust under a variety of specifications. Chiefly, they are not affected by potential policy interest rate endogeneity or supply shocks which lead to unusual deviations from the trend average in the dependent. Overall, the findings are valuable in the context of fiscal-monetary policy. We conclude that the applicability of capital requirements is not limited to safeguarding the resilience of the financial system in partial equilibrium but can be extended to macro-prudential policy making and inflation targeting. Raising capital requirements is a significant deflationary strategy, and the opposite is true as an expansionary measure.

Equilibrium pricing of purely speculative assets

Daniel Jensen, *University of Warwick*

In recent years cryptocurrencies took the world of finance by storm. Now not only individual investors but also institutions key to the proper functioning of financial systems are starting to offer them as a way to diversify the asset portfolio. This however poses a significant systemic risk. Speculative assets (including Cryptocurrencies) are known to have increased volatility that doesn't seem to decrease over time. In my research, I am looking at the price behaviour of purely speculative assets. The equilibrium pricing model I created uses a variety of price expectations, and risk aversion assumptions about the representative agents to simulate the market and generate equilibrium price as a function of time. Through this framework, we can look at the riskiness of the assets over time and derive a set of conditions for risk stabilization that are crucial to understanding the systemic risk of those assets. The model will be also deployed into real-world data using maximum likelihood estimation. As my research shows, speculative assets contain inherent risk which makes them mostly impractical in any wider financial context and requires significant regulatory oversight. Moreover, the creation of an equilibrium pricing model fills the gap in pricing literature relating to the pricing of purely speculative assets. However, the predictive power of the model can be further improved for more robust results and trading applications. This can be achieved by including more sophisticated price expectations, drawing from abundant behavioural literature and increasing existing data on the agents operating in the markets.

7A Advancing in Finance

The low rate of adoption of blockchain in digital finance

Taha Ozair Osman, *Monash University Malaysia*

In recent years, digital finance has become near-ubiquitous as a transaction solution for businesses, while concurrently blockchain technology has become increasingly popular. Despite it being over 15 years since blockchain technology was first introduced, its adoption rate in digital finance has been quite low. While there exists plenty of research on how the blockchain can be leveraged in the financial sector, there is a lack of discussion on alternative distributed technologies that may be better suited to handling financial transactions compared to popular blockchains such as Bitcoin and Ethereum. This paper looks into the reasons behind this phenomenon by delving into the current standard technology used for digital finance, the capabilities of established and prominent blockchain technologies as well as a discussion on alternative distributed ledger technologies by reviewing available literature on each of the aforementioned topics to provide a comprehensive discussion on potential opportunities to integrate distributed ledger technology with the current financial environment. The results indicate that the current state of the blockchain, in particular Bitcoin, lacks the scalability to meet the demands of the number of digital transactions that are performed on a daily basis as well as some of its properties being at odds with legal requirements governing the financial landscape. This research seeks to provide insight into how distributed ledger technology can be viably incorporated into the field of finance and in turn help in accelerating the rate at which this technology is adopted.

eCalculator for Taxes

Ionela Florentina Comsa, *Babeș-Bolyai University*

The 17 Sustainable Development Goals set by the United Nations in September 2015 include improving the quality of education and creating lifelong learning opportunities. As the level of financial education in Romania is quite low, more and more efforts are being made in this area. In particular, many of the penalties associated with non-payment of taxes are due to a lack of understanding of the tax system. The relationship between the taxpayer and the tax authorities is also deficient, and lately, new efforts are being made to increase the degree of digitalization in the public sector. We created an online taxes calculator to address the demand for high-quality tax education in Romania. Any taxpayer can use it to figure out their taxes. To create this computer, we used HTML, CSS, and JAVASCRIPT. Users can confront the amount of taxes owed using eCalculator for Taxes, and also access the computation technique. Furthermore, taxpayers can calculate their tax obligations related to future operations in advance by using eCalculator for Taxes. We are confident that eCalculator for Taxes may contribute to the advancement of tax education and compliance in Romania, as evidenced by the 461 users that it has so far. We intend to maintain this computer up to date in order to comply with the new Fiscal Code rules, include all forms of taxes, provide an English version, and adapt the program for mobile use. The digital solution we developed will also be shared with Tax Administration practitioners. It's available at http://ecalculatorimpozite.uetcompany.ro/.

7B Children's Wellbeing: Social, Medical, and Across the Ages

Training Bilateral Integration of the Upper Limb in Children with Hemiplegic Cerebral Palsy: A Case Study and Literature Review

Emily Kock, Kyrah Lloyd, Catherine Smith, Misha van Kamp, *Stellenbosch University*

Cerebral palsy (CP) is an irreversible, nonprogressive disorder where those afflicted present with abnormal muscle tone, posture and movement. In the South African (SA) context CP affects up to 10 out of 1000 births in rural settings. CP often affects one side of the body, influencing the bilateral use of the upper limbs during independent everyday activities, also known as activities of daily living (ADL). This study aimed to investigate the effect of bilateral upper limb (UL) integration exercises on ADLs in children (age 2-12) with hemiplegic CP (HCP). In the case study that we conducted, a third-year physiotherapy student treated a child with HCP over three 45-minute sessions with techniques focusing on bilateral integration exercises. Tests such as the finger-to-nose test were used in the assessment of coordination. Gait observation, stair-climbing and rolling were used as outcomes to assess function. Integration of the child's right and left side as well as coordination deficits were noted, which negatively influenced the child's ADLs. Reflecting on the case study and the reviewed literature, the key findings of this study suggest the use of bilateral upper limb training improves hand use in functional activities and enhances bilateral hand function and ADL performance for children with HCP.Due to limited resources and under-reporting of interventions in research studies, it is recommended that further research be done to evaluate the long-term outcome on function using bilateral integration and midline crossover exercises on children with HCP within a larger population group using appropriate standardised outcome measures.

Parental Autonomy Support Predicts Children's Free Will

Jing Ting Ong, *Nanyang Technological University*

Free will refers to people's beliefs that they can choose what to do or not do when facing various constraints. Research with children has shown that free will beliefs develop through age, and the developmental trajectory may further vary by culture. Parental socialisation is a possible underlying mechanism contributing to this variation. The present study examines the effect of one particular parental socialisation practice, autonomy support, on children's free will. Singaporean children aged between 4 and 9 years old (N = 89) undergone an online structured interview consisting of hypothetical scenarios used to measure free will. The child's parent completed a self-report online survey with one question measuring autonomy support. Our results reveal that consistent with previous findings, Singaporean children above 6 years of age are more likely to endorse free will beliefs than children under 6 years of age. In addition, parental autonomy support is positively correlated to children's free will. Children of parents with high autonomy support are more likely to endorse free will beliefs. Even after controlling for children's age and parent's gender, parental autonomy support significantly predicts children's free will. These results suggest that parental socialisation may play an important role in children's development of free will beliefs, which may underlie the observed cultural differences in children's free will.

7B Children's Wellbeing: Social, Medical, and Across the Ages

First Steps: Education and the Gothic Child in Ann Radcliffe's The Mysteries of Udolpho, Matthew G. Lewis's The Monk and Mary Shelley's Frankenstein

Tarini Tilve, *Nanyang Technological University*

Gothic literature from the mid-18th to mid-19th century exemplifies the Marxist critique of a democratized childhood as instrumental to a larger scheme to insure the reproduction of the self-regulated, rational and autonomous subjects needed for modern economies. An inversion of the educated and angelic Romantic child, the character of the corrupted 'Gothic Child' hence dominates contemporary Gothic literature as the bearer of death and loss. However, it is seemingly absent from the discourse surrounding classical Gothic literature which privileges the incomprehensible by focusing on the characters' interactions with the supernatural. This paper fills this gap through a content analysis of the genre, working backwards to locate the child and centring it. Consequently, this paper reveals a clearer causality between the fate of the characters and the education afforded to them, an otherwise implicit part of the genre. By demonstrating how intellectual pliability and the repression of femininity govern the key decisions made by the characters, this research sheds light on the role education plays in repressing and manipulating the Gothic Child. Situating this research alongside the genre's propensity for discussing and engaging with cultural anxieties then opens up a new mode of discussion which allows readers to trace the systemic cause of these anxieties from their monstrous manifestations. This illuminates a new relationship: where true terror is not within the supernatural but in the tangible failure of education.

7C Perspectives on our Environment

Checklist of the Dung Beetles of Singapore (Coleptera: Scarabaeidae: Scarabaeinae)

Zann Teo, *Nanyang Technological University*

Dung beetles provide a variety of ecosystem services and are functionally important in tropical ecosystems. They are an excellent proxy for monitoring ecosystem health and can act as surrogate indicators for elusive mammals. However, information on the distribution of dung beetles across Singapore, particularly ion in urban parks and green spaces is currently lacking as sampling efforts were previously concentrated in the Central Catchment and Pulau Ubin. This study aims to create a species checklist to better understand present diversity, add value to taxonomic records, and support implementation of meaningful biodiversity conservation strategies. A dichotomous morphological key of local species was also created to support future dung beetle studies in Singapore and encourage citizen science. Increased sampling effort at green spaces was carried out in 2021 to supplement distributional records in previous studies focused on the Central Catchment. In our recent sampling, 15 species across 4 genera were identified, and 9 morphospecies have yet to be identified. 11 species found in previous studies were not sampled in our direct collection. In total, we have identified 26 valid species and 9 morphospecies. Species which were not recollected in recent sampling may have become locally extinct, or the trap types or baits used are not suitable in collecting these species (e.g. arboreal species, specialist feeders). Identification of most specimens, both historical and recently collected, are done via morphological traits. Future work may utilize integrated taxonomist approaches, such as DNA barcoding to confirm species identity, to increase accuracy of identification.

Non-autonomous saddle-node bifurcation: theory and illustrations

Gabriel Remond-Tiedrez, *University of Warwick*

Dynamical systems often depend on parameters, think of the earth's weather as a function of parameters like insolation and CO2 concentration. When changing these, the system can either stay qualitatively unchanged, up to a change of variables, or change behaviour in which case we have a bifurcation. Understanding these phenomena is crucial for many applications, such as weather forecasting, biological networks, classical and quantum mechanics. In the case where the dynamical system is autonomous – the origin of time plays no role in how the system evolves – there has already been a lot of research and development of the theory. But when we add time-dependence to the mix, things get trickier and the research sparser. Anagnostopoulou and Jäger have done work in this direction, more specifically on the saddle-node bifurcation. The effect of this bifurcation is that the system goes from having a stable trajectory –trajectories starting nearby stay close and behave nicely – to having none. In the context of many applications this is also called a "tipping point" or a "catastrophe", where part of the system's behaviour is annihilated. We focus on investigating a specific example of such a bifurcation, mainly through explicit computations.

7C Perspectives on our Environment

A Geomorphological Hazard Analaysis of Seamounts in Southeast Asia, with a Regional Case Study on the Sangihe Volcanic Arc

SuFen Wee, *Monash University Malaysia*

Seamounts are one of the world's most common marine ecosystems (Harris et al., 2014). They are defined in this research as discrete, morphologically distinct, volcanic landforms that rise 100m above the seafloor, but have at least 70% of their body submerged. Despite their abundance, they are largely understudied, especially in terms of their hazard potential in Southeast Asia (SEA). This research uses maps of the seafloor to characterise SEA seamounts based on their physical attributes. From there, a regional hazard case study was performed on the Sangihe Volcanic Arc (Indonesia). Quantitative (height, width, slope) and qualitative parameters (textural features and past hazard evidence) of seamounts were measured and compared with previous literature to identify the potential hazards. Hazard studies for seamounts in SEA are significant because it is one of Earth's most densely populated places, while being also one of the most volcanically active. Hence the hazards that occur are disastrous and significant towards people and infrastructure. Reference from the Global Volcanism Program and Kim & Wessel (2011) were used as a springboard for seamount identification. Four seamounts outside the databases were found within the case study region, and they demonstrate potential for explosive eruptions. Furthermore, multiple past landslide morphologies were identified. Hummocks (blocks > 50m in height, and >100m in diameter) are evident throughout the Arc, and were identified at 12 sites. Major head-scarps commonly accompany these hummocks, such as those found West of Banua Wuhu, and are distinctive of mass failures. Explosive eruptions, flank collapse, and tsunami generation are found to predominate the hazards found along Southeast Asia, and the Sangihe Arc.

Towards Assessing Population Status of the Indo-Pacific Bottlenose Dolphin (Tursiops aduncus) in Dubai Waters Using Photo Identification Methods

Hamda Almosawi, *Zayed University*

Marine ecosystems play a vital role in the environment, yet their quality is rapidly declining, largely because of habitat destruction, over-exploitation, the introduction of alien species, water pollution, and changing climatic conditions. These changes in environmental suitability and anthropogenic pressures have also affected the populations and distribution of cetaceans, and although they are recognized as keystone and umbrella species, many of these functionally important species are classified into threatened or near threatened categories by the International Union for Conservation of Nature (IUCN). One of these species is the Indo-Pacific Bottlenose Dolphin (Tursiops aduncus) which occurs in Dubai Waters in the Arabian/Persian Gulf, and it is listed as Near Threatened. In the Arabian/Persian Gulf, like other cetaceans, this species is poorly studied with limited information on its abundance, population trends, distribution, and occurrence. This study aims to assess the population status of the Indo-Pacific Bottlenose Dolphin in Dubai Emirate to provide data to assess the population trends, to list the species into the appropriate threat categories and conservation status, and for conservation management and planning in the United Arab Emirates (UAE). This will be done through mark-recapture methods on photo-identification data. Photo-Identification is a reliable, standard, and valid tool for studying marine and terrestrial wild animal populations and understanding their ecology. It is also non-invasive and allows long-term monitoring of a population which can provide information beyond population size such as movement, home-range, survival rate, longevity, and calving interval.

7D Health and Wellbeing

Impact of Physical Activity on Neural Correlates of Motor Learning

Fu Miao Tan, *Nanyang Technological University*

Exercise is well-established to be beneficial for cognition and motor learning-related brain regions. However, most evidence was derived from short-term laboratory-based structured exercise protocols in older adults. It is unclear if similar benefits can be translated towards habitual physical activity (PA) in a younger cohort. With declining PA amongst the youth, it is important to ascertain if it has any detrimental effects on motor function. This study investigated differences in motor performance and neurophysiological modulations during motor learning between young adults of differing habitual physical activeness. 26 young adults were classified as active or inactive according to the World Health Organisation PA guidelines, via the International PA Questionnaire. Functional near-infrared spectroscopy (fNIRS) measured the dorsolateral prefrontal cortex (DLPFC) activation during a serial reaction time task. This region-of-interest was chosen due to its function in attention and response monitoring during motor learning. Motor learning was quantified as an accuracy-reaction time trade-off function. DLPFC activation was characterised as task-related changes in oxyhaemoglobin (Δ[HbO2]) measured via fNIRS. All participants' performance improved over time, but differences between conditions were non-significant. Δ[HbO2] was greater in inactive subjects with moderate effect size (d=0.55), but did not reach significance. This study found no differences in motor performance or underlying neural activity between activity conditions. Hence, it may suggest an insufficiency in current guidelines to elucidate habitual exercise's benefit on motor learning in young adults. Further research is necessary to better determine appropriate exercise-dose recommendations to stimulate neural adaptations and motor learning in a younger cohort.

A data mining-based analysis of core acupoint combinations for obesity management

Ng Yan Jie Chester, *Nanyang Technological University*

Obesity is a growing health concern worldwide . In recent years, acupuncture has been gaining popularity in treatment. Acupuncture is a treatment modality of Traditional Chinese Medicine (TCM) that involves inserting thin needles into skin acupoints before physical or electrical stimulation. With scientific literature validating the safety and efficacy of acupuncture , exploring novel acupoint combinations could be crucial in improving obesity treatment. Hence, this study aims to elucidate acupoint combinations and prescription regularities for obesity treatment through machine learning algorithms. Randomized controlled trials (RCTs) detailing acupuncture for obesity treatment were sourced from electronic databases from inception till January 2019 to establish a database of acupoint combinations. The databases searched were Pubmed, Embase, and Cochrane Central Register of Controlled Trials. Our search yielded 33RCTs involving 2503 patients and 69 acupoints. Data analyses were then performed using R-Studio 4.1.1, showing that obesity arises primarily from a splenic deficiency in these patients. Additionally, acupoints from the stomach, spleen, and conception vessel meridians were found to be most frequently used in obesity treatment. Hence, a common TCM treatment principle identified was strengthening the spleen to eliminate dampness and phlegm. Data analysis also revealed two novel acupoint combinations which could be effective for obesity treatment. However, as both combinations are novel, further research is required to validate their safety before clinical use. In closing, our study revealed novel acupoint combinations for managing obesity via machine learning, thus paving the way for future research to investigate mechanisms-of-action and efficacy of these combinations in obesity treatment.

7D Health and Wellbeing

Language testing in bilingual aphasic populations: A systematic review

Nini Chrispeels, *Vrije Universiteit Brussel*

Research has shown that language processing differs in bilingual and monolingual speakers. This distinction also holds true for bilinguals suffering from aphasia, a disorder that can affect different aspects of language. In bilingual aphasics, different languages can even be impaired differently. Scholars therefore agree that when testing aphasics' language skills to ensure better comprehension of their disease and to plan treatment, bilinguals should be examined differently. A test specifically created for this population should be administered, in all their languages. However, only the Bilingual Aphasia Test (BAT) contains portions specifically designed for bilingual aphasics, such as tasks measuring translation abilities. The question is thus how frequently this test is actually used and how frequently patients are tested in all their languages. In this systematic review, I searched the literature assessing language skills of bilingual aphasics to determine which language tests are administered and in which of the patients' languages. Three databases were scanned for articles. Results show that the majority, 86 of 127 analyzed studies, tested patients in all their languages. The BAT is the most used instrument, but it is not administered in the majority of the studies under review (n=71) and it is almost always used in combination with other tests. These results may point to a certain lack of trust in the BAT, possibly due to its low degree of standardization in many languages, and they underscore the necessity of more standardized versions for future use. The fact that most of the studies tested patients in all their languages shows that a distinction between monolinguals and bilinguals is made more and more.

What are the experiences of using online health information among family members of children with rare genetic conditions?

Xinyi Lyu, *University of Sheffield*

Due to the scarcity of research efforts on rare conditions, families of children with a rare genetic condition may receive limited information from health professionals (Muir, 2016). As a result, families often rely on seeking out information about their child's condition online. The quality of online information can vary and even the most reliable information can often be disseminated in a format that is not accessible to the needs of families (Pauer et al., 2017). To date, there has been little investigation of the experiences of family members in their use of online information. The aims of the study were to explore the experiences of using online health information among family members of children with rare genetic conditions, and to identify their preferences regarding the format and features of information. A qualitative online survey was used to collect information from 25 family members of children with a rare genetic condition aged 0-16 years old. Data were analysed using inductive, Reflexive Thematic Analysis (Braun & Clarke, 2019). Themes were developed to summarise family members' experiences and preferences. The findings of the study suggest that family members value diverse formats of online information and use different types of information for different purposes. Providers of online information in rare conditions should consider sharing information in varied formats, ensuring the provision of lay-friendly formats. Interaction around resources can also be facilitated. For example, routes to connect with health professionals and researchers and ways to share and discuss information with other family members.

7E Global Challenges and Global Governance

Jim Crow Spectacle Lynching (circa. 1874 - 1935) and African American Trauma

Zaamia Arif, *University of Warwick*

Spectacle lynchings during Jim Crow in the United States (circa. 1874 -1935), were public executions typically of African Americans carried out by white mobs. Amongst extensive post-1970's studies of specific occurrences of lynching's and their triggers, little scholarship addresses the emotional impact of lynching's on African Americans. Considering the extensive voyeurism of violence against black bodies that occurs globally today, studying the traumatic implications of lynching on the African American consciousness and experience is imperative. Therefore, this project fills a gap in existing literature by analysing African American lynching trauma through primary sources produced by black Americans – materials which are often neglected in lynching history. This includes analysing personal trauma through Richard Wright's works and collective trauma through storytelling traditions in music i.e., 'Strange Fruits' and film i.e., 'Within Our Gates'. Individually, trauma was predominately shaped by fear, grief, and helplessness. However, collective trauma involved black directors, musicians and activists utilising collective memory of lynching's to invoke anger in black audiences and, later, politically mobilise them. Thus, analysing such complexities of lynching trauma adds depth to scholarly understandings of trauma in different social and historical contexts. These findings also reconceptualise lynching history from a marginalised perspective, consequently renegotiating the dominant historical narrative to be more representative and inclusive. Ultimately, this project lays the foundation for critical interdisciplinary studies examining the psychological and social consequences of constant exposure to racialised violence for African Americans. This sits alongside studies of 'Transgenerational' black trauma, and its intrinsic role in constructing racial categories.

Britain's involvement in human rights abuses in Brazil during dictatorship years

Mehr Ahmad, *University of Warwick*

Human rights history often falls victim to 'white supremacism' discourse, with dominant conversations surrounding 'transnational solidarity'; a good example would be Amnesty International. Western involvement in these same human rights abuses must be acknowledged as well; not just the activism. Brazilian President Jair Bolsonaro has repeatedly praised the efforts of soldiers who tortured suspected 'communists' during Brazil's dictatorship (1964-1985). Although it is known that the United States has assisted Brazil by providing methods of torture within what is colloquially referred to as 'Schools of Americas', Britain's involvement has been less commonly known. As part of the research method, archival materials at the National Archives have been used to uncover the U.K propaganda campaign to counter communist threats, as well as initiatives taken to teach Brazilian officials torture methods either on home soil or at a psychological operation base in Salisbury. My findings revealed a complex relationship; the process of containing the communist threat under the guise that the ideology denied freedoms to people, involved violence and torture, which was considered a necessary intervention by western governments. The truth has not been reconciled by the Brazilian government or the United Kingdom, which is a further direction that this research aims to explore. Several books written in Portuguese such as Geraldo Cantarino's 'Segredos da propaganda anticomunista' and 'A ditadura que o inglês viu', and João Roberto Filho's 'Segredos de Estado. O Governo Britânico e a Tortura no Brasil ' remains untranslated, but explores this relationship between Brazil and U.K. The translation of these texts will raise awareness of Britain's involvement and provide direction for future research.

Democratic Values in Political Parties: The Vox Analysis (2019-2022)

Ada Font Burdoy, *Pompeu Fabra University*

In recent decades, Europe has seen an increase in parties located to the right of the ideological spectrum. Vox bursts into the spanish political scene alongside other parties and cracks the two-party system that had existed up to that moment. Vox, specifically, runs for the first time in the state elections in 2019 (twenty-nineteen) as a disruptive party in the democratic playing field. It is for this reason that from the very beginning the existence of democratic values in Vox as a political party has been questioned by the academy. In this study, the presence or absence of democratic values within Vox, in both its organizational and programmatic part, will be analyzed through a qualitative methodology through 6 variables and their mandatory 17 (seventeen) indicators. The 6 variables used are: accountability, limitation of power, political equality, elections, inclusion, and freedom of speech. After the analysis, only positive compliance of 1 indicator and partial compliance of 3 indicators are found. Which is insufficient to affirm that Vox partially complies with certain democratic requirements. Subsequently, the inclusion of certain parties in the current Spanish democracy will be reflected upon in the form of conclusions. A debate is then born: Should Vox be included in the democratic playing field? Some theories that should be considered are Popper's Paradox, among other arguments from scholars such as Rawls.

8A Language in Teaching and Learning

Differentiated Instructions: The Effectiveness of the Oracy Component in the Chinese Language 2015 Happy Companions Instructional Materials for Lower Primary Students

Germain Wong, *Nanyang Technological University*

Differentiated Instructions (DI) refers to the constant reaction to what students require during a learning process. It is a popular pedagogy used by teachers to cater to students' needs. To master a language, oracy (listening and speaking) is very important for young learners. Since the 2015 Happy Companions Chinese instructional materials (teacher's guide, student's textbook and workbook) are widely referenced by teachers, this research focuses on analysing the sufficiency and effectiveness of current DI. The analysis was done through a comparison of lower primary (aged 7-8) instructional materials with Tomlinson's theory of differentiating instructions according to content, process, and product. DI in these materials were classified according to content, process, and product for students of different progressing levels. Thereafter, the total DI provided were summed up. An online questionnaire for teachers was also performed to verify the analysis. Results showed that, of the DI provided for the oracy components, 30% of teachers felt that it was sufficient in the student textbook while only 20% felt so in the student workbook. Although DI was incorporated, majority was only found in teacher's guide, which focused more on process and less on content and product. 80% of teachers pointed out that the DI in the teacher's guide can be increased and made more in-depth. As findings are able to provide insights for future curriculum planners, this research suggests that future textbooks could incorporate picture-word cards and workbook to include listening-matching activities, and teacher's guidebooks could also suggest students to be grouped according to their personalities. Finally, it is also necessary to incorporate differentiated instructions in assessments.

The use of discourse markers by language learners of Spanish

Luana Vanderstraeten, *Vrije Universiteit Brussel*

The topic of my research is the use of discourse markers by Spanish language learners. Discourse markers play an important role in expressing and interpreting discourse in an adequate way. They do not have an informational content, but contribute to it by establishing links. They can be used as connective devices with an argumentative, reformulating or organizing function. They can operate as discourse modalizers, can focalize an element in a discourse, can serve to enhance or maintain contact and control in communication. For the compilation of the data, I will use the PRACOMUL (PragmaticCompetencefromaMultilingualPerspective) platform, created in the framework of the PRACOMUL project, which brings together Spanish learners with different mother tongues. More specifically, I will be using students' conversations from the PRACOMUL platform. The students were invited to have a conversation on a general topic with another participant. They were not informed about the research topic, neither were they given any specific explanation on how to use different discourse markers. In a second phase of the PRACOMUL project, the use of discourse markers will be explained in a digital and interactive way. After these virtual teaching modules, the students will participate again and will have a conversation with another student. I will then investigate how the discourse markers were used by the Spanish language learners with different mother tongues, and more precisely analyse which markers appear more frequently and with which discourse function they are used. In brief, I will analyse the use of discourse markers before and after the learning process and therefore I will help assess the quality of the teaching.

8A Language in Teaching and Learning

German at Leeds - Then and Now

Holly Perril, *University of Leeds*

In an increasingly globalised world, language teaching can provide an individual with their first impression of another culture. Thus, the power of language teaching is immense. It can fight prejudices, stereotypes and misconceptions. The answer to a world without xenophobia: we need to decolonize language teaching. This research project concerns the history of the German department at the University of Leeds and informs a wider discussion regarding the decolonisation of our curriculum and how universities deal with international crises. The project addresses how German language teaching and learning has been affected by significant world crises of the 20th Century, such as WWI and WWII, and how this has cultivated an image of the German language within Britain that serves a political function. Furthermore, it analyses how these perceptions are reflected in the project's case study, the University of Leeds. This project is founded upon the principle that it is imperative to analyse how images of other cultures are constructed, and what purpose they serve for the country perpetuating such ideas. For example, why is it that the British insist that German sounds 'aggressive'? How do such tropes affect the perception of other cultures that we use to inform British students about the wider world? The sources for this project have consisted of archival materials from the University of Leeds which engage with the changing staff, curriculum and pedagogy of German Studies in Leeds and further afield. Consequently, the project seeks to extend the decolonisation of the education system within Britain through emphasising the essential role that language learning and teaching play in this task.

8B Exploring the Forgotten: Informing our Present through Historical Exploration

Studying the role of food in the evolution of Bengali Nationalism through the late 19th and early 20th centuries

Ahana Mitra, *University of Warwick*

This research project seeks to trace and analyze the changing nature of Bengal's culinary identity under colonial rule, with a focus on the time period in between the late 19th and early 20th centuries; and explore how this metamorphosis lent itself towards the national movement, in the form of everyday, performative or banal nationalism, against the wider context of the Indian National Movement. For the purpose of this project, we are going to focus on expressions of culinary nationalism as performed by the people of colonial Bengal through their everyday activities, and how these everyday choices contributed towards the discursive construction of a national identity, in the context of wider international developments of the 19th and 20th centuries. Culinary or gastro-nationalism has usually always been an important part of national expressions of independence or sovereignty, however, in the Bengali context, there is a noticeable lack of literature pertaining to this context. As Jayanta Sengupta writes, analyses of culinary nationalism in fact allows us "to establish the cuisine and culinary art of a nation as one more site in which the hegemonic aspects of colonial culture may be adapted, emulated, subverted or resisted." Using this bottom-up view of nationalism allows us to empirically observe the everyday behaviour of people, who consequently become, "the consumers, (re)producers and challengers of nationalism." In this sense, nationalism, in the colonial context, takes on a performative nature; where elements of nationalism such as identity and belonging were performed and exhibited through the everyday living experiences of the colonised people, in the nature of a complex power dynamic against the universalising forces of Western imperialism. Therefore, this project seeks to make a contribution towards analyses of banal nationalism, especially in the colonial context, where nationalism developed as a process of resistance towards the 'othering' of indigenous cultures and communities.

Every catastrophe needs a culprit: what was the impact of the Little Ice Age upon the European witch trials?

Daisy Shead, *University of Warwick*

My presentation will critically examine the legal impact of Article 31 of the TRIPS Agreement on enabling access to medicine worldwide. It will focus on the clause about allowing WTO's members to use a patent 'without the authorisation of the right holder, including use by the government or third parties authorised by the government (...) in cases of national emergency" (Article31). This provision is significant in Global Intellectual Property law because it attempts to, in one way, loosen patent protection worldwide, but it makes this sacrifice for the wider good of enabling access to medicine. Nonetheless, this claim is not as clear-cut once one looks deeper into this area of law, and especially after examining real case studies from Rwanda, Thailand, and the COVID-19 pandemic. Therefore, the research goes beyond the scope of a theoretical academic legal debate which enhances existing research by analysing real-world application of this legal question. It will conclude that analysing case studies reflects that Article31 lacks successful legal enforcement mechanisms that would significantly improve access to medicines. The research uses primary sources, such as TRIPS Agreement, as well as the Doha Declaration. Furthermore, the legal analysis is enriched to include secondary academic sources from respectable academic journals, such as European IP Law Review. A combination of primary and secondary sources will allow me to discuss legal documents and different academic opinions and theoretical deliberations about the wording of international agreements by putting them in an academic debate context. The research is filling a gap in existing research by prioritising the real-life implications of Article31 rather focusing on theoretical legal analysis.

8B Exploring the Forgotten: Informing our Present through Historical Exploration

Re-Writing Myths in Singapore Literature & Culture

Yee Kiat Quek, *Nanyang Technological University*

Singapore is a mythic nation, with a diversity of myths both literal and ideological, reinforcing within the consciousness of its people an official Singaporean identity which aligns with the national myth of 'The Singapore Story'. These myths, as well as those from beyond the country, have been re-written by writers in Singapore who contemporise the myths within the context of the nation, proposing alternative narratives in attempts to re-construct national identities through literary discourse. This paper is a cohesive study of selected re-writings of myths in Singapore and their re-significations, encompassing three interconnecting themes – "Founding Fathers", "Fearless Females", and "Queering Hybrids" – in which writers each postulate their re-envisioning of a national identity, through re-evaluations of patriarchal norms, reclamations of feminine symbols, and re-imaginations of hybrid creatures. These re-assertions of identities may originate from different perspectives but rather than refute one another, they converge in this combined reading to represent the possibility and reality of fluid, pluralistic identities, and imaginations, within, and of the nation that is Singapore.

A Study on the modern Swedish equestrians knowledge of the Prehistoric horses

Xinyi Lyu, *University of Sheffield*

Horse and man have a long and complicated relationship in Scandinavia starting with wild horse-hunting to modern days riding and competing. Considering or with an eye to the manifold archaeological evidence for horses and for representations of horses in material culture from prehistoric Scandinavia, from the stone Age to the Viking period. This study aims to highlight the mutual cultural heritage horse and man share and if and how it affects equestrians and horsemanship in modern times. In order to do so a qualitative (interviews to museums staff) and a quantitative (questionnaire to horse interested people) investigations was carried out. Respondents were asked whether they had knowledge about horse and man's joint history and asked to assess their own level of awareness on the subject. The study shows that among people interested in horses there is a great interest towards knowing more about the early history of the human-horse relation. Museums on the other hand do show material, but do not seem to prioritize the topic. All in all this essay shows that there is potential for further studies and also further development in making the cultural heritage of horse and man available to the public. This can be done by merging platforms to increase the exchange of knowledge between equestrians and the museums and in this way benefit both parties.

8C Behavioural Science and Social Systems

Daytime Sleepiness and Communication: Is There a Relationship Between Daytime Sleepiness and Non-verbal Communication?

Amy Burgoyne, Beth Hudson, *University of Warwick*

Sleep research on verbal communication has been dominated by sleep deprivation or sleep loss studies. The current study instead investigated daytime sleepiness and aimed to address whether the experience of daytime sleepiness is related to non-verbal communication, specifically gesture production. It was hypothesised that gesture is the element of communication that covers for lack of speech when experiencing daytime sleepiness; thus, the use of gestures increases with increased daytime sleepiness. 50 participants were presented with the simple task of describing a novel kitchen gadget and answering the Functional Outcomes of Sleep Questionnaire-10. Pearson's correlations showed no significant relationships between daytime sleepiness and the rate of total gesture production, representational gesture production, or non-complementary gesture production. These findings are further discussed in the context of gestures serving a compensatory function, the possible impacts on cognition and how the study relates to previous literature findings. Future directions of this research procedure are also suggested, such as using comic strip stimuli.

Validating the SEFI® Tool (Self Evaluation of Food Intake) in hospitalized patients of South Africa

Nicolene Kruger, Alvine Steenkamp, *Stellenbosch University*

Nutrition status deteriorates during hospitalisation, with nutritional assessment seldom performed as staff are unskilled and untrained. Dietary intake is fundamental to nutritional assessment and directly impacts clinical outcomes of undernutrition. This cross-sectional descriptive study aims to validate the SEFI® tool in establishing the food intake of hospitalised patients in Cape Town, South Africa. 519 patients were screened, and 265 participants were recruited (48,1 years; IQR: 34.4-63.1; 53.2% male). After lunch, the SEFI® tool was completed to determine food intake, using two methods, the visual analogue scale and the assessment of the portions consumed. The reference standard for actual food intake was a SEFI® score determined by assessing photographs of the consumed meals. The tool's understandability and ease of completion were recorded. The SEFI® tool demonstrates minimal limitations compared to existing food intake assessment tools. All participants were able to complete the SEFI® tool efficiently. Majority fully understood the tool (75.5%; n=200) and found it easy to complete (78.5%; n=208). A significantly strong positive correlation was found between the SEFI® score allocated by participants and researchers ($r=0.798$; $P<0.001$). Results established a relatively high sensitivity (85%), specificity (81%), positive (79%) and negative predictive value (86%). SEFI® provides a valid, accurate subjective assessment of food intake and can be performed without training. It's a quick, easy-to-use tool that can be utilised to determine food intake within the hospital settings of South Africa to facilitate the early identification of malnourished participants. Future studies can focus on the use of the SEFI® tool by other health care professionals and the use within the GLIM criteria for early identification of malnutrition.

8C Behavioural Science and Social Systems

Gratitude: Seeing the Good in Ugly Food

Tulip Yu Lay Ong, *Nanyang Technological University*

Food waste is a major drain on environmental resources. One of the major contributors of food waste is the discardment of ugly food. Ugly food is food that is of edible quality but has an unappealing appearance due to its shape, colour, size or the presence of blemish. Gratitude involves the feeling of having benefited from an external source. Past research found that people higher in gratitude tend to focus less on their appearance when evaluating their self-worth. As such, we predict that consumers higher in gratitude are more likely to accept ugly foods. In this study, we aim to investigate the effect of dispositional gratitude on consumer's quality perception of ugly foods. Two studies were conducted to test our prediction (Study 1: n = 299, Study 2: n = 297). In both studies, participants were randomly assigned to one of three conditions and saw pictures of fresh food that were either pretty, has a deformed shape, or has some blemishes. Their gratitude disposition was then measured via the six-item Gratitude Questionnaire (GQ6). Results across both studies consistently show that there is a difference between how consumers with different gratitude dispositions perceive the different types of ugly food. Specifically, for participants higher in gratitude, their perceived quality of the food was negatively affected by the presence of blemishes on the food but not by the deformity in shape of the food. Hence, the findings suggest that retailers can reduce ugly food waste by marketing ugly food in deformed shape to grateful consumers.

Association between sensory processing sensitivity, resting state electroencephalography activity, and sport participation

Kai En Yow, *Nanyang Technological University*

One's compatibility with a sport may be attributed to individual differences in responses to environmental stimuli; consequently, affecting adherence and performance thereafter. Sensory Processing Sensitivity (SPS), an intrinsic personality trait related to increased perception and sensitivity to environmental and social stimuli, and neuroimaging measures in Resting State (RS) Electroencephalography (EEG) spectral powers may be predictors of sports participation and achievement. While this association may provide guidance on the performance optimization of athletes, its predictive utility remains untested. This study serves a twofold purpose: (a) To investigate the relationship between SPS, RS spectral powers, and sport participation and achievement characteristics; (b) Predict the sport type and participation based on SPS scores and RS spectral powers in healthy, active adults. 30 healthy adults (age = 24.53 ± 3.33 years) with various individual and team sports participation completed the Highly Sensitive Person (HSP) Scale and underwent a 10-minute RS EEG recording. Correlational analyses were done between SPS scores and RS spectral powers. Simple logistic regression analyses were performed on the SPS score and RS spectral powers to predict type and participation level of sport. The Sub-scale of HSPS (Ease of Excitation) was positively correlated with Delta RS spectral powers ($p = .05$). No significant predictive ability of SPS and RS spectral power was found on type and participation level of sport. Our findings suggest a plausible association of SPS and RS EEG recordings. Prediction of sports participation and achievement from SPS scores and RS EEG data remains elusive. Recommendations are suggested for future studies.

8D Social Change, Inclusion and Engagement

Factors affecting social capital among students aged 14-18 in England

Charlie Atkins, *University of Warwick*

The UK government understands the benefits of social mobility, and their Levelling Up campaign highlights this importance. Students from different socio-economic backgrounds who attend different schools have different experiences. The adage 'It's not what you know, but who you know' shows the importance of the network that one can form through family relations, extracurricular activities or within their school. The research will identify how various factors affect a young person's access to social capital and examine how this can be improved. Using questionnaires and interviews with young people aged 14-18, the study explores students' understanding of social capital and their access to networks. The interview data informs the statistical analysis of the questionnaire to understand the influential factors in determining access to social capital and the ways disadvantaged young people can compete. The study shows, in line with previous research in this field, that while there are similarities - students from the more advantaged backgrounds, with better access to social and cultural capital, are more likely to take advantage of the networking opportunities presented to them. This research supports the current literature on levelling up and social mobility to inform schools and parents about how students can take advantage of their network and highlight the power of social capital. Young people will approach social capital from different starting points, and this research hopes to suggest ways to maximise access to and the benefits of social capital.

Examining if Australian Government's Responsibility to Asylum Seekers is Fulfilled through First-Hand Accounts of Former and Current Australian Asylum Seekers

Naomi Szeto, *University of Leeds*

The goal is to consolidate critiques of the Australian Asylum system, based on academic assertions it is not currently fulfilling its obligations as a signatory of the 1951 Refugee Convention. Australia's immigration policy is held in high regard internationally; eradication of its system of offshore detention centers would aid in the efforts to normalize the morally unacceptable nature of implementing such practice. The research must be convincing to the everyman. It will consist of legal document analysis, literature, and a micro-level investigation of the humans impacted by the detention centers. The methodologies will be triangulated, with the center of the project will focus on testimonials collected through second-hand means, as they possess emotional poignancy that will drive the receptors of my research to action. The use of pre-existing testimonials combined with treaty-based justification to critique the current system forms my inductive research project, with expected outputs to be a poster and presentation that will effectively summarize the moral inadequacy of the current system, including specific examples and next steps for the audience. It will provide advice on ways to respond to the project, such as promotions demonstrating the power of a vote that advances refugee rights, making it a project that can be applied to any country considering or possessing offshore detention centers. The project will be uniquely human-story centered, which is unlike the typical policy review, but more in-depth than a standard headline news story. It will analyze the proposed "Ending Indefinite and Arbitrary Detention" Wilkie bill that outlines reform for the current system for efficacy.

8D Social Change, Inclusion and Engagement

Generational Differences in the UAE

Farah Yaqoob, *Zayed University*

The lack of knowledge about the UAE's different generations results in a complex dynamic between younger people and older people and contributes to negative interactions in Emirati society. This qualitative study aimed to investigate the perceptions and interactions between four different generations (Baby Boomers, Generation X, Generation Y [Millennials] and Gen Z) of Emiratis to understand the dynamic influences of the UAE's economy, culture, and society on the Emiratis. The study used snowball sampling to recruit participants and collected data through semi-structured qualitative interviews. A total of 8 participants were interviewed with questions examining perceptions and interactions between generations. The results showed that younger generations (Gen Z and Millennials) showed admiration for older generations (Gen X and Baby Boomers) while they did not understand the disappointment older generations displayed towards their generations. However, older generations expressed that the youth of the UAE are open minded and embrace aspects of many different cultures, but they also believe this openness results in a loss of cultural identity. The findings showed that different generations faced many challenges in maintaining cultural identity while accepting social change. In contrast, the perceptions suggest that the UAE needed globalization, but Emirati citizens struggle to interact cohesively, and suspected negative interactions can possibly delay national progress. The results of this study point to the need for increased intergenerational dialogue, and may be useful for decision makers, employers, and other stakeholders who engage multiple generations in the course of their work.

8E Society and Culture: Modern Perspectives

Societal Culture and Democratization: Understanding the Limitations of the European Modernization Theory through the Case Study of Taiwan and Singapore

Kalos Lau, *University of Warwick*

Recently, there has been a rapid rise in the international power of authoritarian regimes, which seriously threaten the existing liberal order. Russia launched the Russo-Ukrainian War out of nationalistic interests in February 2022 while China is attempting to export its model of autocratic rule to Hong Kong, Taiwan and Africa. Amidst all the turmoil, it is worth asking why, contrary to general Western expectations, these countries have not developed into democracies despite having a robust middle class. This paper aims to scrutinize the Modernisation school's claim that economic growth is a factor directly leading to democratization. By using comparative analysis, this paper assesses Taiwan and Singapore's politics and explains why although both have a similar historical background and an established middle class, one become democratized and the other did not. It is apparent that the difference in political culture, namely the distinct national identities and future orientation of the two countries, affected their democratization process. By confirming that local culture plays a crucial role in democratization, my research allows politicians to assess countries that share different cultural backgrounds from a different perspective and reevaluate those states' possibilities for democratic development. Moreover, this paper demonstrates that European historical experiences are not universally applicable and that Eurocentrism is still implicit in research. Hence, this paper aims to revise the research culture of political science and proposes that more emphasis should be placed on cultural analysis. It intends to improve the democratic modernization theory and make academic research more relevant to contemporary issues.

Tired, Huddled Masses: The Political Economy of the Exploitation of Migrant Labour in Malaysia

Pei Yi Chin, *University of Warwick*

Foreign labour is a lynchpin of the Malaysian economy, constituting between 14% to 35% of the workforce. However, migrant labour exploitation remains a rampant practice, despite censure from academics, foreign governments, and corporations alike, and has only worsened during the Covid-19 pandemic. This research seeks to study the similarities and differences in the exploitation of male and female migrant workers, and examine which gender and which industries are more susceptible to different types of exploitation. The research scope will focus on the male-dominated construction and plantation agriculture sectors, and female-dominated manufacturing and domestic work sectors; these industries will be studied from the perspectives of: access to healthcare, regulatory and legal challenges, and social expectations, such as gender dynamics. The project's mixed-methods approach will consist of secondary research via literature reviews of research reports, academic publications, and policy documents, and primary research via interviewing experts in Malaysian migrant studies and advocacy. In studying the political economy of migrant labour, this research will examine the extent to which foreign workers are commodified and scapegoated societally, the successes and failures of institutions in safeguarding their welfare during periods of shock, and assess concrete policy changes to establish and protect migrant workers' wellbeing. This paper will be relevant to the UN's 2030 Sustainable Development Goals, especially 'Leave No One Behind', a commitment to combat poverty, discrimination, and inequality. Furthermore, studying Malaysia could inspire comparative research on other wealthier Asian nations with similar high migrant inflows and labour abuse issues, like Singapore and Hong Kong.

8E Society and Culture: Modern Perspectives

Living Technology - The fusion of technology and phototrophic organisms

Asmaa Elsouda, *University of Warwick*

The climate crisis will not be felt equally across the world or different social strata. This is the premise on top of which the entire field of environmental justice (EJ) sociology is built. Traditionally, EJ dealt with how race and class intertwine with the experience of environmental harms, but it has since expanded to include many more environmental struggles and intersections from different regions. My research interrogates whether EJ, as a field and a movement, is a useful framework for understanding the Palestinian context of environmental harm, its causes, and consequences. It explores whether claims to a “globalised” EJ are justified, by cross-examining two specific, relevant perspectives on EJ: decolonial and critical. As a theory that originated in the 1980s in America during an era of civil rights politics, EJ started with a state-centred vision of justice, propelling an on-the-ground social movement. Against the backdrop of the settler colonial project of ethnic cleansing and territorial dispossession, Palestinians are on the other hand constantly exploring and envisioning alternative ideas of justice for human and non-human natures violated by colonialism, many of which exist outside of the state entirely. Therefore, this research assesses the discrepancies, potentials, and limitations of various sects of progressive EJ scholarship in understanding the Palestinian context of environmental damage, by exploring literature that deals with the Palestinian environment, some of which identifies as EJ, and some of which does not. As such, it uncovers that transporting theories of EJ to new contexts increases their theoretical rigour; and bringing new theories to the understanding of the Palestinian struggle expands anti-colonial definitions of justice.

Living Technology - The fusion of technology and phototrophic organisms

Felix Graf, Joel Colin Christ, *Freie Universität Berlin*

Climate change poses an enormous challenge to our society. Research on systems that actively remove carbon dioxide (CO2) from the atmosphere, so-called carbon capture systems (CSS), hardly finds room despite the urgent need, presumably because CO2 is a very internal gas and can only be assimilated through high energy expenditure. As part of the X-Tutorial "Living Technology 2021/2022", we tried to circumvent this problem by creating a fusion of technology and plants that naturally convert CO2 into sugar. This was done as a collaboration between an interdisciplinary group of students from the University of Berlin and established experts in the fields of biology, physics and engineering. The idea for this project came from the two tutors, Felix Graf and Vivian Polenz, both 6th semester bachelor students of biology with a special interest in biophysics. In our project, we focused on the fastest growing plant on earth: Azolla. It completely overgrew the Earth's north pole about 49 million years ago and changed the Earth's climate permanently. The enormous amount of metabolised CO2 caused the average temperature of the entire planet to drop, so that the greenhouse climate of the Earth at that time came to an abrupt end. Over the past two semesters, the students did research on optimal conditions to influence the growth of this plant. We also created a first prototype for a CSS that actively removes CO2 from the atmosphere. The question is: Can we manage to modulate the Azolla event with this method?

9A Global Challenges and Global Solutions

Social Media and Electronic Communication usage by South African Dietitians

Kirstin Allies, Deena Shaulov, *Stellenbosch University*

Social media has become a major channel for promoting health information, especially relating to nutrition and food. An increasing number of dietitians are utilising digital platforms to enhance professional networking, to educate both public and other healthcare professionals by providing accurate nutrition and food-related information. This study aimed to determine the use of digital platforms by South African dietitians, and to investigate selected digital platforms hosted by dietitians in terms of adherence to relevant guidelines and regulations. South African dietitians were included in this cross-sectional descriptive study, collecting mainly quantitative data by means of an online survey (N=125) and an observational checklist (N=135) assessing dietitians' digital platforms. Most dietitians use Instagram (n=45, 45.9%) and Facebook (n=31, 31.6%) as these platforms are user friendly, quick and suitable to their target audiences. The Covid-19 pandemic caused an increase in social media usage (n=54, 65.1%). Barriers to social media usage included not having enough time (n=44, 28.8%) and being unfamiliar with some platforms (n=31, 20.3%). Enablers to social media usage included better reachability of platforms (n=51, 20.2%) and ease of use of some platforms (n=47,18.6%). The majority of survey participants were aware of HPCSA social media guidelines (90.7%, n=68). Thirty-four (25.2%) of the platforms observed engaged in forms of touting/canvassing. This research can be used to enhance professional networking, health promotion and education. It can also aid dietitians with improving their social media content, engagement, and activity, as formal research on exactly how this can be done in South Africa is very limited.

Digital Media Content Required for Health Education by Registered Nurses Working in Primary Health Care Setting in the Northern Tygerberg Substructure of the Cape Metropole

Alexa De Villers, Rosemary Elliott, Daniel Jordaan, Keri Lambooy, *Stellenbosch University*

South Africa is faced with multiple colliding epidemics that continue to affect a large percentage of the population. The dissemination of health education is challenged by the vast resource constraints, both human and material, that exist within South Africa. Literature shows the barriers and gaps in the availability, understanding, and the resources for delivery of health education to the South African population. The study aimed to bridge the gaps that exist in health education. A fieldworker-administered questionnaire was compiled and conducted to collect data from the 93 registered nurses, within the 10 primary health care facilities in the Northern Tygerberg Sub-Structure. Data was collected to determine the digital media practices and preferences, to identify the resource considerations to deliver health education, and to identify the learning barriers of community members, from the perspective of Registered Nurses. The results showed that the most beneficial medium for health education was in-person explanations by healthcare professionals(35.5%; n=33), posters and pamphlets(32.3%; n=30). The use of computer screens and television for delivery of digital media were identified as the most appropriate devices. Preventative education presented in 5-minute videos is the most effective. Further research is needed to confirm whether the recommendations made by the participants regarding content and style of digital media will yield greater information retention. Additional research is needed, from the patients' perspective, regarding the feasibility of different digital devices for the delivery of health education in South African communities.

9A Global Challenges and Global Solutions

Can corruption within government entities be deemed as an underlying contributor to the Beirut Explosion of August 4, 2020?

Lea Christy Assaf, *University of Warwick*

The Beirut Explosion of August 4, 2020 was measured against a stream of on-going hardships in Lebanon: the political havoc and uprisings of October 2019, the drastic collapse of the banking sector and the health crisis accompanying the Covid-19 pandemic. As Lebanon bears the overwhelming burden of these crises, the domestic investigation into the blast has yet to come up with a conclusive report analysing the series of events leading up to the accident, nor establish provisional liability accordingly. Numerous international assessment reports and academic journals from Human Rights Watch, World Bank, USAID, Transparency International and Chatham House, were reviewed to support the analysis of the dangers of ammonium nitrate, corruption and interference of officials in judicial affairs; bearing in mind potential biases towards this stance. This dissertation expands on the existing literature in providing an objective yet critical account of the events leading up to the blast, and establishing a causal link between corruption, mismanagement at the Port of Beirut and the occurrence of the explosion. This study found that the Beirut Blast could have been prevented, had the ruling class taken an active stance in safely storing the chemicals. This dissertation tackled corruption and mismanagement persisting within the government's Port of Beirut and characterised the misconduct of executives as an underlying contributor to the explosion. This dissertation calls upon the international community to conduct an investigation into Lebanese authorities' intrinsic procedural mishaps, lack of judicial independence, immunity of officials, violations of fair trial standards and due processes; in order to allow victims to achieve justice, truth and accountability regarding the explosion.

Rationality in the online sports betting industry: studying the impact of tax on the behaviour of agents in England and Poland

Szymon Litwin, *University of Warwick*

My research will investigate the rationality of agents in a sports betting market. In England, online sports betting is tax-free. In Poland, however, there is a 12% tax on the stakes. I will collect the odds from the online sports betting market in England and Poland and make a quantitative comparison to check whether agents adjust their decision by this tax. The online sports betting market is growing rapidly. Globally, it is expected to have a compound annual growth rate of 10% from 2021 to 2028. Considering this growth perspective, insights into agents' behaviour in this specific market could be beneficial. The results of this research might not only help to understand people's rationality when gambling, but also assess their rationality when faced with taxes. Surprisingly, there is no literature covering this particular topic. There exist some literature covering taxation on the sport-betting market from the macro-perspective and the effect of taxes on the bookmakers' profit, however, the evidence from the sports betting market hasn't been used to assess the agents' rationality yet. The finding of my research could potentially contribute to the gambling industry's knowledge base. Understanding peoples' rationality could improve the market taxation and potentially help to make a more optimal macro-economic decision. I am expecting that the odds will suggest that agents make irrational decision. Then, I could further investigate the agents' rationality in the sports betting market by changing my assumptions (such as the distribution of agents' expectations or the agents' utility function).

9B Global Challenges and Global Solutions

Co-living and wellbeing: comparative assessment of housing cooperatives in Spain and the UK and their effect their members' wellbeing

Vladislav Prokofyev, *Pompeu Fabra University*

Housing cooperatives are a response to the ongoing housing crisis which is a global phenomenon that directly affects the wellbeing of a great deal of people all around the world, as their access to housing had been greatly reduced. I analyse and compare long-standing co-ops in the UK and the emerging co-ops in Spain to see how they manage governance, collective decision-making, and how being a co-op member affects one's wellbeing, and whether there is a significant difference between them. I use interviews and literature review to gather the necessary data, and use the Comparative Method to perform a contrast of the formal aspects of selected cooperatives to see to which extent they are different. I also analyse the interviews to study the coops are managed by their members. As I establish, contexts for the emergence of Spanish and British cooperatives are very different, however their governance dynamics appear to be similar among both, regardless of their formal differences and their origins. This allows me to see if the experience from the British context can be applied to the Spanish cooperatives, as well as determine whether their external characteristics, such as history and legal status, affects their internal governance structure, as well as if these results align with existing literature. I also contribute to the literature of Spanish cooperatives, which at present is limited.

Determining moral responsibility within climate crises with reference to Derek Parfit's Non-Identity problem

Roman Irven, *University of Warwick*

Derek Parfit's Non-Identity problem concerns our moral responsibility toward specific future generations. A hypothetical absence of climate change mitigation has the potential to alter the direction of our lives drastically, and ultimately bring into existence individuals who would otherwise never have been alive. The concern, for Parfit, involves what we owe such people. Are they really harmed by the resulting climate breakdown when their existence is entirely dependent on it? If not, our duty to prevent climate breakdown must be found elsewhere. Through an exploration of the philosophy of time, my research will explore how we can still regard future generations as moral agents, and so still grant them political consideration, despite their conditional existence. Distinguishing between different sets of future generations, my research will explore more holistic understandings of harm which can form a foundation for our moral responsibility. Climate change, and what we owe to those who will live with the consequences, ask why it is immoral to act in specific self-serving ways. Since we believe that individuals are deserving of fundamental human rights, this is important. This research allows us to consider those impacted by the uncomfortable conclusions provided by Parfit. This research will add to the limited publications investigating the real-world impact of Parfit's work. Such work is extremely important in understanding how we must proceed in our climate breakdown prevention.

9B Global Challenges and Global Solutions

The disproportional effect of high inflation on low income households and minority groups

Fraser Drennan, *University of Warwick*

The U.S. CPI, used as a metric of inflation, is currently at a 40-year-high. The CPI aims to capture the spending patterns of a typical household. But is there ever really a typical household? There are some nuances in the way that people experience inflation that official metrics such as the CPI fail to capture. In 2011, Bill Dudley, president of the New York Fed at the time, gave an outreach speech to a blue collar community to address concern about cost of living expenses - just like the concern seen today. Unlike today however, the official metric for inflation was not that high (only 2.7% YoY compared to 8.3% YoY as of April 2022). The Fed were not particularly worried about inflation and Bill Dudley even gave an example to show that some prices were even going down in real terms; the iPad 2 which had just come out, was the same price as the previous iPad 1, $499, and it was technologically better in every way. During the speech someone from the audience shouted: “We can’t eat an iPad” - this remark is the stem of my research for this presentation. I will discuss how the price index for low and high income households can systematically differ over the course of a business cycle, and by analysing data on consumer spending patterns, come to a conclusion on how we can modernise and improve metrics of inflation; for example by disaggregating the CPI.

China’s influence in the Western Balkans: implications for the integration of the region into the European Union

Alba Marí Sánchez, Pau Verdú i Blas, *Pompeu Fabra University*

China's rise as a superpower has been a key theme in international relations for decades, focusing on its expansion and growing economic influence over third countries. The eastward expansion of the European Union is also a topic that has received special attention. Our research project aims to analyze the interrelationship between these two phenomena. The question that will guide our research is whether China's influence in the Balkans can have an impact on the European integration process in this region. To do so, the methodology used is qualitative. Firstly, we will be doing a systematic review on the existing literature regarding Chinese economic growth and international expansion, as well as regarding the process of European integration of the Balkans. Secondly, we would like to revise, to the extent possible, primary sources. We expect to discover whether China's influence can condition the entry of countries in the region into the EU. Therefore, although we think China’s influence in the Western Balkans countries does not represent an alternative to EU integration, there is an increasing sense in the Western Balkans countries of abandonment by the EU that may push these countries towards China and make their entrance to the Union more difficult. With our research we try to further develop the research on the topic of the Balkan integration. Furthermore, we think this paper contributes with the studies on the growing Chinese area of influence, especially along the known as “new silk road” that connects Europe with China through different commercial routes.

9C Perspectives on Gender and Society

Underrepresentation of women in leading politics in the Czech Republic

Gaetana Fagone, *University of Warwick*

My research is about women's underrepresentation in institutional politics in the Czech Republic. This is a crucial issue for Czech democracy because half of the population is currently excluded from political and legal decision-making. Women's issues like fair maternity leave, fair education, equal opportunities, the gender pay gap, sexism, and violence against women, will never be adequately addressed if, on average, 80% of politicians are male. I found that some reasons behind gender inequality are the entrenched stereotypes, institutional sexism, and insufficient caring possibilities for children under three years old. Moreover, the phenomenon of the 'Queen Bee syndrome' is widespread in the Czech Republic, which means that successful women do not support the women below to succeed. So, to change the situation in the Czech Republic, we must support each other and campaign for greater inclusion of women in politics to create enough tension in the government to see women in political roles as a norm, not as something unusual. To complete the project, I read "The Authority Gap: Why Women are Still Taken Less Seriously than Men," which gave me an essential insight into how the economy and gender equality are related. Then, I read some articles, which redirected me to other resources. I ended up reading the Strategies the country has developed to tackle discrimination, following the summaries from the government of their achievements and failures throughout the year. The crucial part of the project was interviewing three women politicians to understand their experiences, for which I got ethical approval and completed two courses: "Research Integrity" and "Protecting human participants."

'Queering the Archive': A Radical Understanding of the Preservation of Memory

Emily Hughes, *University of Warwick*

The institutional archive has long-marginalized queer histories. The concept of archival ‘silences’ – that what is not preserved in the archive can be as telling as what is – has been long-studied, with many queer archives aiming to compensate for this silence and curate a queer past. However, there is perhaps a certain irony to such efforts conforming to the institution of systemic violence that has created such silences. Accordingly, Queering the Archive instead studied radical, non-conformist archives that aimed to create memory, not merely preserve it. It posed the question: how could we understand the archive through a radical lens? Using two case studies, the staged documentary-style film The Watermelon Woman (dir. Cheryl Dunye, 1996) and the digital cartographic archive Queering the Map, this research explored how subverting archival norms represents a deliberate radicalization of memory and the archive itself. Ultimately, through an understanding of the non-normative archive, I argued that the collective memory shared by the queer community must be understood through a uniquely queer lens. Through a discussion of archival notions such as truth and authenticity, this research sought to open up a new discourse about both the methods of preserving memory and for whom it occurs, as well as the crucially affective value it can provide to queer identities in the present. It asserts that the queer collective past only exists if there is a want for its preservation; pride in the non-normativity of queerness both demands, and deserves, a non-normative archival approach.

9C Perspectives on Gender and Society

The role of U.S. imperialism in the construction of masculinity in the Puerto Rican and Dominican diaspora

Kaitlan Russell, *Baruch College - City University of New York*

This study seeks to investigate the traditional descriptions of Puerto Rican and Dominican men as “breadwinners” yet “womanizers” to demonstrate that masculinity and the characteristics used to describe it are a reflection of the economic systems we exist within and change as those systems evolve. Also, to demonstration how these ideas were imported and reinforced by the initiation and intensification of the imperialist relationship between the U.S. and the Dominican Republic and Puerto Rico. The works of Rafael Ramirez, Helen Safa, and Rita Indiana focus on this relationship and this study will use their works as a launching pad for further investigation on how industrialization in the mid-to-late 20th century in Puerto Rico and the Dominican republic, in addition to mass migration to the U.S. and the intensified imperialist relationship between the countries resulted in a mass shift within society. This mass shift intensified the relegation of women to the home and required men to behave in a particular way in order to be considered “masculine.” This study seeks to bring light to the relationship between U.S. imperialism and the dominant ideologies surrounding masculinity within their colonies/neo-colonies to demonstrate that ideas surrounding masculinity are unfixed. This study also hopes to stimulate further discourse on how imperialism affects the interpersonal relationships between people within the colony/neo-colony and how that is an intentional effort on the part of the imperialist country.

The Racialisation of Body Hair

Zara Sharif, *University of York*

The removal of body hair is a women's beauty practice that is treated as normative (Toerien & Wilkinson, 2003), but reveals how control is exerted over women in the construction of submissive, heteronormative, white femininity (Fahs, 2019). Women of colour exist even further from this sphere of acceptable femininity, and so their body hair is more policed and their femininity questioned, yet they are left out of the research (Hope, 1982). Discussion into how these practices are intertwined with racism is limited, but is incredibly significant for the development of Intersectional Feminist Theory and to young women of colour. Alongside an online survey, five in-depth interviews with women of colour were conducted about their changing relationship with their body hair and how this is informed by/informs their racial identity. Whilst their experiences and the findings are incredibly personal, it provides an important and valuable insight into the taken for granted practice of body hair removal and how this affects women of colour, and how adolescent girls develop this fraught relationship. Findings reveal how restrictive Eurocentric ideals of beauty are created and transmitted by peer groups, schools, families and the media to keep women as self-hating consumers (Freedman, 1986) in a constant, unwinnable effort to be beautiful, to the point where the removal of body hair becomes akin to self harm. Larger scale, more representative research could give voice to more women of colour and further contribute the theories of Critical Race & Intersectional Feminism, as well as a greater analysis into the role of the media in the creation and reproduction of these norms.

9D The Internet, Big Data, Cyber Security and Privacy

Digitalised workplaces and online advocacy: are prospective barristers prepared?

Zoe Adlam, *University of Durham*

Prospective barristers are entering a new workplace. From digital case management systems, like the Common Platform used in criminal courts to the increase in remote hearings, for example, in 2020/21 86% of family court users attended a remote hearing. Yet, there is little research into whether prospective barristers are prepared for it. This research asks whether the Bar Training Course (a postgraduate course providing prospective barristers with the professional skills to practice) is preparing them to use digital workplaces and conduct remote hearings. An initial literature review illustrated the broad themes of the research, including the digitalisation of work and the digitalisation of the legal profession. Alongside this, a PESTLE analysis demonstrated that digitalisation is impacting the Bar, providing further background as to why the research is necessary. However, the course details online did not show whether the advocacy component of the course covered remote hearings or whether prospective barristers were introduced to digital workplaces. Thus, interviews with practitioners who teach on the course helped to answer these questions, showing that the Bar Course does not sufficiently prepare prospective barristers for digitalised workplaces or online advocacy. This is because they are neither taught about online advocacy nor able to practice using digital workplaces due to technological limitations or negative perceptions about teaching it. As a result, it is necessary to begin a dialogue with the Bar Standards Board and Bar Course providers to emphasise the importance of these skills. This research recommends integrating classes on remote hearings and giving providers access to digital case management systems so prospective barristers can practice these skills.

Striking the social balance: Analysing the societal impact the implementation of Financial Technology can have on UK Community Development Financial Institutions

Natasha Pickard, *University of Warwick*

Community Development Financial Institutions (CDFIs) are non-profit organisations which provide affordable credit to those with limited credit options, often resulting from low and immature credit profiles. The economic impacts of the pandemic and the cost-of-living crisis have increased the demand for affordable alternatives to high-cost lenders. To date, CDFIs contribution to reducing social inequalities has been marginal compared to the scale of unmanageable debt in the UK. Furthermore, these organisations have struggled to develop a scalable business model without support from government grants. Due to the resource constraints of these organisations and the size of the sector, no research has yet been conducted that maps the potential impacts of implementing Financial Technology (FinTech) against the sector's social goals. This research is concerned with analysing key themes currently developing in the UK CDFI sector, relating to how FinTech can be utilised by these organisations to improve the depth of their social impact. By combining a literature review with conducting key stakeholder interviews, followed by analysing relevant commonalities, this research aims to identify how different FinTech adoptions may alter the social impact achieved. From this, it is expected that a trade-off will be presented between scalability and CDFIs ability to contribute towards the 10 UN Sustainable Development Goals of the sector. These findings will add knowledge to a grant-reliant sector and bridge academic literature relating to economic inequality and ethical banking. This research will enable better-informed decisions on future strategies within the sector, which translates to fundamental support for the development and longevity of this socially valuable sector.

9D The Internet, Big Data, Cyber Security and Privacy

Assessing Google Translate's Accuracy in Processing Homonyms in a Sentence Structure from Modern Standard Arabic to UK English

Aymen Zekeria, *Zayed University*

Machine translation is the use of machine learning to translate between languages. Usage of machine translation is indispensable as the world becomes globalized. It is unrealistic to depend on human translators to translate the large volume of information exchanged between people speaking different languages. While machine translation has opened the door to easy, rapid cross language communication, the complexity of languages and their nuances impact the accuracy of this technology. One of the language complications is homonyms, which are words that have the same pronunciation or spelling but different meanings. The machine has to understand the context to accurately translate a sentence containing a homonym. Although much research has been done in this area, the researcher believes that it hasn't reached to a desired stage. This research project assessed the accuracy of google translator when translating sentences containing homonyms of standard Arabic to United Kingdom English. Source text (50 pair of homonyms) that was translated by a machine translator were compared with human translated text. The results infer that google translator is excellent translating common sentences, however, find some difficulties when there is a meaning changer word with stress (Shada), double consonant letters (Tanwin). These findings mean that there are still some advancements needed to fully rely on machine translators as we rely human translators. The researcher plans to use these findings to create a machine translation model that can tackle this issue and help close the gap between human translators and machine translators in translation of sentences containing homonyms.

Stock prices and Machine learning: Implementing Machine Learning methods to forecast equity prices and propose an optimized portfolio composed of equities listed on the DJIA

Aron Sbhatu, Siem Hadish, *Zayed University*

For centuries, people have tried to increase their wealth by allocating their money to resources or businesses they believe are lucrative. The idea of investment has passed through many phases and had different drawbacks at different times. The most recent bottleneck in the area of investment is the limitation of human processing power, and the fact that no individual can possibly process all necessary information and simultaneously have all the skills required to use the information for informed decision making. This pilot project is part of a larger research project that aims to develop a deep learning model that can predict stocks from the selected set of companies based on their historical data and recent performances. In this study, the historical price of 27 stocks currently listed in the DJIA from the beginning of the year 2000 to the end of 2021 were used to train and test the model's performance. Based on the initial findings, the model to sort the companies based on their probabilities for profit and this would enable traders to have scientific insights to aid them in their operations. Positive outcomes from this research will be used as a ground work for developing a deep learning model that will be able to implement live trading strategies with minimal human interventions.

9E Gender and Social Inequality

Exploring late 20th-century participatory feminist media with specific regard to Cobwebs

Rebecca Capel, *University of Warwick*

My project focuses on Cobwebs, a feminist magazine published by the Women's Association at Warwick University in the late 1980s. Cobwebs covered a great range of things: drawings, poetry, reviews, current events, and advertisements for community events (just to name a few!). I will be writing an academic research paper situating Cobwebs within a wider context of creative, self-published feminist media, and a zine (homemade booklet) for public audiences. From these, I will create an engaging, accessible spoken presentation to present at ICUR. To create these, I have and will consult existing feminist scholarship in this area, in addition to wider reading about feminism in universities and the UK during the 1980s. I have successfully reached out to alumni online, and will create an open-ended form for those willing to contribute. I will also liaise with them over email for follow-up questions. I will utilise the Modern Records Centre at Warwick, which has archived Cobwebs both online and physically. From my work on this project so far, I expect that Cobwebs will emerge as an ambitious and creative publication which fits into wider trends of self-published feminist media which aimed to encourage and situate creative and political self-expression, unique viewpoints, a sense of community. My analysis will add to this exciting strand of history, and offer unique insight due to its creators being university students who welcomed male contribution.

Female Abuse in China

Yayun Zheng, *University of Warwick*

Gender inequality is a prevalent social phenomenon in China. Despite a general pattern of falling gender discrimination over time, women's rights have still been an issue. The All-China Women's Foundation reveals that approximately 30% of married women have been domestically abused. The research question asks: "What are the correlatives of female abuse?" The research uniquely analyses underlying correlatives by discussing a combination of secondary qualitative findings from Katie Curtin's work on feudalism in history and Zeng Meng's evidence on the unintended side effects of government regulations in the current stage. Results are interpreted and validated based on historical and contemporary literature. My study finds that both survivals of feudalism and the newly adopted 30-day cooling-off period on divorce potentially destroy basic human rights enjoyed by women. This paper fills in the knowledge gap by thoroughly illustrating the undesirable effects of both inertias from the past and current policies in China rather than merely discussing the former. The paper is highly relevant to inequalities and the sustainable development agenda, with direct implications for SDG 5: Gender Equality. The research emphasizes the requirement for reform of current government policies by constructing public awareness so that more females can be protected away from discrimination and abuse.

9E Gender and Social Inequality

The Incompatibility of Constitutional Monarchy with Democracy

Matthew Munnelly, *University of Warwick*

Democratic theory does not address the varying ways legitimacy and equality are handled in constitutional monarchies compared with other kinds of democracy. It does not consider the tensions that a constitutional monarchy causes with democracy. This paper does so, arguing that the only way such tension can be resolved is through abolishing constitutional monarchies. After clarificatory points and an introduction to key terms in part 1, part 2 of the paper outlines the socio-political rights of an 'abstracted' constitutional monarchy. Part 3 notes a 'folk-theoretic' commitment to democracy before outlining two theories of democracy: Fabienne Peter's 'Pure Epistemic Proceduralism', which focuses on what achieving democratic legitimacy requires of a political system and Elizabeth Anderson's theory of democracy (referred to here as 'Dualist Democratic Equality'), which focuses on democratic equality. In part 4, these theories of democracy are used to analyse the socio-political rights of the constitutional monarchy. This analysis demonstrates the tension between the essential features of constitutional monarchy and democracy. A stalemate is thus shown between monarchy and democracy. In part 5, I propose that the only way of resolving this tension is to abolish either one or the other. Given the folk-theoretic commitment to democracy, it is argued that constitutional monarchies must be abolished; for Fabienne Peter's democracy, this removes constraints on the development of public knowledge; while for Elizabeth Anderson's, it is for democratic equality (or equal relations between people) to be achieved.

Links between Sleep Quality, Dysfunctional Beliefs and Attitudes about Sleep, and Perceived Social Support among Undergraduate Students

Triinu Zimmerman, *LCC International University*

Research on sleep shows that sleep quality among college students is decreasing. Various factors, such as beliefs and attitudes about sleep, as well as perceived social support can be affecting students' sleep. Therefore, the purpose of this study was to examine the relationships between dysfunctional beliefs about sleep, perceived social support, and sleep quality among undergraduate students. The number of total participants was 104, aged from 17 to 33 years of age. They took an online survey that included three questionnaires to measure the mentioned variables. It was hypothesized that a greater level of dysfunctional beliefs about sleep would be linked with worse sleep quality, while students with less dysfunctional beliefs and attitudes about sleep would have greater sleep quality. As expected, a statistically significant positive correlation was found between dysfunctional beliefs and attitudes about sleep and poor sleep quality. 36 (37.4%) participants were classified as good sleepers, while 68 (70.72%) participants were classified as poor sleepers. It was also hypothesized that a greater level of perceived social support would be negatively correlated with poor sleep quality. The results showed a significant negative correlation. Additional analysis examined whether there would be a difference between low level (N = 6), moderate level (N = 46), and high level (N = 52) of perceived social support and sleep quality. The findings supported the hypothesis, finding a significant difference in sleep quality between low and moderate levels of perceived social support in comparison to high level of perceived social support. For further research, the importance of different sources of social support in relation to college students' sleep quality needs to be examined.

10A The Future of Europe: New Perspectives

How do economic evaluations affect preferences for a bizonal, bicommunal federation solution to the Cyprus Conflict?

Maria Papapetrou, *University of Warwick*

For almost half a century, Cyprus has had a unique status quo in Europe, divided into two separate territories with 37% of the island unlawfully occupied by another country. Although considerable research has been devoted to several aspects of the Cyprus conflict, little attention has been paid to the way economic evaluations of a prospective resolution affect individuals' likelihood of supporting it. To the author's knowledge, this is the first paper to examine the different channels through which such evaluations affect Cypriots' support in a potential referendum. The solution to the conflict in question is a Bizonal Bicommunal Federation (BBF), the only solution at least weakly preferred by both communities. By collecting primary data from around 700 individuals from both communities in the island and employing ordered probit and linear probability models, this study shows that positive perceptions of the solution's economic impacts greatly increase the probability of supporting it. This renders the solution's economic aspects a new key instrument that can help predict whether the next referendum will pass, following the rejection of the latest plebiscite in 2004. The novel application to the case of Cyprus widens the arena of research in the field, with the possibility of extending this paper's findings to the cases of other disputed borders.

Donbas: analyses of identities, political views and regionalist parties

Darya Shkarupina, *Vrije Universiteit Brussel*

This paper analyses Donbas war by inspecting local identities, use of language, regional political parties and politicians along with propaganda techniques that were implemented in order to shape people opinions. The topic was researched using literature analysis, open-source information and qualitative interviews and analysis. I interviewed Donbas locals on the question of identity, language, political views and their views on the Donbas war in 2014. Donbas war is a product of long-existing contentions such as the overall unstable political situation in Ukraine since the fall of the USSR, specifics of the Donbas region, and behaviour of the Kremlin, pro-Kremlin politicians, security forces, and oligarchs in the region. This paper was written in the time frame of November 2021 – to May 2022 and while analyzing this multi-layered conflict in Donbas, Russia started the full-scale war on the Ukrainian grounds. This fact needs to be regarded as very important since empirical research was already conducted during the war, therefore selected respondents cannot always be clear-minded. Along with that, several pieces of evidence and articles were deleted from the open-source access in both sides Russian and Ukrainian. Donbas needs to be regarded as the main base for the future analysis of the war in Ukraine in 2022. Without understanding factors that led to the Donbas war such as the historical premises, involved actors (pro-Russian politicians, oligarchs, Ukrainian politicians), and events, any research on the ongoing war would not become valuable.

10A The Future of Europe: New Perspectives

Applying a socio-ecological perspective to social implications of the proposed area of the EU Biodiversity Strategy for 2030 for non-EU countries

Martyna Wrona, *University of Warwick*

The EU aims to recover European biodiversity with the Biodiversity Strategy for 2030, introducing protection of 30% of Europe's land area. The policy includes strict protection of forests, forbidding intervention in habitats occupied by naturally-occurring species. Unfortunately, the decrease in wood logging in Europe will result in the leakage of roundwood production to disadvantaged non-EU countries. This leakage would deepen the environmental inequalities, eventually increasing the discrepancy between the Global North and the Global South. The controversy over the policy is predominated by economic discourse, while social implications have been ignored. The reasoning behind my research was to qualitatively evaluate the possible leakage effect, that is, unintended spillover of timber logging. I wanted to fill in the knowledge gap, adding a new perspective on the environmental injustice of EU's environmental emergency. Firstly, I conducted secondary research on the Strategy core regulations. Then, I studied the shifts in industrial roundwood production, with the use of mathematical simulation of the Global Forest Products Model, analysing trends in wood industry. Eventually, I applied a socio-ecological framework to visualise the risks for non-EU countries. It showed that human-environmental systems are interconnected, acting in cross-scale interactions. Overall, the most negatively affected countries are countries with the lowest vulnerability indicators of governance and forest management, such as Brazil, Chile, and Malaysia. The EU should re-consider the implementation of the Strategy until all doubts are resolved. If the EU does not address the possible leakage with a regenerative approach, global socio-economic divisions might be deepened and the most disadvantaged might suffer.

Opposition to European integration: an analysis of Euroscepticism at the electoral and citizen level from a comparative perspective

Xavier Lamarca Ferrés, *Pompeu Fabra University*

The legitimation crisis that is facing the European Union endangers its integration project. Eurosceptic deputies have steadily increased, being the current European Parliament the most Eurosceptic in recent decades. In the same way, European public opinion makes its vote of protest felt at the polls. Considering this, Euroscepticism has become a generic term used by the literature that is not always useful to capture the nuances of the different types of opposition to the integration. Two complementary approaches have been used to measure integrationist attitudes at political and citizen levels. A qualitative methodology through a framing analysis of the selected electoral programs has been used to present the different forms of opposition or criticism that political parties use towards the European Union. Likewise, I use a quantitative —empirical— analysis of the European public opinion to find those variables that can best predict the Eurosceptic sentiment in citizens. The findings obtained overcome the reductionist and simplistic distinction between "hard" and "soft" Euroscepticism, showing that Euroscepticism does not constitute a homogeneous ideology, but rather a transversal ideological phenomenon that differs in intensity and in the arguments used when criticizing or opposing the current level of integration. Furthermore, it is appreciated a correlation between the dominant discursive practices of Eurosceptic political elites and those key areas that best predict the probability of a citizen being Eurosceptic. In this sense, it would be convenient to determine in future lines of research the ascending —bottom-up—, descending —top-down— or bidirectional nature of this relationship.

10B Health and Wellbeing in Society: COVID-19

The mind, the body, and the pandemic

Lorna Pepperill, *University of Leeds*

Throughout the lockdowns, society transferred to its online counterpart: social media. Undeniably, social media can have a detrimental effect on individual's relationship with their body and thus, as the reliance of social media increased during the pandemic, one must question if attitudes towards body image also shifted. In particular, there was a surge in the promotion of getting fit and losing weight bloomed throughout the three lockdowns as media outlets advocated that self-isolation was the time to redefine oneself. The effect of this pressure and the dangerous entanglement of the body and social media needs to be urgently addressed. Thus, through interviews and gendered focus groups, I completed a research project that investigated if the idolisation of health during the pandemic has affected body image. Conclusively, individuals either relinquished or tightened control over food and exercise during the lockdowns; during such an unprecedented time control- or lack thereof- became soothing. Additionally, gendered stereotypes of body image was highly influential in what people ate, how often they exercised and what characteristics of their body they wanted to change. During this research project, it became apparent that academic attention must be turned toward the relationship between the mind, body and the pandemic.

Forecasting UK population growth rate using Hidden Markov Model based on theory of the Second Demographic Transition

Wen Jiang, Jialong Xu, Yuanhe Zhang, *University of Warwick*

The Second Demographic Transition (SDT) is a demographic framework used to describe sustained sub-replacement fertility and the disconnection between marriage and procreation. Though the growing sexual rights of females have been regarded as fundamental factors in advancing the process of SDT for a long time, the effects of the change in other women's rights, such as the breakdown of traditional family, should not be ignored as well. We aimed to investigate the effect of women's rights other than sexual rights on the SDT process in the United Kingdom. In this research, we modelled historical data including population growth rate, fertility rate, age of first pregnancy, and divorce rate using Hidden Markov Model(HMM). And we used the trained model to perform forecasts. HMMs are considered as a specific form of dynamic Bayesian networks, which are based on the theory of Bayes. We use HMM to capture hidden information (e.g., up/down/no change in population growth rate) from observable sequential symbols (e.g.,fertility rate, age of first pregnancy, and divorce rate). The results confirmed the impact of divorce rate, age of first pregnancy, and fertility rate on population growth rate under SDT framework. Furthermore, the rise of women's sexual revolution, family status, and gender income gap have contributed to the SDT process. This research will be a useful reference for the British government to understand population and women's rights issues and to formulate policies. Moreover, our work provides a unique perspective for demographic research in different countries based on the development of women's rights.

10B Health and Wellbeing in Society: COVID-19

The effect of reduced haemodialysis sessions due to covid-19 on nutritional outcomes

Jana Maree, Thobile Nkabinde, Mikyle Rodrigues, *Stellenbosch University*

The aim of the study was to investigate the effect of the reduced dialysis sessions on the nutritional outcomes of patients with end stage kidney disease (ESKD). ESKD is the last stage of chronic kidney disease (CKD). The nutritional status of ESKD patients is affected by the many metabolic complications of the disease. At Tygerberg Hospital, patients with ESKD usually receive three haemodialysis sessions per week. Due to the Covid-19 related lockdown, the number of sessions were reduced to twice weekly. Information was obtained using a questionnaire to collect biochemical information, interdialytic fluid gain, and questions related to the participant's compliance on the dietary guidelines obtained from a dietitian. Statistical analysis was performed using SPSS/Stata, with statistical tests used to test nutrition changes over a seven-month period. There were 34 patients, with an average age of 41,3 ± 9,4. Eighty-five percent of the study population received dietary guidelines, and a similar percentage of the total study population followed the guidelines for cooking methods. Majority of participants did not adhere to the fluid guidelines. Biochemical tests showed a significant increase in sodium from the start-point to the endpoint and in potassium from the start-point to mid-point only. Looking at the biochemical results, it is clear that sodium was elevated throughout the time period, while potassium only increased at the midpoint and stabilised thereafter. Therefore, the conclusion could be made that a reduction in haemodialysis sessions may be acceptable to practice for short periods of time in a hard lockdown.

The Impact of Study Environment and Personality on Wellbeing in Relation to COVID-19

Iona Craig, Ffion Davies, *University of Warwick*

Previous research shows that working from home has a mixture of impacts on wellbeing. There is an abundance of research indicating that wellbeing is intrinsically linked to personality, which is scarcely explored in the literature regarding work environment. This study set out to explore the impact that studying from home, resulting from COVID-19, has had on students' psychological wellbeing (PWB), controlling for personality. Quantitative data was collected to gather PWB and personality scores using the Oxford Happiness Questionnaire and the Big Five Inventory 10. A qualitative question, "How do you feel about your current study environment situation?", was also included. No relationship was found between study environment and PWB in a bivariate correlation. This remained unchanged when personality was controlled for in a partial correlation, which does not align with previous findings. However, themes of socialisation, flexibility, mental health, and lack of motivation were found in the thematic analysis implying that there is a relationship between wellbeing and study environment. A multiple regression found a significant relationship between agreeableness, extraversion, conscientiousness and neuroticism with study environment. Further analysis also revealed that those studying in-person full-time tended to be less agreeable than those in other study environments. This implies personality interacts with study environment which may have implications for adjusting learning environments within universities. Future research could look further into these factors that influence agreeableness and we also suggest repeating the study with a subjective wellbeing measure to address the discrepancy between quantitative and qualitative findings.

10C Modern Perspectives: The World of Science

Who wants to live forever?: What can we learn from worms about living a long and healthy life?

Gemma Marshall, Adele Morgan, *University of Warwick*

Despite ageing being a much-studied subject within science, the mechanisms driving it are still unknown. One factor shown to impact ageing is dietary restriction (DR). DR can extend lifespan in many different organisms, including the roundworm Caenorhabditis elegans. This small (~ 1mm) roundworm is convenient for studying ageing because of its short lifespan of 2 weeks allowing experimental results to be analysed quickly. Furthermore, it shares many genes with other animals (including humans) and it's easy to genetically manipulate. A second factor affecting longevity reproduction is the removal of the reproductive cells in them, which increases sterile worms' lifespan from 2 to 3 weeks (~60% longer). We hypothesise that both conditions (DR and sterility), will further increase the lifespan. We will use sterile worms on a normal bacterial diet and then move them to DR at different intervals in their lifespan, revealing the timepoint during adulthood in which DR is most effective. We will also test whether they are attracted to glucose when on DR, and the sugar's effect on their lifespan. This allows us to obtain a greater understanding of the extent to which DR affects lifespan, and how. Follow up research includes gene inactivation experiments to find the genetic basis of lifespan extension on DR of those sterile worms. Understanding the mechanisms behind lifespan in C. elegans will act as a steppingstone towards understanding ageing in humans and other higher organisms.

The Effect of Storage and Transportation Conditions on the Performance of RT-PCR for the Detection of SARS-CoV-2

Ziyu Yi, *University of Warwick*

Millions of samples were taken from the household to the laboratory to undergo RT-PCR tests to detect the SARS-Cov-2 following the government requirements in the United Kingdom during the pandemic. It is believed that accurate RT-PCR results contribute to better policy decisions regarding public health while minimizing the impact on society. However, the action of household sampling and delivery by post is possibly associated with problems which impact the sensitivity and specificity of the RT-PCR and widely impact infection control and policy deciding process. This project is based on this to discuss if the conditions during the storage and delivery will or how affect the RT-PCR-based detection of the SARS-CoV-2. Specifically, how the temperature and the time from sampling until used in the laboratory co-functioned in the results. We set control groups which be placed for a maximum of 15 days and under temperature ranges of 0-40°C to locate the date and temperature needed to result in false negatives under laboratory conditions. The RT-PCR will be conducted every day and expected to show that when samples are placed for more than 10 days or/ and above 21°C, the false-negative results will be presented. Therefore, the sensitivity and specificity of RT-PCR are wakened due to the change of condition of storage of SARS-Cov-2. It is expected to see false negative presented and therefore confirm the date and temperature impact on the sensitivity and specificity of RT-PCR and provide suggestions in policy deciding for COVID-19 aiming to provide a balance between higher effectiveness and efficiency in using laboratory resources and more reliable RT-PCR results for highly accurate infection control.

10C Modern Perspectives: The World of Science

Using computational tools to investigate the population genetics of syphilis infection

Arthur Margolis, *University of Warwick*

Syphilis is an infection caused by the bacteria Treponema pallidum. Little is known about how host genetics may impact syphilis infection. In this project, under the supervision of Dr Bridget Penman at the University of Warwick, I will investigate the possible interaction between syphilis and Major Histocompatibility Complex (MHC) genetic diversity. We will utilize the Columbian hypothesis as the motivation for a population genetic analysis The Columbian hypothesis is the theory that returning European explorers such as the crew of Christopher Columbus brought syphilis from the New World to Europe when they sailed home in 1493 as part of what is widely known as the Columbian exchange. If the Columbian hypothesis is correct, indigenous Amerindian populations may have co-evolved alongside T.pallidum for a far greater time than European populations. MHC alleles that are well adapted to syphilis (i.e. those which encode MHC proteins that can bind crucial T. pallidum antigens) may therefore be found at higher frequencies (or found at all) in Amerindian populations rather than in European populations. We will investigate this question using in silico methods to determine the binding capabilities of different MHC variants, and then determine the allelic frequency of those MHC variants within certain geographic populations. From this we should be able to investigate the levels of MHC adaptation and thus theorize the source of the pathogen. In the future, we could build upon this to better investigate the source of other pathogens as well as increase the efficacy of drugs targetting these pathogens.

Computational Studies of the Decarboxylation of Cannabidiolic Acid to Cannabidiol

Florence Unitsky, *Baruch College - City University of New York*

Cannabidiolic acid (CBDA) is one of the many compounds produced by the cannabis plant, and when decarboxylated, it gets converted to cannabidiol (CBD). Currently, there is still much to be learned about CBD and its biosynthetic pathway. The decarboxylation of cannabidiolic acid (CBDA) via loss of CO2 to form cannabidiol (CBD) was studied using computational methods. Computations were carried out with B3LYP/6-31G(d,p). The study of the decarboxylation of CBDA revealed that it involves an acid catalyzed keto-enol tautomerization, which was found to be the rate-limiting step. A second derivative of the cannabis plant, delta-9-tetrahydrocannabinol (THC), is also obtained through decarboxylation, but the two compounds have differing effects on the body. While THC produces psychoactive effects like increased heart rate and disorientation when absorbed into the body, CBD produces calming effects, and has various anti-inflammatory and anti-seizure properties. Decarboxylation reaction energies and tunneling contributions will be discussed and compared to the decarboxylation of THC. Following a better understanding of the biosynthetic mechanism of CBDA, future research should be aimed at using CBD for the treatment and possible prevention of various diseases, such as arthritis, gastrointestinal (digestive) issues, and seizure disorders.

10D The Internet: Navigating Accessibility, Uses and Abuses

Detection of cyber harassment on social networks

Diana Clementine Zoua Mvaembe, *CY Cergy University*

With the abundance of Internet, bullying has moved its place from real life into cyberspace; to be now known as Cyberbullying. Cyberbullying, can be defined as intended and repeated online bullying behaviour. Due to its harmful effects on people, especially youth, it has to be detect as early as possible. A lot of research is ongoing with the purpose of detecting cyber harassment. Most of them are not clearly designed to detect cyberbullying, but related content, such sentiment analysis, abusive language, emotion analysis etc. We need a tool which takes into consideration all the cyber harassment characteristics such as repetition, hate, user's behaviour. The repetition make a huge difference between cyberviolence and cyberharassment. For this project, we are going to combine sentiment analysis, user's behaviour, session, in order to better understand the context of tweet and thus having a better detection of cyberharassment. We are also going to use pre-trained cyberharassment datasets and data collected from Twitter. It is also a great opportunity for me to contribute in solving a growing social problem and at the same time to acquire new skills, especially in NLP and linguistic corpus that are in-line with my studies.

Rethinking the role of older adults in a digital society: A qualitative investigation on the impact of older adults' web usage on their social wellbeing during the Covid-19 pandemic

Ellen Yang, *University of Warwick*

The increasing reliance on digital technologies due to the Covid-19 pandemic has intensified the issue of the generational digital divide in the UK. Recent reports from AgeUK highlight that despite having the access to the internet, more than 3 million older adults struggled to maintain their social well-being at home as they found it difficult to utilise social networking sites to establish social connections. However, research should not just focus on older adults' incapability of using the web. This paper employed a qualitative narrative approach. 10 older adults living in London were interviewed, and a thematic analysis was conducted to unfold the impact of their web usage on their social wellbeing during the pandemic. The findings revealed older adults' ability to create self-explanatory tools using basic digital software that imitate the complex social media software, to maintain social connections with others. The results suggest that older adults have learnt to use the web strategically to reduce the risks of being exploited by cyber security problems. Furthermore, it highlights the growing agency of older adults in a digital society and subsequently invites researchers to reconsider older adults' position on the issue of the generational digital divide. The paper is highly relevant to the inequalities and wellbeing agenda, with direct implications to SDG 3 Good Health and Wellbeing and 10: reduced inequalities. The paper encourages researchers to reconsider older adults as active citizens in a digital society and emphasises the importance of developing digital literacy skills among older adults' communities.

10D The Internet: Navigating Accessibility, Uses and Abuses

Are you really listening? A research method that captures more authentic student voice

Lilian Jaber, *University of Leeds*

In recent years, conventions of research have been rapidly evolving to better understand participant responses and experiences. 'Listening Rooms' is a non-invasive research methodology (Heron, 2019), which situates itself in the heart of this advancement, aiming to capture genuine student experiences, with the researcher removed from the participant environment. This method involves recording conversations between two students, using topic prompts rather than interview-style questions, allowing students to lead the conversation and focus on areas that are significant to them, rather than their institution. Using a framework of existing literature, I was able to thematically evaluate this technique, focusing on its effectiveness in creating an empowering environment for underrepresented students at university. My literature review found that 'Listening Rooms' combat many issues associated with traditional research techniques like interviews, surveys and questionnaires. The question-and-answer structure in some of these can often be unnerving for participants, particularly around sensitive topics. Many articles in my review suggested that the authenticity of data that arises from the use of topic prompts is much higher than other elicitation techniques in qualitative research. My study also showed that 'Listening Rooms' create an environment that encourages reflection and comfort for students by reducing power asymmetry between the participant and researcher, allowing them to control the conversation and speak out about personal experiences. The future application of this method is bright, with the potential to provide deeper insights into not only university life, but the experiences of marginalised groups in several institutions, whose voices deserve to be louder.

Want to be retweeted? (What explains retweet proneness in the 2020 American Presidential Election?)

Luís Andrade, *Universidade NOVA de Lisboa*

The advent of social media has brought new ways to consume political information. The literature suggests that the effects of this consumption include polarization and the dissemination of extreme opinions. Twitter has also become a political battlefield for political campaigning and a secure place for political automated bots. On this platform, the number of retweets a tweet gets is a good indicator of the engagement it generates. Successfully increasing virality and popularity on Twitter means more leverage to influence public opinion. Thus, considering all the quantifiable variables, the leading question of this study is what causes a Tweet to get more engagement. In this study, networking features, sentiment analysis tools and bot calculation probability were used to predict retweet proneness of political tweets during the 2020 US Presidential Election. I make the hypothesis that tweets with more emotional content are more retweeted and thus have more dissemination power. First, sentiment analysis techniques provided by Google perspective APIs were used to analyze the text of each tweet and to identify toxicity characteristics, bots' presence and evaluate sentiments of posts. Then, logistic regression models were built to explain how all variables influence retweet proneness. Finally, it was concluded that retweet proneness can be explained by some sentiment-based variables, namely identity attack. This serves as evidence that identity issues are present and relevant in the digital political discourse. More studies could be conducted to better explain identity as a political instrument used by politicians and as a feature of digital popular mobilization.

10E Behavioural Science and Social Systems

Multilingualism and Identity in Melbourne's Chinese Restaurants

Johanne Herland, Sonia Julkarni, Marysia Popowska, *University of Warwick*

In an increasingly multicultural world, language plays a critical role in community construction. Previous studies have explored language use in the English-speaking world, finding that minority languages were maintained. Still, little work has been done to compare the role of Chinese language in creating community boundaries in different parts of one city. We explored the effects of language use in Melbourne's Chinese restaurants by asking 'How do Chinese restaurants use multilingualism to construct and market collective identities in three Melbourne suburbs?'. Data was collected from three Melbourne suburbs with different Chinese populations. We chose four restaurants per area and analysed the signs in each restaurant. Overall, restaurants prioritised Chinese language more in suburbs with a higher Chinese population. Then we focused on two restaurants in one suburb: one with the most English and one with the most Chinese language. Language use correlated with Chinese culture, rather than language ability. These results indicated that language use was largely symbolic. It constructed a micro-culture and served as a marketing tool for authenticity, either to cultural insiders or outsiders. The multilingualism observed in these three suburbs' restaurants reduces the extent of cultural isolation, and can contribute to an integrated society. These findings may be explained by the flexible language policy in marketing. Implementing a similar language policy in other domains (e.g., education) could further promote multiculturalism and integration. Future studies could focus on qualitative analysis, including customer interviews, to further investigate the impact of language policy on constructing communities.

Could an entry fee make you win? Determining the existence of optimal entry fees in games

Michal Wizner, *University of Warwick*

Existing research on risk aversion (Fehr-Duda, 2010) implies that in games with entry fees, the choices of players tend to differ depending on how big the stake is. For instance, in a game with a very low or no entrance fee, players might make foolish, from a Game Theory perspective, decisions such as taking too much risk, and thus not optimising their strategies. The research aims to determine if there is an optimal stake that would lead an individual to undertake more rational choices compared to other stakes and to check whether these stakes differ or remain the same for similarly profiled players. It combines the existing literature on dealing with uncertainty, i.e., C. C. Eckel (2019), with a conducted pilot experiment, in which previously assessed (through a survey) individuals' risk profiles were matched with their later determined optimal entry stakes. The experiment involves a game, which objective is for its participants to reveal their strategic behaviour under different hypothetical incentive values, i.e., an individual could be asked to decide how much are they willing to risk for a particular reward knowing the cost of entering the game. If the project succeeds, it could lead to levelling the playing field by casinos, helping people better understand their risk tolerance, or even insurance companies improving their profiling abilities. It directly touches on experimental and behavioural economics as well as psychology and could be further improved by increasing the number of participants or conducting a more advanced, incentivised experiment.

10E Behavioural Science and Social Systems

How is teenager's self-construction influenced by online communities?

You Wu, *University of Warwick*

The idea of virtual communities has been developed to managing the members and in marketing theories. However, there are widely worries and disagreements about living a digital life towards the generation born under the digital environment, while the post-pandemic world inevitably pushed that happened. The study asks "how does teenager's self-construction influence by online communities?". The study starts by systematically reviewing the field from an exclusive approach, which bases on Susan Harter's theory of self, and expands on Shanyang Zhao's digital self-theory by focusing on the "digital natives" self and communities. Most secondary qualitative data comes from research on virtual communities. While most research on adolescents is about the negative impacts, the review has been successful in outlining common behavior and cognizing pattern for teenagers. A change in their ideal identity and distance between the virtual and real self has been found when teenagers revise their presentations facing different audiences, showing their effort in balancing and exploring the two different worlds. Some social factors such as also shown to be influencing the presentation of the self. To conclude, adolescents intend to fit themselves into existing virtual cultures by altering their self-presentation, the construction of their real self is influenced depending on their perceived role. The result calls for a further case study to dig into the social determinants of digital roles with a more in-depth qualitative analysis. The research is highly relevant to the realistic need to adopt the post-pandemic, internet-based workflow and lifestyle. By deepening understanding on the theory, I'm also looking for solutions to social inequality and discrimination.

Writing Socialization and Memory Retention – A Mixed-Methods Study

Enese Ágnes Daróczi, Kai Schmalow, *Universitat Wien*

Digital devices, primarily computers, are becoming increasingly important for educational purposes. Therefore, it is crucial to investigate whether there are differences between writing by hand or by computer in terms of memory retention. Mueller and Oppenheimer (2015) have shown a distinction between the effect of handwriting and typing on remembrance, and furthermore demonstrated that in comparison handwriting seemed superior. We want to replicate these findings and additionally inspect the variabilities in experiences of handwriting and typing, hence the socialization in writing. Our team devised a mixed methods design which allowed us to develop a quantitative psychological test on memory retention in combination with a subsequent qualitative guided interview, which focused on subjective experiences. The test comprised two separate similarly structured measurements involving two texts. At first the subjects took notes by hand, the second time via keyboard. We were able to replicate the findings of Mueller and Oppenheimer (2015), both the quantitative and qualitative data further undermined the superiority of handwriting for remembrance. However, early knowledge of the ten-finger-typing system appears to have a positive influence on memory retention. Conclusively, further research would be constructive, especially regarding the interdependence of socialization in writing and recollection. Furthermore, this data could also have practical implications for educational institutions, as timely training in the ten-finger typing system may affect memorisation in ways that might rival handwritten notation. Thus, replicating our findings bears compelling potentiality and, if appropriate, they could guide schools in improving the remembrance capabilities of their pupils.

11A Investigating our Ecosystems

A Comparative Study of Network Formation Models in Developing Areas: Differences and Policy Implications

Yueming Chen, *University of Warwick*

Most rural areas in developing countries are short of modern social security and commercial insurance. In this case, farmers who are exposed to income risks might face severe consumption fluctuation, leading to lower quality of life and serious welfare losses. However, farmers have developed a variety of mechanisms in practice to deal with income risks and ease consumption fluctuations. Among them, forming informal risk-sharing social networks appears to be effective. Therefore, it is important to understand the impact of risk-coping mechanisms behind these social networks. The main goal of this paper is to examine which determinants are the most influential factors in forming social networks in developing countries. We analyze two data sets in this paper. One is from Nyakatoke, a village in the Kagera region of Tanzania, collected by De Weerdt (2004). The other comes from "Farmers' Risk-response Behavior Survey" conducted by Ma (2009) in Shaanxi Province. Through both descriptive statistics and regression analysis, the scale of relatives and friends network, number of affluent households, average household income level, reduction of informal credit market loan constraints, government assistance, and size of agricultural land are crucial to consumption smoothing. One of the main contributions of this paper is to compare the most influential factors that determine the formations of the two networks. We provide suggestions on how to form more stable and beneficial social networks. Moreover, education level and religion affiliation are decisive in forming links in the Nyakatoke network, whereas informal credit market loan constraints and government assistance are more important in the network formation in Shaanxi. According to these results, we suggest promoting religion gatherings and associations, and improving current minimum living standard and social security.

Two Juvenile Hormone Degradation Enzymes, Different Effects on Drosophila melanogaster Growth

Jie Ying, *Baruch College - City University of New York*

The juvenile hormone (JH) is a developmental hormone playing important roles in insect growth, metamorphosis, diapause and reproduction. In Drosophila melanogaster (the common fruit fly), this hormone’s presence allows larval growth and prevents metamorphosis. To enable metamorphosis, JH must be degraded by JH degradation enzymes, two classes of which are: JH esterase (JHE) and JH epoxide hydrolase (JHEH). My mentor obtained mutant flies in which the gene editing tool called CRISPR caused JHE or JHEH to be absent. We noticed that JHE mutants are bigger in body size than the wildtype flies, whereas JHEH mutants are smaller. Hence, we hypothesized that this must also apply to tissues like the prothoracic gland (PG), the site for producing ecdysone, a molting hormone that prepares the larvae for metamorphosis. To test this theory, we set up crosses to produce larvae with two copies of the mutant alleles and used wildtype flies as the control. We dissected the larvae right before they pupariate, stained them and took images of their PG through a confocal microscope (used for fluorescent imaging). I then measured the size of their PG in ImageJ (program used for image data analysis) and found that contrary to our initial theory, the JHE mutants on average had relatively similar PG sizes to their wildtype counterparts, whereas the JHEH mutants had significantly larger PG sizes. The results of this experiment contribute to ongoing research on pesticides using JH since insects rarely develop resistance to their own hormones.

11A Investigating our Ecosystems

Auxin for food security

Elvire de Thomasson, *University of Warwick*

With Global Climate Change affecting various parts of the world, food insecurity becomes a very important issue that needs to be tackled. Pesticides and genetically edited plants are often used to ensure that crops adapt to environmental disruptions. Plant growth regulators, such as herbicides, are also used. Some of them require auxin, a hormone that regulates growth and is very important to the plant. It does so by attaching itself temporarily to a part of a protein called a “binding site”. This research project investigates what makes auxin so specific to its binding site, located on a protein called TIR1. This implies understanding what auxin binds and does not bind to. To do so, several versions of TIR1 were created. First these proteins were extracted and purified. This ensures that there are only a limited amount of molecules around TIR1 so that auxin can bind easily to it. Auxin and similar compounds were then added to the proteins and a SPR (Surface Plasmid Resonance) machine analysed how strongly the proteins and auxins bind together. Molecules that bind very well with TIR1, but are not auxin, could be used to prevent unwanted plants from growing around crops. With a better understanding of auxin binding, Plant Growth Regulators could become more specific and effective to target certain plants. This would improve agricultural production and reduce the amounts of chemicals needed. A better control and understanding of the chemicals used will also avoid resistance.

Expressed Will to Exercise Practical Autonomy in Mink: Habeas Corpus and Anti-Discrimination.

Iván Ruiz, *Vrije Universiteit Brussel*

To evidence whether if and how some wild animals communicate their interests on exercising their practical autonomy, I will focus on farmed american mink. Because debates on this issue remain based on animal welfare, around whether their biological needs like swimming, hunting, controlling territory or living in solitude can be met in a cage confinement system. What do farmed mink communicate through stereotypical behavior? Under which conditions should the fundamental right to exercise one's practical autonomy be granted? These literature gaps will be the basis of the study. Precisely, what I will research is the different forms of communication they use and what’s the purpose behind that communication. I will do it through an audiovisual content analysis and a literature review on the animal welfare debates and EU anti-discriminatory Law. So what this attempt intends to contribute is a parallel argumentation on the reasons why mink farming should be banned in the EU. Focusing on practical autonomy will imply a significant advancement to the establishment of the protection of fundamental rights rather than investigating which animal welfare regulations are to be applied to continue a profitable production of animals. But much of this wider context will have to be regarded in future studies, as ‘domesticated’ farmed animals like sheep, cows or pigs have been engaged in a deprivation of exercising their practical autonomy for many more centuries than ‘wild’ farmed animals. Therefore it would require a per-species specific analysis of what have been the consequences to their ability to survive in the wild: to held the necessary obligations to protect their own existence.

11B The Future of our Health

The carriage of antibiotic resistance genes in children from Cape Town communities

Danielle Wilck, *Stellenbosch University*

Antibiotic resistance threatens public health, globally. The gastrointestinal microbiome is a reservoir for antibiotic resistance genes, facilitating transfer between commensal and pathogenic bacteria. Plasmid-mediated quinolone resistance (PMQR) and β-lactamase genes cause resistance to quinolone and β-lactam antibiotics, which are routinely used to treat bacterial infections. The carriage of these resistance genes in children from Cape Town communities has not been described, but may contribute to increased burden of disease, particularly in low resource settings. Stool samples were collected from healthy children (<5 years) enrolled in the Tuberculosis Child Multidrug-resistant Preventive Therapy (TB-CHAMP) trial between 2017-2019. TB-CHAMP is a double blinded placebo-controlled trial evaluating the use of 24-weeks of levofloxacin (a quinolone antibiotic) to prevent the development of multidrug resistant TB (MDR-TB) in children. Stool samples were collected before treatment (n=100), and following 24-weeks of treatment with levofloxacin or placebo (n=48). DNA was extracted and PCR was performed to detect PMQR and β-lactamase genes. High rates of carriage of resistance genes were observed before treatment, with higher PMQR gene carriage at 24-weeks, which may be attributed to levofloxacin exposure in a portion of the population. The aforementioned high rates of resistance gene carriage in these young children, before antibiotic exposure, is extremely concerning as it may increase the risk of developing resistant infections, with poorer treatment outcomes. Following unblinding of TB-CHAMP, we can evaluate whether levofloxacin treatment is responsible for the increase in carriage of resistance genes at 24-weeks. This may influence policies regarding the use of levofloxacin to prevent MDR-TB.

Power: A critical analysis on Chinese politics and its relationship with the effectiveness of Chinese pandemic policies

Zhiyan (Eian) Chen, *University of Warwick*

Local lockdowns for three months, with severely strict quarantine regulations in cities like Shanghai, Changchun has caused citizens to go through depression, anxiety, and desperation. It is not only a disruption of the national economy, ruining the livelihood for people with low economic-societal status, the abuse of power and political neglect has caused unnecessary tragedies. I decide to investigate the epistemological aspects of political system in China. To criticize Chinese covid-related policies and to give adaptive alternatives. By reviewing literature on contemporary Chinese political structure; political psychology; its covid-related policies implementation, I have discovered that there's a distorted and disconnected perception about politics, country, government, and authorities. The health-related approaches have countereffects due to lack of inclusivity, countermeasures of risks, and political struggle. Surveys are conducted to understand public perception on these topics. The lack of public involvement has caused a gradual loose of interest and depth of understanding from the Chinese public. The findings I have, will contribute to potential Chinese political system change when it comes to delivery and execution of policies. By understanding what politics mean for governors and citizens, it could help reducing the inefficiency and the possibility of abusing power through bureaucratic systems, while enabling more discussion around politics in China for social changes. I expect more interdisciplinary approaches taken in the discussions, research from both internal and exogenous stakeholders of global health and sustainability disciplines. Therefore, I am planning on starting a podcast that is dedicated to discussion of sustainability-related topics.

11B The Future of our Health

Making Antimicrobial Resistance Futile: Targeting the Peptidoglycan Biosynthetic Pathway

Nisa Fareed, *University of Warwick*

The continued rise of antibiotic resistance (AMR) threatens our ability to treat common infectious diseases. The AMR Review 2014 reports that by 2050, AMR will become as great a cause of death as cancer is now. Recent scientific literature has largely attributed AMR to the unnecessary use of antibiotics, especially those that only target one protein. Single-targeted antibiotics have previously demonstrated rapid resistance compared to those that are multitargeted. Hence why an exploration into multitargeted antibiotics is a sensible next step in making resistance futile. We looked at multitargeting Mur ligase enzymes, specifically Mur C and Mur F, which contribute to the synthesis of peptidoglycan, a component of the bacterial cell walls essential for bacterial survival. We characterised Mur C and F activity of Pseudomonas aeruginosa, a pathogen listed in the World Health Organisation (WHO) high priority list, using a spectrophotometer and plate reader. Our research has revealed that potential inhibitors would require a higher affinity than 137 and 63 μM for Mur C and Mur F, respectively, to outcompete ATP, its energy source. This would subsequently lead to a loss of activity and potentially cell death. Next, we have identified enzyme inhibition by a known ATP inhibitor, ADPCP. This allows for the comparison of enzyme activity which will inform the direction of screening potential inhibitory compounds to later develop into marketable antibiotics. Ultimately, our research hopes to contribute to resolving the fragile antibiotic pipeline as well as inform us of the viability of multitargeted antibiotics. This necessitates collaboration at an international level to promptly prevent a post-antibiotic era.

11C Art and Culture in Society

The role of philosophy in the French educational system and the study the study of its role, impact and possible proposals worldwide.

Raquel López García, *Pompeu Fabra University*

Philosophy has accompanied us since our first steps as humanity. It is the legacy of what constitutes us as humans, our ability to transcend from living beings to beings that realize themselves as alive and limited in the face of the immensity they are embedded in. That is why the exhausted study of the role that it currently has is so important. Even though philosophy is tremendously important, less and less significance is given to it in the educational system and it is important to understand why it is happening, it is actually a general trend and if so, how it can be reverse making it essential again. Furthermore, it is seen as a subject purely theoretical included exclusively in the branch of humanities when it is more comprehensive, it goes beyond by presenting itself as a way of life, a spiritual exercise in which the human finds meaning to his anguish, and only this way achieving a society at peace with themselves and with the absolute that welcomes them. Hence, the education of the people in philosophical ideas is more than essential for the cultivation of a bright community, where life is put in the first place, and the discovery of what is underneath is part of our everyday discourse. Philosophy is crucial for a society that thinks, that goes beyond what is visible and, discovers that the possibility of truth is always hidden and, through it, can be revealed. That is why it is fundamental that the SDGs take study of philosophy into consideration as one of the basis for a substantial development. As it will be seen, the study of philosophy is really diverse in every part of the world, however, as it will be showed it is essential for the maturing of critical societies that stand for democratic life.

Magical Realism: A Response to the Loneliness Epidemic

James Mays, Chloe Peratikou, Allaya Rasul, Michelle Tsang, Yinglun Wang, *University of Warwick*

In recent years, many nations have identified an “epidemic of loneliness”. Our project will examine a literary genre – ‘magical realism’ – which responds to this crisis, developing research surrounding mental health and wellbeing during the 21st-century and Covid-19 pandemic. Scholars such as Massimo Bontempelli argued that magical realism creates a “collective consciousness” by uniting people under the roof of a spiritual world, or immaterial dimension. In constructing this world, magical realism contextualises human existence in relation to a higher force or being and consequently acts as a treatment for the isolation necessitated by modernity. Our project will examine magical realist novels, animation and games through a post-pandemic lens, considering the texts alongside current criticism and articles before applying our findings to global loneliness epidemics. The Midnight Library (UK), Weathering With You (Japan) and others follow solitary protagonists who attempt to reconnect with the world – respective of their own culture’s experience of loneliness – through an escape into chaotic and extraordinary universes. Using this comparative case-study approach, we will produce a series of short essay-style videos which revisit the genre in light of the global pandemic, commenting on how magical realism acts as both as a coping mechanism and symptom of loneliness. We will upload the videos to YouTube, a fitting medium which itself is a sort of immaterial dimension itself that similarly mirrors the feeling of interconnectedness felt throughout the pandemic. Our research aims to demonstrate how the absurdities and mysticism of magical realism parallels the ‘new normal’ of living during/post a global pandemic.

11C Art and Culture in Society

From mimesis to poesis: Poetry, Nature and Subjugation. Uncovering the ideological foundations of sustainability through Italian poetry

Louise Rossetti, *University of Warwick*

As Sustainability becomes every day more relevant, addressing the issues that concern our conception and execution of sustainable initiatives becomes even more paramount. It is so that as one evaluates the validity of modern conceptions of sustainability one might start witnessing a pattern: often, sustainable initiatives are conceptualised with an optic co-existence with nature rather than symbiosis; nature can be instrumentalised, dominated, controlled, and used to serve man. This dissertation will use an inherently interdisciplinary lens—combining intellectual history, critical theory, philosophy, and sustainability studies—to chart in the evolution of Italian poetry a fundamental shift in man's attitudes towards nature: from symbiosis to dominion. It will focus on Dante Alighieri's Divina Commedia and Torquato Tasso's Gerusalemme Liberata as groundwork for case studies to observe the changing epistemological and ontological cultural assumptions of our relationship with nature. It will thus uncover ideological foundations of sustainability and how they are conveyed in literary texts, creating a new and unique approach to the intellectual history of sustainability and its consequences on our modern execution of sustainable initiatives. This dissertation highlights a fundamental issue with our modern conception of sustainability, and charts it into some of the founding works of western thoughts. It thus offers a new and original approach to envisioning a new type of sustainability. One based on symbiosis and not co-existence with nature. Further research should inquire into modern sustainability initiatives that do indeed treat nature as a symbiotic element and how to incorporate them in mainstream sustainable solutions.

The UN's Sustainable Development Goal 4.7 in Hong Kong: Youth's identity and political expression through art

Paula Pagà Gómez, *Pompeu Fabra University*

After years of instability due to the socio-political and cultural conflict between Hong Kong and mainland China, Hong Kong's National Security Law was enacted in 2020. Being China's response to the Anti-Extradition Law Amendment Bill Movement of 2019, this new legislation directly affects Hongkongese citizens' freedom of expression. Looking at the situation through SDG 4.7, sustainable knowledge, human rights and global citizenship seem compromised by authorities. Previous literature recognises the importance of culture in political conflicts, and critics like David J.Clarke point out the uniqueness of Hongkongese art as a tool for expression and regional identity. This dissertation aims to demonstrate the new legislation's negative effect on the resilience of juvenile art as a form of political expression and the establishment of identity. The methodology has consisted of a mixed-research method. Several (mainly) written and oral interviews were conducted, including one with a former consul-general; and a Hongkongese citizen involved in the protests. The quantitative approach was covered through a survey directly sent to Hongkongese young citizens. Results portray a high relevance of younger generations' involvement in artistic protest movements. Nonetheless, while this situation has stimulated creativity in artistic denunciation, this dissertation's results also show that artistic resilience and adaptability to the current context are decreasing due to oppression and discouragement. Now, spreading awareness of Hong Kong's case is crucial for the maintenance of citizens' identity, and the growing Hongkongese diaspora can do so through art and media. Finally, the international community is also important for the recognition and development of more research on the matter.

12A Truth-Seeking in a Modern World

Why Do Men Keep Swiping Right? Two-Sided Search in Swipe-Based Dating Platforms

Alberto Hernandez Senosiain, *University of Warwick*

In today's love market, swipe-based dating platforms (SBDPs) such as Tinder or Bumble have a well-established presence, but novel platform features can add significant complexities to the user's search problem in ways that have been largely under-studied in existing literature. This paper formulates a model of two-sided search within SBDPs, where agents with heterogeneous preferences seek multiple romantic partners whilst facing intertemporal action constraints. Using numerical methods, I approximate stationary equilibria and perform comparative statics on various exogenous parameters that help explain stylised empirical facts. Finally, agent-based simulations are used to asses the structure of stationary equilibria as well as its attainability under myopic best-response dynamics.

The constructivist ontology of science and its consequences through the case of economic equilibrium

Carles Pare Ogg, *Pompeu Fabra University*

Science has long been seen as the universal uncoverer of truth. But this consideration, which has its origin in the Illustration period and its absolutist idea of reason, is biased towards certain contextual and social perspective. This research starts noticing, in line with Ian Hacking's "historical ontology", that the objects that science study, prominently in social sciences, are not always reality in itself but a model of it, which is necessarily conditioned by the perspective of its author. In this sense, we argue that conflicting scientific theories are not doomed to fight each other to survive. Instead, it is acknowledged the possibility that each one surveys a part of its broad object of study through their particular analytical tools and lenses, thus providing a less rigid and more confluent and tolerant view of knowledge. To ground this a study is presented focusing on economic equilibrium as a historical object: the concept can be used to study certain patterns and parts of the economic system, but to consider that it exists, turning it from an analytical tool to a real object, imposes a veil which renders difficult to see other kind of patterns like disorder and chaos, undoubtedly important to study the economy and any social system. We conclude that this framework presented enlarges the possibilities to know: if it is acknowledged that different alternative theories of the same topic study different things using different tools, then more can be known, and the perspective of each person is necessarily considered when trying to understand what their theory observes and what it forgets.

12A Truth-Seeking in a Modern World

What are we in the "normal" life of COVID-19？Towards a new site of Foucault's theory of power

Fangyang Xie, *University of Warwick*

What is happening to us when living with COVID-19 regulations becomes "normal"? Extending Foucault's power analysis, Hanna (2020), Constantinou (2022), Couch, Robinson and Komesaroff (2020) have examined the operation of disciplinary power in articulations of correct behaviours and normalized judgements. Agamben (2020), Lorenzini (2021), Pylypa (1998) and Žižek (2020) have debated the extent of biopower in controlling the biological performances of a population. Since few scholars place the locus of power analysis upon individual lives, my research contributes to Foucauldian studies by reassessing the objectification and reconstruction of subjectivity in the socio-historical site of COVID-19. In a life that is constantly moulded into ideal forms of normality, how does one exist? Building on Wickham's (1983) framework of understanding power relations in specific cites constituted by specific practices, I analyse the conditions, mechanisms, reciprocity, and self-perpetuation of disciplinary power in the operative sites of tracking, testing, and quarantine. Then I evaluate the biopolitical reduction of life to its biological dimension, followed by a discussion on the open field of freedom, resistance and ethics left by Foucault. My research shows that technologies of observation, documentation and categorization construct subjection of an individual. Through establishing social norms and keeping individuals in continuous comparisons accordingly, disciplinary power perpetuates in the subject through self-regulation. Biopolitical goals of securing the healthy body of a population renders individuals as units of information, threatening the preservation of subjectivity. Finally, resistance remains possible through resituating power relations. For future studies on power and subjectivity, this project offers a groundwork for understanding the meaning of subjective existence within power relations under successive times of crisis.

A virtual reality experience through the human condition

Laia Caballero Lagunilla, Alberto Garrido Santos, Ariadna Núñez Patino, *Pompeu Fabra University*

Our project consists of an artistic creation in Virtual Reality format, which invites us to explore the complex identity of human beings. With a narrative based on the Homeric epic "The Odyssey", the audiovisual invites us to meditate on our condition and identity, thanks to special glasses that introduce us to a 360º immersive environment. For the exhibition at ICUR we will not be able to have these glasses for the audience, but we have prepared a 2D version to be enjoyed through the computer screen. Being an artistic investigation, the experience of knowledge is essentially different; our goal has been to create an environment that allows viewers to enjoy an aesthetic and intellectual experience that provides tools to think about the past, present and the future. It is not, therefore, a typical scientific research project where a thesis is presented and an attempt is made to prove it by provable logical methods. Instead, we have based our short audiovisual on the scientific research of three research groups from our university, the Universitat Pompeu Fabra. These three research groups are the Music Technology Group (MTG), a computer-based sound and music research group, the Translational Synthetic Biology, a group dedicated to genome research and genetic engineering in human skin, and the Human Mosquito Interaction Project, an investigation that tries to investigate, understand and prevent diseases caused by tiger mosquitoes and yellow fever. For our project we are dedicated to synthesizing the knowledge acquired by these three investigations to create an audiovisual artistic piece with a deep interdisciplinary interest that allows plenty of different perspectives and conclussions.

12B Data, Modelling and Predictions

Using the A* Search Algorithm for Strategy Selection to solve the Firefighter Problem

Andres Zepeda Perez, *University of British Columbia*

Many problems dealing with mathematical graphs cannot be solved through direct methods due to their large nature. One method which has been successfully used is that of hyper-heuristics; where rather choosing a single strategy for a specific problem, is a strategy to choose from another set of strategies. The A* search algorithm was designed for pathfinding, but this paper shows it is also possible to use it as a hyper-heuristic. Treating these graph problems like a single-player game where you must find the best strategy at each point in time, we can model it with a mathematical tree (effectively the same as a decision tree), thus making it suitable for the A* algorithm and other hyper-heuristics. We have tested our approach on the Firefighter Problem (FFP) proposed by Hartnell, which models spreading fire and strategies to contain it. The results from these tests were positive and showed improvements over the individual strategies. Successfully using the A* algorithm as a hyper-heuristic allows for the use of developed algorithms from the field of search problems to be used in other similar graph problems. From applications of the FFP, this can mean finding an optimal defense for minimizing the propagation of a computer virus or disease spreading. This research invites future work by providing a new methodology for solving instances of the FFP. However, it also broadens what is possible to use as a hyper-heuristic, which has applications in the entirety of combinatorial optimization, particularly extending its application to other relevant problem domains.

Benford's Law as a quality flag for Space Weather Indices

Artur Benedito Nunes, Jekaterina Gamper, *University of Warwick*

Given our modern world's dependency on technology, our susceptibility to extreme geomagnetic storms has never been more apparent. The UK national risk register has highlighted severe space weather events as having both moderate likelihood and impact, the same level of risk as surface water flooding. Predictions for geomagnetic events are based on data from 1960 to present. Older data is not as reliable as modern data; our research aims to quantify its reliability through the use of Benford's Law. Benford's Law determines a digit distribution that multiplicative datasets obey: it is an active area of research but it has proven useful as an indicator of earthquake activity, data quality, and fraud. We have explored ways to adapt Benford's Law as a quality flag for geomagnetic indices, which are used as a benchmark to estimate the risks of space weather events. We have established that individual magnetometers are well-calibrated and that there are enough magnetometers to compile geomagnetic indices. Our findings mean that we have adapted an existing data quality indicator (Benford's Law) to a new field (space weather). Our results show that we have a sufficient number of magnetometers to draw conclusions from and make predictions regarding space weather. Predicting space weather events is highly topical. Therefore, it is important to communicate these findings to the scientific community. Given the new solar cycle is about to begin, publishing these results would ensure that the scientific community is informed on how to make the recorded data more reliable.

12B Data, Modelling and Predictions

Impact of choice of compression method on the performance of deep learning algorithms in histology

Rushabh Shah, *University of Warwick*

Digital pathology uses computers to create high-resolution digital scans of surgical tissue samples, to aid pathologists in diagnosis. An effective alternative to traditional pathology, it accelerates biopsy results and disease identification through instant virtual transport, specialist collaboration and application of deep learning image analysis software. Despite the field's far-reaching benefits, the exceedingly large size of raw digitised tissue slides introduces a critical limitation to pathology labs worldwide. Persistent advancements highlight the demand for efficient data reduction techniques, and existing research has motivated the widespread use of JPEG and JPEG 2000 compression on whole slide images. This project evaluates varying levels of JPEG, JPEG 2000 and JPEG XL compression on individual tissue patches and larger histological sections, benchmarking achieved reduction in file sizes against conserved image quality. Metrics computed include peak signal-to-noise ratio, structural similarity, and the classification accuracy of deep learning-based tissue patch prediction models. Results show that JPEG XL achieves better or equal quality retention at all compression levels, with significantly superior performance at high fidelity, near lossless compression. JPEG XL is presented as a promising new candidate for whole slide image compression, having outperformed legacy standards in a range of visual and diagnostic tests. Furthermore, lossless compression is suggested unnecessary for routine digital pathology tasks, yielding negligible increases in diagnostic accuracy at half the efficiency of weak lossy compression. The findings encourage a parallel investigation evaluating the performance of human pathologists alongside deep learning models. The research can be applied to inform more efficient digital pathology pipeline development, ultimately improving the data handling capacity of pathology labs while reducing the rate of misdiagnosis.

Applied Random Forest Approach in Breast Cancer Progression Prediction

Xiaohan (Lotus) Wei, *University of British Columbia*

Breast cancer is the second most frequently diagnosed and death-causing cancer in women, and 1 out of 5 newly diagnosed breast cancers is in DCIS (Ductal Carcinoma in Situ) case. While DCIS itself is a non-invasive situation, it is considered a precursor of invasive breast cancer. Conventionally, the standard care for DCIS patients involves mastectomy surgery. However, studies have shown that a considerable number of DCIS lesions remain indolent, and statistically, this means that many women may undergo unnecessary overtreatments. Despite the efforts and progress made by many previous studies, an effective method of differentiating and predicting DCIS lesions remains unknown. Thus, further study on reducing overtreatment in DCIS-diagnosed patients while preserving their chances of survival is crucially needed. This study developed a two-class machine-learning classification model using the Random Forest algorithm. Specifically, the purpose is to differentiate and detect such differences among the DCIS lesions with or without invasive cancer cells in proximity. The model is trained with the morphometric data collected from 21 DCIS-diagnosed patients and achieved a 71.9% overall accuracy. The voting scores of the model were then extracted to identify whether a specific DCIS cell is at a higher risk of progression. In summary, this study aids the current DCIS studies by providing preliminary insights into DCIS progression prediction via a machine-learning-based approach. Since the model only provides insights of examining and differentiating DCIS from pure and mixed lesions, a follow-up panel study is needed for reducing unnecessary mastectomy surgery in breast cancer patients.

12C Innovation: the World of Science and Materials

Improving concrete structural strength under earthquake loads through application of metal strapping

Daniel Dalton, *University of Warwick*

Earthquakes can cause severe damage to reinforced concrete structures, which have not been designed, detailed or constructed properly. Structural damage predominantly is caused through poor deformability of elements under seismic axial loading, resulting in premature failure. Lateral confinement is known and proven by several researchers to improve the strength and ductility of concrete (Moghaddam et al.), however most present methods such as fibre-reinforced polymers (FRP) are expensive, complex and require specialist labour skills. It is necessary to develop an easy inexpensive method of retrofitting concrete columns that can be applicable in developing countries. This research presents an innovative confinement technique using standard strapping devices, used in the packaging industry, are applied to high strength metal strips around concrete columns. Compressive experimental testing was conducted on 36 concrete specimens varying the number of straps and the degree of pre-tensioning force applied to straps, with the effect on peak strength being measured. Test results showed significant increase in the strength and ductility of specimens when strapped, particularly when strips were pre-tensioned, improving strength by 245% in cases. Applying tension to metal strips induces a pre-stressing force to concrete specimens which was shown to delay failure, this is known as active confinement, which prevents premature concrete crushing and full utilization of strip capacity. A series of concrete building frames were produced in SAP2000 software to assess the effectiveness of the metal strips in improving overall building performance. Pushover analysis results showed building capacity to improve by 135% when compared to expensive FRP-confined counterparts.

Optical Properties of Halide Perovskite in Polymer Matrices

Lindsay Jones, *Pennsylvania State University*

Hybrid organic-inorganic perovskites are an exciting class of materials with applications in solar cells and LEDs. Controlling size and increasing stability can help to tune the perovskite crystals to fit the wide range of applications. Previous studies have used small organic molecule ligands to control size, and others have used polymer matrices for increased crystal stability, so with the right polymers, both goals could be achieved. We synthesized the hybrid perovskite crystals in four different polymer matrices. Each polymer had a different chemical structure that affected the strength of its binding to the organic portion of the perovskite. The perovskite-polymer mixtures were studied as both films and in solution, and optical properties (UV-vis absorbance and fluorescence) were observed. It was found that more chemically similar polymers to the organic molecule found in the perovskite binded better to it and inhibited the crystals' growth, leading to enhanced optical properties that come with smaller crystals. With this information, scientists now have a framework for selecting polymer materials for specific applications. Knowing which polymers will yield bulk crystals and which will yield nanocrystals can lead to more informed decision-making when fabricating devices such as LEDs or solar cells, thus improving these devices' performance. In the future, specialized copolymers (polymers with two different repeat units) could be synthesized with specific ratios of good- and poor-binding monomers to more precisely control the growth of crystals. This increased precision would further lead to enhanced device performance and specificity.

12C Innovation: the World of Science and Materials

Simulation and synthesis of geometrical coating complexities in 3 dimensional glass substrates using Physical Vapor Deposition techniques

Arya Keni, *Pennsylvania State University*

Organic Light Emitting Diodes (or OLEDs) that emit a high frequency wavelength such as blue, leak a lot of energy in a given unit of time, scaling up to many unit Watts hourly, rendering their working lifetime as a Solid State Lighting (SSL) device much lower than expected. Studies in nano-scale energy physics suggest that the coating of conductive organic solvents used on the glass base of such LEDs disintegrate over time with more energy emissions, leading to loss of that solvent medium to convert chemical energy into light. To abate this effect, focus is brought upon the PVD (Physical Vapor Deposition) method of depositing these organic solvents directly from solid to gaseous vapor onto the glass base (or substrate). Effectively synthesizing a highly accurate model for accurate predictions in context of the unpredictable nature of the movement for minimizing solvent loss, and optimizing a particular substrate pattern while having a successful coating is key (where success is determined by its efficacy of area illuminated, adhesiveness of solidified vapor, and uniformity of deposited vapor). According to typical PVD behavior, having the substrate follow particular defined motions within the constraints of the PVD chamber is key to analyzing and visualizing this optimization for successful coating, such that model calculations will suggest a fully an increase in its lifetime two-fold, based on a metric of comparisons (an important one being the voltage and power consumption for a current supply value, and that of stress based durability) between current SSL devices and the new model of OLEDs that will be synthesized via this novel PVD model.

12D Novel Perspectives: Gender

Contextualising Clara Wieck-Schumann's Piano Concerto Op. 7 in an historical network

Benjamin Southwick, *University of Durham*

My research focusses on Clara Wieck-Schumann's Piano Concerto Op. 7 (1835) by situating it in 'an historical network'. Clara Wieck-Schumann was a nineteenth-century virtuosic pianist, composer, and pedagogue. Her contributions to music have been overshadowed by those of her now more famous husband, Robert Schumann. There are few analyses of Clara Wieck-Schumann's Piano Concerto, in comparison to hundreds of those of Beethoven, simply because she is a woman. Particularly, Clara Wieck-Schumann's Op. 7 is an important work for study because of its significant contribution to the evolution of the piano concerto genre, due to Wieck-Schumann's innovative structure and form. This paper draws on the works on three musicologists to address the problematic analysis of the Op. 7 presented by Stephan Lindemann in his book 'Structural Novelty and Tradition in the Early Romantic Piano Concerto'. I argue that Stephan Lindeman misinterpreted the unusual aspects of Clara Wieck-Schumann's piano concerto because of a lack of contextual understanding. By analysing this concerto in its cultural and social contexts I dismantle Stephan Lindeman's analysis. I have reinterpreted these so-called novelties with their historical context by uncovering the connections between Wieck-Schumann and other composers, via the medium of a new approach to musicology: the historical network. The research framework in this paper creates a methodology for understanding other marginalised works such as those by Johanna Kinkel, Fanny Mendelssohn-Hensel and Samuel Coleridge-Taylor. It creates a method by which pieces outside the traditional Western Art Music canon can be understood, particularly those composers who have been marginalised throughout history.

The effects of imagined contact on sexism and rape myth acceptance in males and females

Wen Qin Tan, *University of Sheffield*

Sexism is a significant global problem which has a variety of negative outcomes linked to sexual assault, harrassment, and rape. Unfortunately, sexist prejudice continues to be widespread in the contemporary context. Imagined contact is a prejudice reduction technique whereby visualising positive interaction with members of another social group can reduce prejudice. While imagined contact has been found to reduce prejudice towards a variety of different out-groups, its effectiveness in reducing sexism and related constructs (e.g., victim blaming, normalisation of myths about rape) has been relatively underexplored. A negative relationship has been found between positive contact with counter-stereotypical women and sexism (Taschler & West, 2016), but no causal relationship has been established. Thus, the objective of the present research is to investigate the effectiveness of imagined contact in reducing sexism and related constructs using experimental design. Study 1 investigated the effects of counter-stereotypical imagined contact, and Study 2 further explored how imagined contact with a counter-stereotypical woman and a stereotypical woman would lead to reduction in sexist attitudes, victim blaming, and rape myth acceptance compared to the control group. Results from both studies show that imagined contact is useful for reducing sexism in men and victim blaming among men and women. There are important implications from the study suggesting that imagined contact can be used as a novel and cost-effective intervention to address sexism. Future research can explore the potential of contact theory and expand the application of imagined contact to address sexism and related prejudices in a variety of contexts.

12D Novel Perspectives: Gender

Impact of choice of compression method on the performance of deep learning algorithms in histology

Katrynna Jackowicz, *Baruch College – City University*

Digital pathology uses computers to create high-resolution digital scans of surgical tissue samples, to aid pathologists in diagnosis. An effective alternative to traditional pathology, it accelerates biopsy results and disease identification through instant virtual transport, specialist collaboration and application of deep learning image analysis software. Despite the field's far-reaching benefits, the exceedingly large size of raw digitised tissue slides introduces a critical limitation to pathology labs worldwide. Persistent advancements highlight the demand for efficient data reduction techniques, and existing research has motivated the widespread use of JPEG and JPEG 2000 compression on whole slide images. This project evaluates varying levels of JPEG, JPEG 2000 and JPEG XL compression on individual tissue patches and larger histological sections, benchmarking achieved reduction in file sizes against conserved image quality. Metrics computed include peak signal-to-noise ratio, structural similarity, and the classification accuracy of deep learning-based tissue patch prediction models. Results show that JPEG XL achieves better or equal quality retention at all compression levels, with significantly superior performance at high fidelity, near lossless compression. JPEG XL is presented as a promising new candidate for whole slide image compression, having outperformed legacy standards in a range of visual and diagnostic tests. Furthermore, lossless compression is suggested unnecessary for routine digital pathology tasks, yielding negligible increases in diagnostic accuracy at half the efficiency of weak lossy compression. The findings encourage a parallel investigation evaluating the performance of human pathologists alongside deep learning models. The research can be applied to inform more efficient digital pathology pipeline development, ultimately improving the data handling capacity of pathology labs while reducing the rate of misdiagnosis.

13A The Environment, Food and Water

Do tRNA-Like Structures Trigger mRNA Mobility

Xingyu Wu, *University of Warwick*

Some messenger RNAs (mRNAs) have recently been shown to act as signals within plants, known as mobile mRNAs. Although many mobile mRNAs have been discovered using different experimental techniques, little is known regarding the relationship between mobility and mRNA sequence. Several studies suggest that tRNA-like structures (TLSs) within the secondary structure (derived by pairing nucleotides in the RNA sequence) are triggers of mobility. The hypothesis was tested by applying computational methods to the dataset of the RNA sequences of Arabidopsis thaliana. The secondary structures were predicted from the sequences using the viennaRNA software package. A tRNA-finding algorithm, which takes the predicted secondary structure as input and outputs the number of TLSs in an mRNA, was designed and implemented using Python. The process was run using high performance computing to accommodate the large size of the dataset. The number of TLSs was compared to the mobility status to find correlations. However, the distribution of the number of TLSs shows little difference between mobile and non-mobile mRNAs, providing no evidence for this hypothesis. It suggests that the existence of TLSs may not be the sole trigger, if at all, for mRNA mobility. Different structural motifs or characteristics, beyond what the current literature suggests, will be needed for further understanding of mRNA mobility. The outcome of this project will prompt biologists to find new evidence of mobility indicators. The algorithm utilised during this project can be generalised by mathematicians and computer scientists to aid further research in genetics.

Modelling the spontaneous rapid dispersion of small particles on liquid surfaces.

Lily Board, *University of Warwick*

Microscopic particles (e.g. pepper, flour) undergo rapid dispersion when sprinkled on the surface of water. In the model proposed by Singh P. et al. (2009), "Spontaneous dispersion of particles on liquid surfaces", Proc. Natl. Acad. Sci. U.S.A., 106, 19761-4 dispersion is thought to be due to small waves. However, this model fails when tested with microscopic glass beads hence further investigation is needed. In this project the aim is to develop an alternative model based on the hypothesis that surfactants/impurities in the particles change the surface tension of the fluid, causing dispersion across the fluid and repulsion between particles. This project will involve developing a mathematical model in the form of a partial differential equation, solved analytically or numerically. The model will aim to predict behaviour seen in experiments and investigate the mechanism behind the effect which would otherwise be difficult to determine experimentally. The direction of further research will depend on the initial results of this model. If it appears to match experiments, then the model can be tested for more complex cases. If the model fails, then further research would involve developing alternative hypotheses. Understanding the mechanism behind this effect may have important applications in biology, such as the spread of disease via the dispersion of viruses across liquid surfaces and the effects of pollution on the dispersion of pollen from coastal sea grasses.

13A The Environment, Food and Water

Decolonizing Water Discussions: A Look at the Indigenous Water Crisis in Canada from an Anti-Settler Colonialist Perspective

Brianna Ragsdale, Marcus Shew, *University of British Columbia*

Canada is one of the most water-rich countries in the world, so it may be surprising to learn that many Indigenous communities do not have access to clean drinking water. Colonial legacies have been supported in Western societies for centuries, and Indigenous Peoples have been denied guaranteed access to clean drinking water by the Canadian government, all while colonial-era laws do not allow them to fund or manage their own water treatment systems. Without clean water, many Indigenous communities rely solely on bottled water. This harms the environment and is also a violation of basic human rights. Previous research has shown not only that drinking tap water with parasites, bacteria, and toxic heavy metals can lead to serious health issues, but also that being unable to access clean drinking water contributes to socio-economic, cultural, and political autonomy issues in Indigenous communities. This study will survey members of several Canadian Indigenous communities to provide greater insight into the current state of water quality in these communities. It will focus on determining the accessibility, reliability, and quality of drinking water provided by the Canadian government compared to alternatively sourced water. Biocultural indicators and the observational indicators used to assess alternative water sources utilized by Indigenous community members will be recorded. Samples of water from multiple sources will be analyzed for turbidity and the presence of pathogens. We hope to contribute data that will better inform policy and awareness to improve the equity and access to clean water in Indigenous communities in Canada.

Heat Inducible Precision Agriculture: A Synthetic Biology Platform for Heat Resistant Wheat

Brenda Ma, Myles Osenton, *University of British Columbia*

As climate change continues to create challenges internationally, agriculture is especially hard hit with many key crops experiencing heat stress from record-breaking temperatures. This causes reduced overall agricultural yield, having a significant economic impact. Wheat is one of the crops most notably affected; periods of extreme heat causes reduced seed germination, number of grains per head, photosynthetic capacity and chlorophyll content. Common wheat (Triticum aestivum) is a major foodstuff for diets internationally, thus there could be significant consequences for global food chains and food security from increased frequency of extreme temperatures. Crops have previously been genetically modified to combat drought and cold stress, however current agricultural practices are largely limited to managing heat stress by optimising irrigation schedules. Yet contemporary genetic engineering solutions for reducing heat stress are lacking, with scarce research conducted on inducing heat tolerance in response to heat stress. Using synthetic biology, we aim to provide a novel solution to combat heat stress by creating a wheat strain with increased tolerance to heatwave-like conditions. We can address many of the issues in wheat caused by climate change through genetic engineering, such as increasing water retention, minimising deficiencies of proteins associated with crop growth, and promoting biosynthesis of key organic products. Introducing a heat-resistant wheat strain could support agricultural systems struggling to adapt to extreme changes to heat and precipitation patterns. Eventually, we hope to introduce this synthetic biology platform to other plants and more broadly address the impacts of climate change on agriculture and food security.

13B Teaching and Learning: New Perspectives

Investigating the factors that can influence the participation of first-year undergraduate students in seminars: A mixed-method study

Shenghao Lyu, *University of Warwick*

In the 2021-2022 academic year, universities in the UK have gradually returned to in-person teaching sessions after the release of the restrictions due to the Covid-19 pandemic. In this context, the present study aims to examine the various factors influencing first-year undergraduates' participation in in-person seminars. With reference to relevant literature and the post-pandemic context, a theoretical framework that categorises the factors impacting students' participation as structural, environmental, technological, instructional, and communicational was derived for data analysis. This small-scale study was conducted at a UK Russell Group university and has adopted a mixed-method approach that combines observation and online survey. The qualitative and quantitative data were analysed to establish comparisons and maintain the accuracy of results. Findings suggested that classroom size, seating arrangements, the utilisation of digital platforms, and lecturer and peer characteristics are highly influential for seminar participation. Surprisingly, Covid-related factors were discovered to have rare negative impacts on participation, which challenges the original hypothesis. In fact, this is the first undergraduate research to consider the factors influencing first-year undergraduate seminar participation in the post-pandemic context. Results of this study confirm the 'exaggerated' impacts of the pandemic on seminar participation and contribute to future amendments of classroom policies regarding the pandemic, teaching approaches, peer engagement, and seminar structures. However, due to the small-scale nature of this study, further research should focus on enlarging and diversifying the sample size. Whether gender difference is associated with the extent of different factors influencing participation is worthwhile to be explored in the future.

Understanding the Efforts to Widen Participation among Students in Indian National Law Universities

Soham Banerjee, *University of Warwick*

The aim of the research is to understand whether the government, policymakers and university staff are able to accommodate individuals belonging to different social classes in premier law schools (or NLUs). These universities are often seen as hubs for elites and socially well-off individuals, widening the class divide between the privileged and the underprivileged. Through interviewing students, teachers and heads of private tutoring institutes (who often facilitate admission into such law schools by charging very high fees), I will attempt to understand the processes that prevent or enable socially underprivileged students to get admission in such institutions. After understanding all processes and positions of involved stakeholders, I intend to publish an article highlighting barriers to entry to such institutions, and ideas for improving various processes by discussing historically successful methods of Widening Participation (WP). In the future, I wish to work with bureaucrats and policymakers to understand what challenges they face while implementing policies that intend to improve access to higher education. Further down the line, I also would like to extend my research to all public universities in India and publish my results to improve the understanding of WP in the academic community to encourage more debate in the area of access to education. My ultimate aim however, is to help improve the chances of admission in elite institutions for the underprivileged classes, which will contribute significantly towards the development of their communities.

13B Teaching and Learning: New Perspectives

Multi-Agent Car Parking using Reinforcement Learning

Omar Tanner, *University of Warwick*

At present, collision avoidance techniques used by autonomous cars are limited by their sensors. However, with increasingly more autonomous vehicles on our roads, this limitation can be overcome as cars can also communicate with each-other to share information. Collision avoidance therefore becomes a multi-agent problem. Due to the inherent density and danger of car parks and the advancement of AI with the ability to learn high-performing models, this study applies state-of-the-art reinforcement-learning techniques to the problem of multi-agent car parking, newly assuming that every car is autonomous and exploiting multi-agent communication. We design and implement a flexible car parking environment in the form of a Markov decision process, and a suite of tools to perform experiments at scale. Our models park up to 7 cars with over a 98.1% success rate, reducing the crash rate compared to existing models by 2%. In the process, we discover a form of collaboration (giving way) that cannot arise without competition (goal hiding), requiring a careful trade-off. We also discover a 'leaky' form of collaboration whereby agents exhibit collaborative behaviours without sufficient state, hinting at an attractive equilibrium or side-effect from our techniques. Such work introduces and benchmarks several techniques for exploiting communication among self-driving cars in a common reinforcement-learning paradigm, which may be applied in the future to improve the parking safety of autonomous cars, with the limitations and trade-offs known.

Spanning Forest Probabilities on Path Graphs and Binary Trees

Jonathan Figueroa Reyes, *Baruch College - City University of New York*

A spanning tree is a sub-graph formed after removing an edge from the original graph. A binary tree is a type of spanning tree commonly used in many computer applications, including spreadsheets and database indexing. This study was aimed to develop a new formula to identify 1-component possibilities for binary trees of any level. Given a simple graph, the forest-building process was used to identify spanning forests. First, the edges were sorted in some order. Then, moving the order of the list, each edge was kept only if it was incident to a vertex that was not already incident to any previous edge, resulting in a spanning forest. To identify all possible spanning forests, the process was repeated with every possible permutation of the edges. Therefore, the probability of obtaining a spanning tree was calculated as a fraction of the number of single-component spanning forests divided by the total number of spanning forests. Using programming and recursion, our team of four students derived the probability of obtaining a spanning tree (a single-component spanning forest) for graphs of various shapes and arbitrary sizes, and we came up with a recursion formula for single-component binary graphs. Open questions about the tree-building process still remain unanswered, such as graphs that look different but generate the same number of trees. Thus, more research on graph theory is needed to address them. We expect to continue this research to find an explicit formula for Binary trees.

14A Health and Wellbeing

VPS33B is a Promising M. tuberculosis Host Target Shown through Gene Knockout using CRISPR

Sana Samadi, *University of British Columbia*

Tuberculosis (TB) is caused by intracellular infection of Mycobacterium tuberculosis (M.tb). TB is a leading causes of death and multidrug resistance is rising. This creates a public health crisis and calls for potential new therapies that affects all M.tb strains. Therapies that target host machinery are of interest due to low chance of resistant strains arising, compared to bacterial components that can quickly mutate to resist killing. The M.tb protein PtpA has been shown to dephosphorylate the macrophage VPS33B protein. VPS33B plays a role in phagolysosome fusion in human macrophages, which is necessary for the host cell to kill M.tb. This makes VPS33B an interesting host candidate as therapeutic target against M.tb. In this study we isolated CRISPR knockouts of the VPS33B gene and investigated whether these knockouts affect intracellular growth of M.tb. VPS33B knockout CRISPR clones were isolated from a KO pool through a serial dilution method, then sequenced to determine the clones associated genotype. At the transcription level of VPS33B was checked through RT-qPCR assay to investigate how deletions effect RNA expression. Clones were infected by WT and ptpA mutant of M.tb to assess their growth compared to the parental strains. This study found four clones with a mutation in the VPS33B gene that results in a non-functional protein. In infection with M.tb, all knockout clones showed decreased M. tuberculosis intracellular growth. This research suggests VPS33B may be a potential target to reduce M.tb infection.

A new method to identify fusion genes in cancer

Lucy Olsen, Caitlin Page, *Monash University Australia*

Fusion genes, where two separate genes are combined, are common in cancer, and are associated with poor treatment outcomes. Current fusion detection methods use RNA-Seq data containing both genes. These methods are computationally intensive, and may remove rare fusion genes to avoid false positives. This project aims to develop a method to scan for rare fusions across large datasets by comparing expression before a fusion site (low) and after (high). Cancer data from The Cancer Genome Atlas and non-cancer data from the Genome Tissue Expression project has been compiled within recount3 for simplified analysis. Using this data, two genes (ABCB1 and PDGFRB) that form rare fusions as different positions were used for initial analysis. Overall, six samples with potential fusions were identified, three each from ABCB1 and PDGFRB. As yet, none of these potential fusions have been validated using a traditional fusion caller. As such, further validation methods are being developed to verify the accuracy of this method. Moving forward, we aim to first validate our method using a known fusion sample. From there, we plan to investigate the factors that may lower the accuracy of our method - including the position of the fusion within the target gene and low tumour purity in samples. Following this, we hope to make our method a publicly available pipeline that would allow researchers to identify samples with potential fusions involving their gene of interest.

14A Health and Wellbeing

Wrapping glia: The insulating layer in peripheral nerves that helps maintain signal transmission speed in fruit fly, Drosophila melanogaster

Henry Luo, *University of British Columbia*

In vertebrates, the myelinating Schwann cells are important for fast signal transmission, but surprisingly, only about 30% of the peripheral nerves are wrapped by myelinating Schwann cells. Most of the peripheral nerves are surrounded by the glial cells known as non-myelinating Schwann cells. These non-myelinating Schwann cells help create insulating barriers around the axons that are critical for proper functioning of the nerves, but the developmental processes of non-myelinating Schwann cells are still not well understood. In the fruit fly, Drosophila melanogaster, the wrapping glia is morphologically similar to the non-myelinating Schwann cells in vertebrates. Dystroglycan (Dg), an important membrane protein for muscle contraction, is also critical for the growth of wrapping glia, as the suppression of Dg gene expression using RNAi-mediated knockdown results in morphological defects and the loss of axon ensheathment. However, the ligands of Dg involved in this process are unknown. It is known that Dg interacts with proteins that contain the Laminin G (LamG) domain. Here, I investigated the involvement of a LamG protein: Multiplexin. I observed similar morphological defects when Multiplexin is knocked down compared to the Dg knock-down, suggesting that Multiplexin may be one of the extracellular ligands of Dg involved in wrapping glia formation. With this work, I hope to provide more insights into the developmental processes of non-myelinating Schwann cells, the potential etiology of peripheral neuropathies such as muscle weakness, loss of sensation in body parts, and loss of balance, as well as the development of treatments for these conditions.

Reducing RACK1 protein in a fruit fly model of ALS improves motor function and lifespan

Ananya Saraph, *University of British Columbia*

Amyotrophic lateral sclerosis (ALS) is an incurable, adult-onset neurodegenerative disease that progressively kills motor neurons, leading to a loss of motor control, paralysis, and reduced lifespan. ALS is associated with the dysregulation of many proteins in motor neurons, including TDP-43. In almost 97% of ALS cases, TDP-43 levels in the nucleus decrease and it forms abnormal aggregates in the cytoplasm. These aggregates interact with another protein, RACK1, to reduce overall protein production levels in the cell and negatively impact motor neurons. Previous work in our lab has shown that reducing RACK1 levels in cell lines reverses these pathological features of TDP-43. We thus hypothesized that reducing RACK1 levels in a living model of ALS would improve these pathological features of TDP-43, leading to an improvement in the ALS-associated behaviour of the organism. We used Drosophila melanogaster (fruit flies) as our model and expressed human TDP-43 (hTDP-43) in their motor neurons, both with and without RACK1 reduction. We measured their climbing ability (indicating motor function) and lifespan as behavioural indications of disease severity. We found that flies expressing hTDP-43 had impaired climbing ability and shorter lifespans compared to controls. RACK1 reduction in hTDP-43-expressing flies improved climbing ability and lifespan, compared to hTDP-43 expression alone. Our work shows that modulating RACK1 levels could be a potential therapeutic strategy to treat TDP-43-associated ALS. Testing this in more complex animal models like mice would be an important next step. If found to be safe and effective, this strategy could address the current lack of effective therapeutics against ALS.

15A Connecting Cultures

From Victims to Visionaries: Representations of Older Asian Adults in Canadian News Media during COVID-19

Lynda Li, *University of British Columbia*

The growing racial diversity of the older Canadian demographic demands a more nuanced portrait of their identities and perspectives in the media. However, media coverage during COVID-19 has reinforced ageist perceptions of older adults as weak and burdensome and racist perceptions of the Asian community as vectors of virus and disease. Together, the manifestations of societal ageism and racism in the media raise concerns about the representation of older Asian adults during the pandemic. Drawing on intersectionality theory, this study explores the portrayals of older Asian adults in Canadian news media during COVID-19. Content and thematic analyses were performed on 133 articles that either included or focused on older Asian adults published in The Globe and Mail, Vancouver Sun, and Richmond News between March 1st, 2020 to August 31st, 2021. The analysis demonstrated that the voices and perspectives of older Asian adults were largely absent in the news media. When older Asian adults were represented, they tended to be characterized along a stereotype binary of being either victims or visionaries. Such depictions could signify that media attention is only directed towards older Asian adults when they are pitied for their vulnerabilities or praised for their extraordinary success. Despite the ubiquitous stereotype binary, the representation of older Asian adults as engaged citizens suggests a path toward more nuanced portrayals. The key findings of this study raise important questions about the degree to which Canadians hold reductionist perceptions of older Asian adults. Considering the media's role in shaping societal attitudes, initiatives that aim to disrupt stereotypical portrayals of racialized older adults represent an area for future research.

Archaeology of Fragmentation: A Middle Shang Case

Congrui Gu, Pengpeng Chen, *University of British Columbia*

Huanbei was the capital of the middle Shang Dynasty during China’s Bronze Age, a period of significant transition. Previous studies on Huanbei have concentrated on urban planning and monumental architecture, but in recent years, the research focus has gradually shifted to craft production, burials, and other elements that reflect the living standard of the commoners. In summer 2021, we conducted a two-month field excavation on a medium-sized burial (2021NEJT8560M5) associated with a Huanbei bone workshop. The burial is a shaft tomb containing an outer chamber and an inner coffin covered with red fabric and furnished with many exquisite goods, as well as dog and human sacrifices. Among the burial goods are four pottery vessels, fragmented and orderly distributed on or below the second-ledge platform upon which funeral supplies were placed. Throughout the tomb fill, made of layers of pounded earth, are animal bones, pottery sherds, and fragmented humans representing at least five individuals. Judging from their placement, completeness, and spatial distribution, materials found in the tombs were modified and fragmented for very different reasons. From the discarded human bones to complex mortuary practices performed by lineage groups, the tomb's biography and its connection with the workshop were revealed. While the tomb itself contributes materials to burial studies and social development in the middle Shang Dynasty, our study demonstrates the types of information that archaeologists can gather under the context of fragmentation. In the future, we plan to apply biomolecular methods to selected fauna remains in the fill soil for taxonomic identifications to explore the association of the burial with the surrounding sites.

15A Connecting Cultures

Challenging Australia's historical amnesia: Asian-Aboriginal connections predate the First Fleet

Jesse-Lee Dass, *Monash University Australia*

Pre-colonial Asian-Aboriginal connections are often excluded from popular understandings of Australia's history. For at least two-centuries, Southeast Asian sailors traded goods with northern Aboriginal Australian communities. Most notably, sea cucumber was harvested and smoked by Yolngu and Makassarese peoples, before being exported to China. However, the exact date when this relationship began has been contested. This paper examines evidence of Yolngu-Makassarese trade predating European settler colonialism and discusses its implications to Australia's national narrative. A literature review from both Indigenous Australian and Western knowledge systems was conducted. Academic literature was sourced from diverse disciplines, including Yolngu knowledge records and archaeology. Yolngu orality describes a reciprocal trade-based relationship with Makassarese sailors and their integration into Indigenous communities. Radiometric dating of a sea cucumber processing site suggests an 80% probability of its first use in 1637. Additionally, a Yolngu visual depiction of an Indonesian ship was radiometrically dated to 1664. These results imply Southeast Asians arrived in Australia at least 151 years before the First Fleet in 1788. Moreover, this pre-colonial peaceful relationship contradicts Australia's national narrative that Europeans were the first foreigners to live on the continent, and that Aboriginal Australian societies were isolated before European imperialism. The dominant Eurocentric perspectives of Australian history create historical amnesia. Recuperation of historical amnesia requires truth-telling of Aboriginal history, which was called for in the Uluru Statement. This can be applied through inclusion of this Yolngu-Makassarese trade history in educational curricula, museums, and future academic discourse on the Australian identity.

(Re)framing Expertise as Lived Experience: Trusting Immigrants as Experts in their Field of Migration

Aysan Dehghani, *University of British Columbia*

In Canada, many non-immigrants distrust immigrants. Trust is a concept found in literature on democracy and migration. The concept is applicable when categorizing trust in different contexts such as interpersonal and relational to explain where migrants stand in society. However, current literature on migration often disseminates how the concept of trust shapes the hostile narrative of "us" versus "them" in host countries. As academic fields are highly hierarchical and expertise is linked to authority and accuracy, I propose that trust towards viewing an immigrant as an expert is warranted because experience can be operationalized as a form of domain-specific expertise. This research suggests that just as there exists an interpersonal relationship between a trustor (non-immigrant citizens) and a trustee (immigrants), the relation should be viewed as a vertical relationship between an expert and a non-expert. This suggests a source of authority that warrants trust. Through a theoretical approach, using the Phenomenology of Experience and Standpoint Theory (Hegel), I consider the synchronous relationship between credibility, trust, believability and dependability when it comes to considering new information, such as that from an immigrant by a non-immigrant citizen. The relationship between credibility and trust highlights how individuals might not perceive immigrants as having credible proxies to showcase for expertise, thus giving non-immigrants more reasons to not trust immigrants. Most policies for migration are formed through an in-house agenda-setting meeting, with experts ranging from politicians to researchers being present, but no personal migrant knowledge being shared. Experience as a form of knowledge can be used in policy proposals for in-house agenda-settings to transform the current bias towards migrants.

16A Industry, Innovation and Infrastructure

Understanding the role of a novel drug treatment, Licogliflozin (LIK066), in combatting Polycystic Ovarian Syndrome (PCOS)

Niketha Nagasubramanian, *Monash University Australia*

Polycystic Ovarian Syndrome (PCOS), a hormonal disorder affecting 15% of women of fertile age, is characterised by hyperandrogenism, increased levels of male sex hormones (androgens), and insulin resistance, causing hyperinsulinism, compensatory overproduction of insulin. These lead to risk of development of metabolic disorders such as Type II Diabetes Mellitus. Hence, there is a need for research on novel therapeutics for PCOS. Sodium-Glucose co-transporter types 1 and 2 (SGLT1/2) are involved in glucose absorption in intestines and glucose reabsorption in kidneys. SGLT1/2 inhibitor drugs, (SGLT1/2i), inhibit SGLT1/2 and reduce blood glucose levels. Hence, a specific SGLT1/2 inhibitor, Licogliflozin, was hypothesized to reduce blood glucose levels. 24 female participants with severe PCOS, either overweight or obese and insulin resistant, were recruited for a randomised, double-blind clinical study. They were randomly allocated to 50mg of either Licogliflozin or placebo, thrice daily for 14 days. Their blood samples were analysed on day 15 for glucose, androgen, and Free Testosterone (FT) levels. Results indicated 90% in the Licogliflozin group and only 50% in the placebo group showed a decrease in FT levels. There was a 19% reduction in the levels of A4, a key androgen with regards to PCOS, showing promise in reducing hyperandrogenism. Furthermore, Licogliflozin decreased fasting blood glucose levels, thereby reducing insulin levels and hyperinsulinism by 70%. Ultimately, Licogliflozin shows promise as a novel therapeutic for PCOS. Further research could be conducted on other PCOS phenotypes. Additionally, the dosage of the drug could be varied between trials to obtain the concentration of the drug with the highest therapeutic effect while minimising side effects, which included diarrhoea and nausea.

UV Photolysis Study of Para-Aminobenzoic Acid Using Parahydrogen Matrix Isolated Spectroscopy

Alexandra McKinnon, *University of British Columbia*

Humans have been using sunscreen agents for over 70 years to prevent skin cancer and sunburns. Therefore, understanding how sunscreen agents behave under sunlight is highly important. Para-aminobenzoic acid (PABA) is a sunscreen agent that is controversial due to its carcinogenic effects in the presence of UV light. However, the intermediate chemical reactions that occur when PABA is exposed to UV light have not been studied due to their rapid reaction rates. In this study, PABA was exposed to UVA light (355 nm) UVB light (> 280 nm) and UVC light (266 nm and 213 nm) in an inert, solid parahydrogen matrix at -270 degrees Celsius to isolate the supposed PABA radical and to observe the PABA radical for the first time. As the PABA radical has never been observed before, quantum chemical calculations were used to confirm the presence of the PABA radical. This study confirms the existence of the intermediate species previously proposed mechanism of PABA photolysis, the PABA radial. Through this radical, PABA can form a highly carcinogenic adduct with thymine, which in turn destroys DNA strands. Other products currently used by humans containing sunscreen agents may have similar potential carcinogenic properties. Although PABA is no longer a popular sunscreen agent, many other sunscreen agents have a similar chemical structure to PABA and therefore may have a similar photolytic behaviour that has not been well studied. The PABA decomposition pathway and experimental set-up can be used to study the decomposition of other sunscreen agents, such as Padimate-O.

16A Industry, Innovation and Infrastructure

Assessing the influence of assistive technology on falls in community-dwelling older adults through a systematic literature review

Kathryn Crosby, Catarina Rodriguez, *University of British Columbia*

Fall-related injuries can reduce older adults' independence and result in economic burden. Many studies have explored the efficacy of assistive technologies in fall reduction but how and where they should be used to be most effective is not well known. A better understanding of assistive technology can help reduce falls and support functional independence. Our project explores the relationship between assistive technology and fall frequency and location in the homes of community-dwelling older adults. We investigated the efficacy of various structural and ambulatory assistive technologies in preventing falls through a systematic review. We sourced 4,113 articles from 3 databases (Medline (OVID), CINAHL (EBSCOhost), and Web of Science Core Collection) and are assessing them using a set of inclusion and exclusion criteria using PRISMA methods, and managing citations within the Covidence software. We have completed title and abstract screenings and are now conducting full-text reviews of 193 articles. We will compile and evaluate data from the included studies to address our research questions. The primary outcome of interest is 'fall frequency' and the interacting influence of 'fall location', 'injury', 'mortality', and 'hospitalization'. These outcomes all directly relate to falls and their severity which will help us understand the association between different assistive technologies and falls by community-dwelling older adults as reported in the literature. This review will provide a basis for more intentional use and prescription of in-home assistive technologies and inform the design and adaptation of such devices to foster safe mobility and prevent falls in older adults.

Thermal Hall Coefficient of Fractional Quantum Hall States

Fei Tan, *Nanyang Technological University*

Fractional Quantum Hall (FQH) effect has become one of the most studied phenomena in condensed matter physics for the past 40 years. This phenomenon has led to many interesting branches of physics such as topological phases of matter, topological quantum computing and topological insulator. There are many ways to characterize the FQH states, one of which is by using the thermal Hall conductance, which is a physical quantity with quantized value that are robust against small perturbations and thus independent of the microscopic details. However, thermal Hall conductance is not easy to measure in the experiment but we can analytically compute another quantity called central charge (thermal Hall Coefficient) and use it to relate to the thermal Hall Conductance by using the Conformal Field Theory (CFT). While we can use the effective CFT to compute the thermal Hall coefficient and the thermal Hall conductance of the FQH states, such effective theory in principle needs to be derived from the microscopic theory. We can thus use another method so called the generalized Pauli Principle to calculate these quantities. In this report, we discuss the correspondence of thermal hall conductance with the central charge of the edge current. We obtain the thermal hall coefficient of the Laughlin states. The derivation does not rely on the effective Conformal Field Theory (CFT) but only the microscopic partition counting and the generalized Pauli Principle.

16B Teaching and Learning

Development of domain-specific assessment of scientific creativity

Hong Liang Lee, *Nanyang Technological University*

The development of creativity is one of the promises of integrated STEM learning and is likely to be an indicator of high-quality education. Accurate measurement of creativity upon exposure to integrated STEM learning can be a reliable indicator of the success or failure of integrated STEM learning. However, current creativity assessment tools that are widely used, such as divergent thinking tests, have been criticised to be domain-generic and unable to capture the dynamic nature of creativity. This study adapted the Scientific Creativity Test by including test items that were more domain- and task-specific to a vertical farming integrated STEM learning activity. This adapted divergent thinking test was administered to pre-service teachers before and after the vertical farming activity. The behaviour of participants during the activity was also monitored to measure the changes in creativity over time. Results showed that monitoring the behaviour of participants during the integrated STEM learning captured more aspects of an individual's creativity. The results suggested that the two assessment tools studied are not substitutes but are used for different purposes in creativity assessment. The number of participants to be assessed and the construct of creativity to be measured will help inform teachers which assessment tool to select and administer to their students. While this study has identified several behaviours associated with creativity during integrated STEM learning, it is recommended that the behaviour of more participants be monitored during the same vertical farming activity to identify other behaviours associated with creativity. This would allow for the design of a easier-to-use creative behaviour monitoring checklist for teachers in their assessment of student creativity.

A Mixed-Methods Study of the Print and Digital Reading Habits of Pre-Service Teachers

Grace Lee, *Nanyang Technological University*

Reading habits and preferences are invaluable in fostering literacy instruction. Although there is considerable research on the importance of leisure reading for students, there remains room to explore its relevance among teachers and its application to the classroom context. This paper seeks to explore the attitudes, beliefs and habits of leisure reading among preservice teachers, and how their perceptions of leisure reading influence their teaching strategies, attitudes and prioritisation of leisure reading within the classroom. Semi-structured qualitative interviews were administered to 8 pre-service teachers, alongside 102 quantitative questionnaires and Author Recognition Tests to measure the extent of their print exposure. Findings show that most identified as prolific readers, unanimously agreeing on the importance of leisure reading. However, only a handful of pre-service teachers were familiar with book series popular among students, and some remarked on negative reading experiences due to ineffective school programmes and a lack of engagement with their teachers. Thus, the findings recognise the key role teachers play in fostering a reading culture, extending literature and adding value to prior studies. They offer key insights into how their reading preferences and attitudes are vital in influencing the habit of leisure reading, which heralds advantages for teachers and students alike. Implications from the study include supporting wide reading among teachers by developing professional knowledge of extensive reading and reconsidering current reading programmes to implement activities of greater effectiveness. More emphasis should be placed on discussions around young adult literature titles, to engage with the reading habits and preferences of students.

16B Teaching and Learning

Taking a walk in someone else's shoes: The impact of picture book reading on children's social capabilities

Sophie Drayson, *Monash University Australia*

In a globalised world, schools must balance teaching curriculum learning areas alongside developing students' social skills (such as empathy for individuals from different backgrounds and communication skills) so they can thrive in diverse communities (Zhao, 2010). However, educators are challenged by a crowded curriculum, meaning that teachers must think innovatively to teach all the mandated content in a limited time (Crump, 2005). Due to the variety of issues children's literature discusses (McCallum & Stephens, 2011), this literature review analyses the potential for social capabilities to be taught through the picture books used in the literacy classes of children aged 0-10. The content of published scholarly research concerning teaching reading in the early years was analysed using keyword searches of different social skills (for example, "empathy") to ascertain which picture book attributes (such as genre or theme) contribute to the development of these skills. This paper argues that picture books can positively influence children's social skills, teaching children to value diversity, have a sense of global citizenship and understand social justice perspectives. However, this paper also highlights the equal importance of teachers' criticality regarding the books they select and the teaching strategies they use to emphasise diversity-related themes, such as fostering a growth mindset. These results were consolidated into a questionnaire teachers can use to integrate social capabilities into literacy education, mitigating the impact of the crowded curriculum. Thus, the contribution to society at large is the greater potential that children will learn the skills needed to have purposeful relationships with diverse individuals.

Exploring the Prevalence and Experience of University Violence

Natalie Thomson, *Monash University Australia*

As an increased number of workplaces and institutions begin to explore the rates of violence within them, an often-overlooked area is university campuses. Studies indicate that university students are at a high risk of experiencing violence, yet limited research has contributed to the lack of understanding surrounding this issue, which may further perpetuate it. Alongside this, the impact of campus violence on students can be detrimental and is increasingly becoming a point of conversation as the issue gains media attention. Both qualitative and quantitative sources allow for a deep dive into the important exploration of prevalence and experience of university violence, both on and off campus. By gaining an understanding of both the objective statistical figures and the qualitative experiences, this research will allow for a wholistic understanding of university violence, examining possible solutions to this complex problem. It is predicted that university violence levels will show a similar increase to that seen in other institutions, possibly due to an increase in reporting. However, understanding surrounding this topic is anticipated to be low. It is also expected that the impact of violence will have far reaching effects, mediated by university implemented support systems. This research is vital, especially as universities strive to create a safer learning environment for all, through prevention initiatives and support services. The lack of research in this area also means that this examination of current trends and understandings can be used as a baseline to compare future data to, which is essential in the long term.

17A Health and Wellbeing

Withdrawal or Withholding of Life Sustaining Treatment in Extremely Preterm Neonates

Isobel Galloway, *Monash University Australia*

Outcomes in extremely preterm infants vary substantially between and within countries. Little is known about how variations in end-of-life practices of extremely preterm neonates affect outcomes. We aimed to investigate the role of withdrawal or withholding of life sustaining treatment (WWLST) on infant mortality. This single-centre, 6-year retrospective study examined infants <27 weeks' gestation admitted to Monash Newborn (Melbourne, Australia) from 2015 to 2020. Data previously collected for submission to the Australian and New Zealand Neonatal Network were combined with electronic medical records, death certificates and department mortality records. Summary statistics and survival analyses were performed. Of 278 infants included in the study, 15% infants died. WWLST preceded death in 83% of our cohort. The primary reason for WWLST was to prevent expected poor long-term outcomes, indicating a preference towards quality of life. At least one discussion about WWLST occurred in half of our cohort and 77.3% of these infants underwent subsequent WWLST. Infants about whom WWLST discussions occurred were 95.1 times more likely to die than those with no WWLST discussions. Thus, there are interesting implications in the selection of infants for WWLST discussions and the significance of having raised WWLST with parents. Most infants (70%) who did not undergo WWLST after a WWLST discussion survived. Our findings indicate the significance of WWLST in extremely preterm infants' mortality at Monash Newborn. Future research should focus on comparing WWLST practices with other neonatal intensive care units to determine their contribution to variable outcomes in extremely preterm infants.

Burnout in North American orthopaedic surgeons: A systematic review

Cameron Leong, Mina Han, *University of British Columbia*

Occupational burnout is defined by a high level of emotional exhaustion, depersonalization, and a low sense of self-achievement. Physician burnout in particular has negative consequences for physicians, patients, and the healthcare system as a whole. Physicians who are burnt out may make more medical errors and have a detached view of their patients, leading to a lower quality of patient care. Amongst orthopaedic surgeons, previous research shows that the prevalence of burnout is highly variable by country. Thus, it remains unclear what the prevalence of burnout is among North American orthopaedic surgeons. We conducted a systematic review to find the prevalence and risk factors of burnout among North American orthopaedic surgeons as well as strategies for prevention. An electronic search with search terms including "physician burnout" and "orthopaedics" and related terms was conducted. 4086 papers were identified and 28 studies and 30 reports of studies were included in our review. The prevalence of burnout amongst North American Orthopaedic surgeons was found to be very high, ranging from 20-59.6%. 8 studies reported it to be 30% or higher and 3 studies reporting burnout as over 50%. We identified several demographic, personal, work environment, and social risk factors associated with burnout, and strategies to mitigate burnout were related to having a good work life balance and group connectedness. Currently, the scarcity of research highlights a need for more research to be done specifically on the prevalence of burnout amongst Canadian and Latin American countries.

17A Health and Wellbeing

Investigating the neurobiological basis for emotional connectedness between identical twins

Esha Vijay, *Nanyang Technological University*

The emotional relationship between identical twins is an enigma – some twins develop twin co-dependence, serving the role of an ever-present comfort figure in each others' life. Even in childhood, monozygotic twins have a closer relationship than their dizygotic counterparts. Some twins also report emotional connectedness where they feel each other's pain. This study attempted to explain this seemingly meta-physical occurrence by exploring the neurobiological basis of emotional connectedness between identical twins. Twins were placed in separate rooms with no forms of communication possible. Twin 1 underwent a functional Magnetic Resonance Imaging (fMRI) scan while Twin 2 was exposed to a visual condition. Twin 2 saw childhood pictures interspersed among control (non-familiar) faces, while Twin 1 was at rest in the scanner. The data was analysed using MATLAB and SPM software. Based on previous studies, this study identified right inferior frontal gyrus and left orbitofrontal gyrus as potential regions of interest (ROI). Significant activation in the ROIs would point to neuronal populations being responsible for emotional connectedness between identical twins. Insignificant results can still be used to establish trends in activation. Thus, any positive observation would allow us to better understand the neurobiological mechanisms underlying emotional connectedness in twin brains. Results from this study can be used to add to existing literature, which is scarce due to the lack of studies. These ROIs can be used in further research to establish a potential neural network in identical twins to scientifically explain the phenomenon of emotional connectedness between identical twins.

Inter-Organelle Communication: Insights into Mitochondria-Endoplasmic Reticulum Contact Sites (MERCs)

Sana Ahmed, *University of British Columbia*

The Hubble space telescope has provided connections between us Earthlings and the cosmos, and this relationship is mirrored in our cells, especially between cellular organelles through membrane contact sites. Membrane contact sites between the mitochondria and endoplasmic reticulum (ER), also known as MERCs, are regions in a cell where the two organelles come together at a distance of 10-80nm to perform important functions such as calcium signaling key to cell viability, and mitochondrial health regulation. These sites are altered in Parkinson's, and cancer, making it significant to understand the distances in normal vs. diseased conditions and analyze the distribution of proteins responsible for establishing these sites. Previous research has been resolution limited and unable to localize these proteins directly. This project uses super-resolution microscopy to enhance resolution and visualize the distribution and organization of mitochondrial proteins directly, specifically Mitofusin 1 and 2, and ER structures at MERCs with a 20nm resolution. Findings until now show an increase in contact sites between MFN2 and the ER as compared to MFN1 and a mitochondrial reference protein, TOM20. With this information, we will be able to establish how MERCs are regulated with the specific organization of these proteins and establish the distances between the two organelles in normal conditions. This study will be extended to mimic disease conditions via partial removal of the proteins to understand how the distance at MERCs is affected and the implications this has on calcium exchange and mitochondrial health in neurodegeneration and cancer. Overall, the implementation of super-resolution microscopy promotes the potential for new research around mitochondria-ER contact sites.

17B Teaching and Learning: New Perspectives

Developing Educational Videos on Boundary Layer Theory for MEC3451 (Fluid Mechanics II)

Aman Malik, Nathan Thomas, *Monash University Australia*

Active student-centric learning is replacing traditional teaching styles of technical subjects such as fluid mechanics. There is now a greater emphasis on practical applications as students strive to gain skills to equip them for their future engineering career. Linking theory to modern engineering problems introduces students to the types of issues that current engineers face especially with regards to sustainability. We endeavour to explore the impact that the practical application of complex fluid mechanics concepts can have on student learning. We have analysed fluid mechanics textbooks and educational materials provided in Fluid Mechanics 2 (a unit delivered at Monash University). We also analysed the student feedback survey for this unit. Our analysis has informed our methodology as we have focused on pairing theoretical knowledge with practical examples that pertain to real life situations. This ensures students are better able to apply fluid mechanics 2 knowledge in their careers. Our findings have informed us of a deficit that exists between the expected knowledge of students and what they are able to understand. Hence, we are aiming to create supplementary resources for students, in the form of lectures and practical questions, which include suggestions which students have provided after completing the unit. Currently, we are creating the educational resources for the students. We will share these resources and a survey to students who have previously completed this unit. The knowledge and experience of these students will inform us of whether we have improved upon the existing teaching methods and by what extent.

Behavioural Predictors of Math Anxiety

Kinnard Chen, *Nanyang Technological University*

Math anxiety (MA) is a highly prevalent problem in education, and it has been consistently shown to lead to poorer math performance. Presently, the predominant way of identifying MA in students is through self-report measures. However, anxiety can also be inferred through one's behaviour such as fidgeting, which suggests that it might be possible to identify MA through a student's behaviour when doing maths. This study sought to investigate whether certain behaviours are predictive of MA among students. The study involved primary school students who were part of an educational intervention that sought to improve their mathematical abilities through playing a neural-informed math game. Based on the behaviours that these students exhibited while doing maths in the game, ten broad types of behavioural indicators were identified, with examples such as – counting out loud or using their fingers to count. A multiple linear regression was conducted where students' anxiety scores were regressed on these behavioural observations, along with their gender, mood, and math profile. The results suggest that gender, mood, and the students' math profile had no effect on their math anxiety. Only three behavioural observations were positively and significantly associated with their math anxiety. The findings suggests that educators can use such behavioural indicators to identify students with MA. However, more research will be needed to support the use of such behavioural observations in more typical classroom teaching and learning settings as the findings of the present study are based on students' engagement with a math game.

17B Teaching and Learning: New Perspectives

Development and Implementation of Augmented Reality Application for Benchtop Distillation Setup

Leonard Darmawan, *Nanyang Technological University*

Laboratory courses provide students with hands-on skills of analytical and observational skills which are an important aspect in chemistry education. A benchtop batch distillation is a compulsory experiment in the first-year chemistry laboratory course. Many first year students are found to be unfamiliar with the setup assembly due to the limitation of laboratory training they received in their previous education. A 3D application in the form of augmented reality is developed to aid the distillation laboratory setup training and learning of students. The research focuses on to seek better understanding on how students will benefit from the 3D application and to develop a better learning platform to complement students' process of laboratory distillation learning. The 3D application is developed using Unity, consisting of safety video and distillation apparatus setup module. The effectiveness of the application in facilitating students learning is determined via pre-test and post-test quiz. The preliminary data shows that the number of correct answers in the post-test is higher than those in the pre-test, suggesting that the 3D application improves students' understanding in benchtop distillation setup experiment. Further development is needed to increase the user experience of the application, which includes bug fixes, improvement of user interface, refinement of distillation features, simulation process, iOS build, VR development. Further trials and study with a larger number of students is needed to strengthen the findings.

18A Social Change, Inclusion and Engagement

Linguistic Pride Towards Singapore English Amongst Chinese Singaporeans

Michelle Ng, *Nanyang Technological University*

While the ideas of linguistic insecurity and linguistic ownership in Singapore English have been discussed, little attention has been given to the notion of linguistic pride. Despite Foo and Tan's (2019) demonstration of a profound sense of linguistic insecurity amongst Singaporeans towards Singapore English, the latest population census of Singapore in 2020 found that 48.3 percent of Singaporeans use English as their home language. This was a significant increase of 16 percent from the census data in 2010. Applying and refining the various philosophical explications of pride, this paper proposes a set of conditions that can define the term linguistic pride. An empirical study was conducted on 124 Singaporeans across various age groups by employing the conditions to establish whether Singaporeans can have linguistic pride toward Singapore English despite being linguistically insecure. The findings reveal an overall perceived sense of linguistic pride amongst Singaporeans regarding the use of Singapore English. Simultaneously, it demonstrates that there is a new wave of linguistic insecurity amongst the younger Singaporeans. These findings reflect the existence of a complex trinity between linguistic insecurity, linguistic pride, and linguistic ownership amongst Singaporeans towards Singapore English. It also shows that the exposure to the messages from the education system, Speak Good English Movement (SGEM) and the state's rhetoric can have a significant impact on the sense of linguistic pride Singaporeans possess toward Singapore English. Based on the findings of this research, there is room for evaluating the justifiability of Singapore's language policy in contributing to the presented trinity.

Intersectional Identities and Their Recognition in the Equal Opportunity Act 2010 (Vic)

Nahdarin Aqila, *Monash University Australia*

Intersectional discrimination is experienced by many whose identities consist of more than one identity group. Due to it impeding upon multiple individual characteristics, intersectional discrimination acts synergistically and can be more damaging than discrimination based on a single attribute. However, anti-discrimination laws rarely effectively legislate against this form of discrimination, and a lack of representative legislation limits victims' avenues of gaining a remedy. This article uses the Equal Opportunity Act 2010 (Vic) ('EOA') as a case study. It analyses its effectiveness at protecting Victorians against intersectional discrimination through statutory interpretation and examining how Victorian courts have interpreted the Act regarding cases concerning intersectional identities. It also addresses existing literature to explore the reasons why intersectional discrimination is difficult to legislate against. Possible solutions, such as reforms to the wording of the EOA or community based education in differing identities, are offered which may better protect those with vulnerable intersectional identities against discrimination. This article hopes to contribute to the existing scholarship on intersectional discrimination, and how to better protect those who are vulnerable from it.

18A Social Change, Inclusion and Engagement

The Role of Misinformation in Prejudice against Political Minorities in India

Liyana Batrisyia Binte Sulaiman, *Nanyang Technological University*

Many studies have reported the effects of individual motivations on engagement with political motivations. However, we observe a research gap when misinformation does not draw from real-world social issues, such as the status of minorities. The acceleration of misinformation targeting minorities, especially during Covid-19, has motivated this study towards the exploration of one's exposure to anti-Muslim misinformation and its impact on prejudice towards Muslims in India. Since the Bharatiya Janata Party's (BJP) rule in 2014, prejudice towards India's Muslims has heightened and the Muslim community has been targeted as the excluded political 'other' against the Hindu-political majority, within public policy-makings and informal social practices. Through a survey experiment, it reveals that the participants exposed to anti-Muslim misinformation (compared to general misinformation) were more likely to be prejudiced against Muslims. This study also illustrates that prejudice against Muslims is positively associated with supporting policies harming Muslims. Factors of demographics, political motivations and media usage accompanying anti-Muslim misinformation, were identified as significantly influencing one's prejudice towards India's Muslim minority and in turn, their support for public policies harming Muslims directly or indirectly. As such, the relationship between anti-Muslim misinformation and support for public policies harming Muslims is shown to be mediated by prejudice towards Muslims. Thus, this study discusses how demographic characteristics are associated with anti-Muslim prejudice and how such prejudice translates into support for public policy harming Muslims. Hence, these findings illustrate the harms of polarised misinformation against minorities, towards worsening their political and socio-economic positioning within their society. Future work could explore the role of political parties and systems in enabling "us vs them" rhetorics.

Agency of Elderly Female Caretakers at Informal Shrines in Singapore

Stefanie Tan, *Nanyang Technological University*

There is good reason to believe that female contributions to the public domain of religion is overshadowed by the significant claim men have on religion. More than their female counterparts, male devotees are often recognized for their financial contributions and for undertaking key authoritative positions in their respective faiths. But a closer look at an informally-established religious phenomena in Singapore challenges the dominant perspective on the primacy of male involvement in public sacred spaces. Singapore is home to many informal shrines- sacred spaces constructed and maintained by the public. Existing research on shrine communities have only cited male caretakers. Yet, the fieldwork I have conducted for this research has suggested the primacy of female involvement at informal shrines. This paper documents the wholehearted commitment of elderly female caretakers to three informal shrines- Kranji Kali Shrine, Keramat Radin Mas and Jurong West Tree Shrine. Fieldwork records suggest that the nature of these shrines are both private and public, which, respectively, allows the women to exert their personal claim on religion, while disclosing their contributions to the public- hence giving them the public recognition they deserve. Through anecdotal accounts, this paper examines the different connections established between shrine and caretaker(s). It will explore the reasons for these connections and the impact it has on the caretaker's lives. These findings will ultimately converge at the overarching idea that the public-private nature of informal shrines liberates the caretakers from their domestic responsibilities, and promotes their agency.

18B Teaching and Learning

"Values can be taught through Physical Education" – narratives of Singapore's Beginning Physical Education Teachers (BPETs)

Lynnette Aviado, *Nanyang Technological University*

Previous studies have emphasized the potential of using Physical Education (PE) as a platform to teach and instil values. Values, alongside academics, can contribute to one's success in life. However, mere participation through PE does not guarantee the learning of values; instead, this needs to be facilitated by the teacher through deliberate approaches. What is unknown currently is the starting point of newly trained PE teachers, specifically in Singapore's context, Beginning Physical Education Teachers (BPETs), on their preparedness to teach in the affective learning domain. The purpose of the study is to listen to the "lived experiences" of BPETs through interviews on their strategies and challenges to incorporate the teaching of values in their classroom. Three BPETs (2M, 1F) with no more than 3 years of teaching experience from primary and secondary schools were invited to participate in the study. Individual interviews were conducted and transcribed verbatim. The transcripts were analysed using thematic analysis. The findings highlighted three common themes; firstly, PE being a platform to see values in action; secondly, a discussion on values and what it means in students' lives; and lastly, a reflection on their BPET journey. The findings show that BPETs believe that values can be taught through PE, and they would attempt to teach values in explicit or implicit ways. However, they requested for specific courses during the initial teacher training programme that equip them with strategies to teach values in a PE setting. Future studies could include more PE teachers of varying years of experience to share their strategies teaching values through PE; creating a community of practice.

Investigating the Roles of Figures in Science Textbooks of Singapore and South Korea in terms of Representational Levels

Ada Han Xuan Koh, *Nanyang Technological University*

Figures in science textbooks are critical in explaining abstract scientific concepts as they help students visualise phenomena and substances, especially those unseen. The visualisation of the unseen phenomena is crucial in helping students understand scientific concepts in totality. Hence, this report studies how figures in 5 chosen topics are used in Singapore and South Korean lower secondary science textbooks in terms of their representational levels. We examined each figure by dividing them into their visual representations and captions and then classifying their levels of representation into either sensory (SS) or unseen (UN). SS refers to observable phenomena while UN refers to phenomena that cannot be observed with the naked eye. Some visual representations and captions involved both SS and UN levels. It was found that the main role of visual representations in Singapore textbooks was to describe observable phenomena whilst in Korean textbooks, it was to draw connections. This meant that in Korean textbooks, visual representations provided a more causal explanation to explain why such a phenomenon happens. It was then found that the main role of captions in both Singapore and Korean textbooks was to draw connections. This meant that in both regions, captions were crucial in providing causal explanations and words still bear the bulk of causal explanations, especially in Singapore textbooks. We discussed the roles of figures in science textbooks in terms of representational levels to allow for more refined figures to be designed in future such that they can better fulfil their learning objectives.

18B Social Change, Inclusion and Engagement

Reading Intervention and Brain Plasticity: A Systematic Review and Meta-Analysis of Neuroimaging Studies

Bhavya Arya, *Nanyang Technological University*

Developmental dyslexia is a highly prevalent disability causing difficulties in reading-related abilities. Behavioural studies on reading interventions to remediate reading difficulties have demonstrated inconsistent intervention effects. Thus, this paper aims to review literature on objective neuroimaging studies on reading interventions in an attempt to unearth commonalities of brain mechanisms underlying improvement. Using the PRISMA framework, 60 studies were identified to be included in the systematic review. Of these, 10 fMRI experiments were subjected to a coordinate-based activation likelihood estimation meta-analysis using GingerALE software. Findings from the systematic review indicate that neuroimaging studies on reading intervention investigate two primary effects: (1) neural correlates of responsiveness to intervention, and (2) effects of intervention reflected in changes in brain profiles of individuals with reading difficulties. The review suggests that these changes largely reflect normalization of aberrant brain profiles, but may also manifest as compensatory brain pathways following intervention. The meta-analysis identified two significant clusters of functional activation changes following intervention: the left thalamus/lentiform nucleus (cluster 1), and the right insula/inferior frontal gyrus (cluster 2). While cluster 1 suggests normalizing effects of intervention (albeit in brain regions distal to the putative reading network), cluster 2 suggests compensatory intervention effects. Primary normalizing intervention effects may, thus, differ depending on the focus of the intervention. Findings from the review could provide insights on delineating individuals who could benefit most from reading interventions, or those who may require additional and/or more intensive intervention. Future studies are required, however, to examine disparate effects arising from distinct intervention targets.

Current Status and Optimization of Volunteer Education - How It Keep Improving Education in China

Xingyan Li, *Monash University Malaysia*

In China, there are huge disparities in economic levels between regions, which leads to the differences in the quality of education. The Chinese government and volunteers from different countries are trying to change this situation. Volunteers are reaching out to the less developed areas of China to provide quality education. Therefore, in this research project, the researcher will interview the directors of different volunteer education organizations such as Stepping Stones China and Three Heart Club of CUHK, administer questionnaires to students who have received their volunteer education services to know their academic and life improvement and their evaluation of volunteer education and finally refer to previous literature focus on related topics of research in order to assess the current status of volunteer-provided education in China. While existing research has typically sought only improvements in volunteer teaching methods, this research project will focus primarily on institutional and policy improvements that contribute to the development of volunteer teaching services. The quantitative analysis method will be used to analyze collected data and point out how the education provided by volunteers has improved the education in China before, and then research on how the institutions, policies and their own services need to be improved so that volunteers will continue to improve education in China in the future. As a result, the research output can serve as a good guide for China to establish or improve related policies on volunteers, and the output could also be references for other developing countries to promote equity in education, which will contribute to the achievement of the UN goal of Quality Education.

19A Health and Wellbeing

ConvFormer: Decoding Human Attention States from EEG using CNN and Transformer

Ruyi An, *Nanyang Technological University*

Human attention evaluation is of great importance in many cognitive disorder treatments. To accurately evaluate human attention, the technique of monitoring brain activities through Electroencephalograms (EEG) is commonly used in Brain-Computer Interface (BCI) domain. Collected directly by electrodes on participants' head surfaces, EEG signals provide comprehensive information about human attention states. Deep learning techniques for the recognition of EEG signals can vastly accelerate the traditional, laborious process of visual inspection and manual labeling. As human attention is a continuous cognitive process, there are a significant amount of latent dynamics lying along the temporal axis in the EEG signals. To model its long-term contextual pattern, we propose ConvFormer, an end-to-end deep learning framework to decode attention states from EEG signals. The Transformer shows promising results in numerous tasks in fields like natural language processing (NLP) and computer vision (CV) for its ability to capture long-term dependencies of the data series. However, it is susceptible to weak inductive biases, especially on smaller datasets. To compensate for this, in addition to the Transformer, the convolutional neural networks (CNNs), which are capable of learning inductive biases from EEG, are inserted in the Transformer as the feature extracting layers. Extensive experiments were conducted on a publicly available dataset to evaluate the proposed model for attention state classification. ConvFormer outperforms several state-of-the-art methods in the BCI domain with statistically significant improvements in classification accuracy in both subject-dependent and subject-independent settings. With enhanced classification ability, we expect ConvFormer to provide more effective applications in BCI systems. We also see great potential to extend ConvFormer to multi-modal information fusion tasks for attention recognition.

Investigating the role of the Melanocortin-4-receptor in the heart

Kiranjyot Pawar, *Monash University Australia*

Obesity is a major epidemic in the 21st century and is associated with a high risk of secondary health complications. The most prevalent comorbidity related to obesity is cardiovascular disease (CVD). Despite advances in therapeutics, CVD is still the leading cause of mortality among patients with obesity. Current literature demonstrates that further studies are required to better understand the pathways via which CVD is promoted among obese individuals. One such pathway of interest is the Melanocortin system which plays a key role in the regulation of food intake and energy expenditure. Mutations in this pathway, specifically the loss of a receptor known as the Melanocortin-4-receptor (MC4R) is known to lead to the progression of early-onset obesity. Interestingly, MC4R deficient mutations have also been shown to have potential cardioprotective effects. The cardioprotective effects of this loss of function mutation include a lower-than-normal heart rate, reduced blood pressure and a lower risk of developing obesity-related hypertension. This suggests that the MC4R may have potential as a therapeutic target to treat CVD, however, the role of the MC4R in the heart is not clearly understood. Hence, this research project aims to identify the role of the MC4R in the cardiovascular system, and whether the cardioprotective effects of the MC4R allow it to be a potential therapeutic target as a novel treatment for cardiovascular disease. As part of this project, the location of the MC4R in the heart and its role in cardiovascular disease will be examined via the use of mouse models.

19A Health and Wellbeing

Investigating the expression and localization of OBR-2 in Caenorhabditis elegans

Svarika Sonthalia, *Nanyang Technological University*

Lipids fulfil various roles in our body including storing energy, making up the cellular membrane, and controlling cell signalling pathways. This plethora of roles requires lipids to be correctly distributed between different cellular membranes. Within cells, various pathways are involved in lipid transport. Specialised lipid transfer proteins, including a family of oxysterol-binding protein-related proteins (ORPs), facilitate a critical mode of such lipid transport, known as non-vesicular lipid transport. ORP2 is a member of the ORP family proteins, playing a role in cholesterol transport to the plasma membrane. However, little is known about the expression and localization of ORP2 in animals. Hence, this study aimed to investigate the localization and expression of this protein using a transparent worm of approximately 1mm in length, Caenorhabditis elegans, as a model. We used the genome-editing approach to label a worm version of ORP2, called OBR-2, with a green fluorescent protein (GFP) and visualized the expression and localization of GFP-labelled OBR-2 in live worms. Our results show that OBR-2 is expressed in the head, sex organs, and tail regions of C. elegans and that OBR-2 localizes diffusively in a cellular fluid called the cytosol. In addition, OBR-2 is prominently expressed in subsets of neurons in the head region. This expression pattern suggests that OBR-2 may be involved in controlling neuronal activities. In summary, our study suggests that OBR-2 may play a role in transporting lipids in various tissues. Scope for future research entails the study of OBR-2's physiological functions in animals and in-depth investigations about its potential role in regulating neuronal activities.

The Effect of Self-Perception on Binge Eating

Mariam Alsuwaidi, *Zayed University*

Emotional eating incidences are surfacing up to the horizon after diagnosing comfort eating as an emotional disorder. According to American Psychological Association (2013), 49% of adults indulge in unhealthy excessive eating patterns after experiencing frustration. Years afterward, the occurrence of binge eating episodes has amplified from 3.5% to 7.8% worldwide (Galmiche et al., 2019). The United Arab Emirates (UAE) is not an exemption from the surge of emotional eating incidences; one-third of young adults are victims of binge eating (Radwan et al., 2018). The review aims to inspect the motivation behind binge eating with self-perception as a catalyst to the disorder. The paper follows a non-systematic data collection approach where the information was gathered by using Zayed University's library database. The study's objectives are to demonstrate the similarities between food and drug addiction, to explain the impact of food on mood alternation, to investigate the common food group consumed during binge eating, and to understand the psychological and physiological factors that lead to binge eating. The review concludes that food rewires the brain like drugs, especially simple carbohydrates, as it is consumed for mood alteration and comfort. Also, factors such as self-perception, depression, perfectionism, impulsivity, and vitamin D deficiency ignite the disorder further.

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19B Health and Wellbeing

A Ginger-coated Iron Oxide Nanoparticle for the Inhibition of Amyloid Aggregation in Alzheimer's disease

Swathi Jayaraman, *Nanyang Technological University*

Alzheimer's disease (AD) affects many in the elderly population, causing neurodegeneration. The progression of the disease is characterized by the aggregation of amyloid beta, a type of protein, around neural cells, among other causes. Current drugs for AD do not tackle the aggregations directly, hence the disease continues to progress even with treatment. However, a variety of potential drugs to tackle the aggregations are being researched on. These drugs can be delivered using a variety of nanoparticles, which allow localized and efficient delivery. This study aims to explore the use of an iron oxide nanoparticle with a coating of ginger extract for breaking up the amyloid beta aggregations. Iron oxide nanoparticles could be tracked in MRI, and ginger has been shown to have preventative effects against Alzheimer's. This nanoparticle is synthesized through co-precipitation from a mixture of iron oxide solution and ginger extract. The nanoparticle is characterized by its size and absorption spectra. In addition, an MTT assay and a ThT assay were respectively employed to assess the safety and efficacy of the nanoparticle, and its magnetic properties were assessed. The nanoparticle was found to be larger than expected. From the MTT and ThT assays, the nanoparticles were safe for cells but not as effective at inhibiting amyloid beta aggregations. The nanoparticles were not found to be sufficiently magnetic for use in MRI. Hence, further studies are required to optimize and synthesize a better nanoparticle such that it can present a safe option to treat Alzheimer's.

Recent advances and gene therapies for transfusion-dependent beta-thalassemia major patients

Metta Devi, *Monash University Malaysia*

Thalassaemia is a haemoglobinopathy caused by the absence or underproduction of globin due to globin gene mutation, leading to ineffective erythropoiesis and microcytic anaemia. With thalassemia's elevated global prevalence, the clinical significance of the severe form, beta-thalassemia major, was highlighted. In the past few decades, lifelong hypertransfusion and iron chelation therapy have been the primary treatments for transfusion-dependent beta-thalassemia major patients. However, their adverse effects were observed, which led to the research progression of allogeneic hematopoietic stem cell transplantation, which is currently more widely available, and gene therapy developments to treat beta-thalassemia major. The recent developments of innovative treatment possibilities encourage the enhancement of the understanding regarding recent advances and gene therapies for beta-thalassemia major. This review aimed to synthesise the existing literature regarding the current and prospective treatments for beta-thalassemia major and discuss suitable treatments with a potential clinical application for transfusion-dependent beta-thalassemia major patients. Through evaluating previous studies, this review analysed that gene therapies in numerous trials produced promising therapeutic effects safely and eradicated the transfusion necessity in transfusion-dependent beta-thalassemia major patients. Further studies are encouraged to refine gene delivery techniques and improve vector design in order to develop more gene therapies available for more beta-thalassemia major patients. In this review, the recent therapeutic advances for beta-thalassemia major, including allogeneic hematopoietic stem cell transplantation, ex vivo and in vivo hematopoietic stem cell gene therapies, and in vivo genome editing of gene therapy were discussed.

19B Health and Wellbeing

Challenges of Living with Skin Conditions

Vishnucharan Naidu, *Nanyang Technological University*

Skin conditions can have a significant effect on personal well-being, mental health, and social functions which impact a patient's quality of life (QOL). Although QOL studies have been conducted around the world, studies on the impact of skin conditions in Singapore are relatively sparse. This study addresses that gap by assessing both rare and non-rare skin conditions through a mixed-methods approach. It investigates QOL among adults with Epidermolysis Bullosa, Eczema and Psoriasis in two phases. 1) Quantitative study: Data on the burden of skin conditions were collected via the Skindex-29 questionnaire exploring 3 main domains – symptoms, emotions, and functioning. 2) Qualitative study: Semi-structured interviews were conducted with participants over Zoom, exploring QOL, stigma faced and experiences with health services. The results of this QOL study offer an insight to understand how skin conditions result in significant stress and impairment to patients. Some other factors that were found to impact QOL include financial burden, stigma and discrimination. The findings in this study indicate a need for a multi-faceted approach that considers appropriate pain management strategies and psychosocial support systems that may benefit patients in Singapore.

20A Health and Wellbeing

Building empathetic chatbots to improve automated customer service

Kah Ee Gan, *Nanyang Technological University*

Virtual assistants like chatbots have been popular amongst many businesses. Chatbots are classified according to the Response Generation Method under the machine learning approach into retrieval-based and generative-based chatbots. Many online chatbots lack customer service skills as they usually rely on a fixed set of replies to reply to the user, which causes chatbots to be robotic. These are qualities of the retrieval-based chatbots. Previous research has shown that empathy towards customers is one of the key factors towards good customer service. Therefore, this study proposed prepending an emotion label tag to every dialogue in the dataset prior to model training to allow the chatbot to have a better leverage of empathy, and considered alternatives by building generative-based chatbots that do not rely on a fixed set of replies. The chatbots were then evaluated by having 10 participants to interact with the chatbots and provide human evaluation. Participants were given Likert-scale "agreement" questions to assess the different aspects of the chatbots. Results indicate that there is a preference towards generative-based chatbots, and feature engineering on the dataset prior to model training significantly helped generative-based chatbots to perform the best empathetically. This shows that the proposed chatbots can be a better form of empathetic customer-service chatbot as compared to retrieval-based chatbots. This study is crucial for NLP researchers in order to design more comprehensive chatbots with higher accuracy and quality to be more comparable with a human speaker, therefore potentially extending chatbots' capabilities to other areas other that customer service.

Numerical analysis of the time partial fractional diffusion equation

Matthaeus Ragg, *University of Warwick*

In recent research, modified versions of derivatives - so-called fractional derivatives - have found increasing applications in differential equations. This is because often, such modified equations lead to a better description of real-world phenomena. In particular, the fractional diffusion equation in time and one-dimensional space provides an accurate model for the motion of a particle, giving important applications in physics. The project studies the equation in two different settings - unbounded and bounded space. In both cases, a numerical scheme is developed to find approximations to the solution of the equation. The error to the true solution is studied numerically and analytically to provide error estimates and ensure the approximation obtained is correct. Along the way, a new piece of software which can be used to solve a system of fractional differential equations is developed. The software and results about its accuracy provide a tool to plot and study the behaviour of solutions to the fractional diffusion equation. Understanding how solutions to the fractional diffusion equation behave improves diffusion models in physics. In future research, the pieces of code to solve systems of fractional differential equations can be expanded to more cases, and faster error analysis can be implemented. Convergence results of the numerical methods can be improved and studied in different settings.

20A Health and Wellbeing

FastShare Analysis on Erasure Recovery

Teh Yu Xuan, *Nanyang Technological University*

In cryptography, Shamir's secret sharing (SSS) scheme allows a secret to be distributed to n parties such that any t<n parties have no information about the secret, whereas any (t+1) parties can recover the secret easily. However, secret reconstruction is time-consuming in SSS. In this research, we studied a new framework, FastShare, which has a more efficient secret reconstruction algorithm, without compromising its security. This scheme stores information of the secret in an array and apply a transformation algorithm to generate smaller parts of the secret, known as shares, which will be distributed to different parties. However, data erasures may occur in communication and affect secret reconstruction. This research is interested in a special case of the array where all the entries in each row and each column of the array has equal sum after transformation. In this case, erasure recovery depends on the location of erasures within the array. By probabilistic theory, we derived both trivial and nontrivial lower bounds for the probability of successful erasure recovery on the array. Numerical simulations were conducted and all showed that the nontrivial lower bound gave a better estimate for the probability of successful erasure recovery as the array gets larger. The results are useful especially when the array is very large and the exact probability is too difficult to compute. Future research should work on a closed formula that computes the exact probability and extend this research work to consider different types of arrays in the framework.

How optical cells respond to recognising objects in the brain

Runshu Liang, *University of Warwick*

The human brain is the most effective intelligence system but simultaneously can execute complicated tasks. Among the human brain, the visual system plays a crucial role in acquiring information, interacting with circumstances, and inducing emotion, memory and imagination. Therefore, the stimulation of the visual system is a significant development of computational neuroscience. The book Brain Computations: What and How (2021) which the author is my supervisor, basically provides the theoretical background of the research. MATLAB programming language was used to write code for generating new test stimuli for the visual system, consisting of curves, straight lines and other relevant incentives. A file with 50 objects, each with 7 epochs per layer, sent from my supervisor was intended to train the model and test the quality of the code. The project was expected to produce figures to illuminate how cells in layers of visual networks respond to the bar and curvature stimuli. The findings elucidate the different types of neuronal responses of visual cells found in the brain and illustrate these optical cells' activities by generating figures using MATLAB programming. The visual system usually is the first step of perception for most information. Therefore, the findings can set up a solid foundation for stimulating the whole brain, which has been pursued by researchers for decades. New research is encouraged to develop more effective algorithms and programming to stimulate the visual system and produce different test stimuli than bars or curves. The study can prospectively be applied in developing the next generation of AI.

20B Analysing Global Challenges

Exploring Business Models for Retail CBDC

Alvin Joseph Johney, *Nanyang Technological University*

Central Bank Digital Currencies (CBDCs) have become a hot topic in recent years. Put simply, a CBDC is a digital currency issued by a central bank. It is a digital representation of the notes and coins we carry. In particular, retail CBDCs have the potential to re-shape the way we make payments. This paper aims to understand how businesses can develop new business models around retail CBDC. Through literature review, it was found that retail CBDC could offer a new platform on which to develop new business models and it lowers the barriers to entry faced by start-ups in the payments space. To gain a more practical understanding in this area, a qualitative research method was utilised. Interviews were conducted with a CBDC venture as well as the Chief Fintech Officer of the Monetary Authority of Singapore. The interviews were then transcribed and thematic analysis was conducted using a bottom-up approach. Four key findings were obtained: 1) A largely untapped offline payments market presents a great opportunity for retail CBDC; 2) Central banks are pivotal in supporting the development of CBDC business models; 3) New entrants to the CBDC space face numerous challenges; 4) Businesses need to consider environmental sustainability when developing a CBDC business model. Through these findings, the study contributes some insight regarding the considerations and challenges involved in developing a business model around retail CBDC. One potential new line of research enquiry could be to do a comparative life cycle assessment of CBDC versus physical notes and coins to evaluate the environmental sustainability of retail CBDC.

Analyzing and Improving the Learnt Index on Various Data

Yinan He, *Nanyang Technological University*

In the age of big data, data search speed is crucial when performing data intensive tasks and fast data search is often difficult when involving big data. This is especially problematic in applications that are demanding in response time. Imagine the frustration when your social media is not responding, slow data search could be a cause. To achieve fast data search, various data indexing methods are used in databases. In this paper, we analysed the existing Recursive Model Index (RMI) method and proposed the Partitioned-RMI (PRMI) method to answer the research question of “how to accelerate data search to make big data less gruelling?”. RMI is a novel indexing method to accelerate data search by exploiting the dataset’s distribution patterns. The paper analysed RMI’s robustness by examining RMI’s performance on various datasets and comparing the results with the dataset’s distribution patterns. We found that RMI performed exceptionally well on uniformly distributed datasets and relatively worse on data that followed other distributions. Inspired by this, we proposed the PRMI method which improved RMI’s robustness by introducing an additional step to cut the dataset into relatively uniformly distributed partitions before applying RMI onto each partition. This magnified the advantage of RMI as PRMI partitions data in a way RMI excelled in. We implemented PRMI method in C++ language and our empirical analysis showed a decrease in lookup time for more than 50% in various datasets. Our results showed that PRMI method could significantly accelerate data search, impact the design of future databases, therefore allowing faster applications.

20B Analysing Global Challenges

Regional Implications of Contemporary Minilateralism on Singapore's National Security

Kai Weng Kum, *Nanyang Technological University*

Consequent with the awakening of the Chinese behemoth, China's foreign policy revamp has inevitably heightened tensions with the incumbent power, the United States (US). China's new economic might and charm offensive has caused shifting perceptions among America's Asian allies, rendering the Cold War-era Hub and Spoke system increasingly ineffective, thereby placing America on Joseph Nye's proverbial relative decline. In response to this geopolitical shift exacerbated by an outdated strategic cooperation framework, America has turned to regional minilateralism in an attempt to bolster their presence in the East Asian region to contain China more effectively. These developments are increasingly centering around Southeast Asia, turning the region into a political battleground and challenging both the Association of Southeast Asian Nations' (ASEAN) Zone of Peace, Freedom and Neutrality (ZOPFAN), as well as their Nuclear-Weapon-Free Zone (NWFZ). One of the key founding members of ASEAN, geopolitically neutral Singapore is not exempt from this power tussle; while the island-nation is in a unique position to access opportunities from both China and the US, times of conflict could force Singapore to either choose a side or be alienated by both. With external factors such as the present risk of fragmentation within ASEAN being the highest since the end of the Cold War, the threat to Singapore's national security would be dramatically heightened should her immediate neighbors be adopted by different powers. Through content analysis, this paper thus seeks to delve into the regional impact of increasing American-led minilateralism on Singapore's national security, offering findings-based policy recommendations.

Change internally and systematically: Arguments for reform of Gross Negligence Manslaughter in the UK

Runshu Liang, *University of Leeds*

In the UK, the criminal offence of gross negligence manslaughter (GNM) is committed where the death is a result of a grossly negligent act or omission on the part of the defendant. This paper aims to prove that the common law test of GNM has defects and needs reform. First, internally the key to GNM is the requirement that the breach amounted to gross negligence. However, its identification is unclear in practice. Thus, UK domestic cases and jury systems are analysed to explain the requirement is circular and uncertain. Then, this paper analyses systematic issues about unfair labelling and retributive justice in the medical area to express the necessity of reform. Subsequently, under a global context, this paper conducts a thorough literature examination on restorative justice and a comparative legal analysis of Chinese criminal law to put forward two practical legal approaches to reform the GNM, namely a statutory definition of GNM and a novel criminalisation for healthcare malpractice. The statutory guidance of GNM helps each juror make consistent decisions, which achieves overall objectivity at the time of conviction. The new crime of medical malpractice provides proportionate compensation for bereaved families and advocates a restorative system which facilitates oversight to prevent the reoccurrence of the fatal error. Although political factors and practical hindrances may prevent GNM from being reformed immediately, we expect the analysis and suggestions in this paper can give insight into making our current English criminal legal system a better one and reaching an overall judicial justice.

Evaluation of the estrogenic activity of unfermented rooibos tea

Sasha Marais, *Stellenbosch University*

A study claimed that rooibos, an internationally recognized tea indigenous to South Africa, contains compounds (plant polyphenols) structurally mimicking estrogen. This finding prompted the Memorial Sloan Kettering Cancer Centre to caution estrogen-sensitive breast cancer patients. However, the study does not demonstrate whether rooibos mimics estrogen in a manner that poses a risk. Hence, the warning may be premature and could adversely affect the international rooibos industry as breast cancer is the most common cancer globally. The aim of this research is to evaluate the potential estrogen-like activity of rooibos by determining whether rooibos induces gene activation via estrogen receptor alpha (ERα) or beta (ERβ). Most breast cancer cells require estrogen-induced gene activation via ERα to stimulate cancer progression, whereas ERβ inhibits ERα activity. As unfermented rooibos contains increased plant polyphenols than fermented rooibos, different unfermented extracts were evaluated by performing promoter-reporter assays to determine whether the extracts induced gene activation (display agonism) or inhibited estrogen-induced gene activation (display antagonism) via ERα or ERβ. Although preliminary, the results suggest that most extracts inhibit estrogen-induced gene activation via both ERα and ERβ at levels potentially comparable to that of current breast cancer treatments, tamoxifen and fulvestrant. Hereby, we suggest that unfermented rooibos tea may be safe for breast cancer patients. Future research involves including fermented rooibos tea to assess the effects on various hallmarks of breast cancer. This project provides novel insight into the estrogenic activity of rooibos which may indirectly affect affiliated agricultural and nutraceutical global markets.

Investigating a C. difficile protein involved in gut colonisation

Lowell Mott, *University of Warwick*

C. difficile is a pathogen causing severe diarrhoea in people treated with antibiotics. It is the most common cause of hospital-acquired infectious diarrhoea, responsible for 450,000 cases and 29,300 associated deaths per year in the US. The literature to date has not definitively identified which C. difficile proteins are most important in gut colonisation, nor which virulence factors they correspond to. Without this knowledge, the ability of the scientific community to design treatments or prophylactics which effectively inhibit such virulence factors is hindered. As part of an ongoing project, a number of proteins thought to have an important role in gut colonisation have been identified. These proteins are believed to correspond to virulence factors such as breaking down the epithelial barrier or forming biofilms within the human gut.

This research developed a strain of C. difficile incapable of expressing a protein of interest, a putative mucinase. This 'knockout' strain can be compared with the wild type strain, to characterise the role of the protein in infection. Anaerobic culturing, transformation and conjugation techniques were used with E. coli and C. difficile to obtain the product. PCR amplification and gel electrophoresis were used for a variety of DNA extractions. Analysis of variation between strains will build the evidence base for the importance of this protein in gut colonisation, and in which virulence mechanisms it functions. The knowledge derived from this research will augment the capacity of the scientific community to investigate novel, targeted treatments and prophylactics against C. difficile.

20E Health and Wellbeing

COVID and Care: a Study into the Continuing Effect of the Pandemic on NHS Care Services

James Mays, *University of Warwick*

The COVID-19 pandemic has undoubtedly had a negative effect on the effectiveness of adult care services provided by the NHS in the UK. Migita D'cruz describes 'an invisible human rights crisis' when describing the 'marginalised' state of older adults during the COVID-19 pandemic in her October 2020 study. Michael Anderson accredits this marginalisation to the Conservative government's response to the pandemic including limited/slow testing capacity alongside cancellation and postponement of many aspects of routine care in his later May 2021 study. Elsewhere, Mary Daly attributes the slow response to the reality of COVID-19 in care homes to the Conservative government's underhanded, long-term plans to divest the state of responsibilities in social care. From this preliminary research alone, an air of concern surrounding the government's neglect of adult care services is present. In response, this research project will combine previous research, such as those above, made during the COVID-19 pandemic alongside research of adult care services across the UK gathered since to chart the government's neglecting of older adults with care needs in the UK. This combination of studies old and new will allow comparisons to be drawn between the state of care during the pandemic as well as post-pandemic, concluding on what has led to this 'invisible human rights crisis' D'cruz refers to and how it persists beyond the pandemic into the future. This research is timely and important as it explores how the quality of care within the NHS has worsened given the government's lacking prioritisation of social care and so chronicling the development of a crisis thus far left unseen and unspoken.

The perspectives of experienced therapists on the role of mutuality, in enabling clients in fragile processing to become more fully functioning

Julie Elliott, *University of Warwick*

Using Interpretive Phenomenological Analysis, the study examines the memories, perceptions, experiences and associations of three person-centred therapists who work with clients who have a fragile style of processing and demonstrate difficulty in holding emotionally connected experience in attention at moderate levels of intensity and not able to take in the view of another person without feeling their own view was annihilated. The purpose of the research was to identify how therapists can best meet the needs of clients with this style of processing (many of whom experienced neglect, abuse or rape in their younger years) and assess whether mutuality was a significant factor in supporting clients to become more able to process meaning, develop the ability to stay with experiences that are unclear and hold that experience into attention. The major themes found safe relationship essential, requiring congruent therapists who clients could perceive as reliable before mutuality could occur; the importance of relationship and clear boundaries were explicitly and implicitly linked to client's feelings of safety. The exploration of intersubjectivity allowed clients to discover parts of the self that were beyond their everyday self-presentation. One therapist perceived mutual unconditional positive regard allowed clients to experience feeling of value because their existence had meaning to another person in their life; realising that feelings had the right to exist was life affirming. It is anticipated that this research can help us better understand the therapeutic needs of clients who have experienced neglect, sexual abuse or rape. Future research could be conducted into understanding the impact of societal attitudes on the processing styles of clients from minority groups.

21A Society and Culture

Horror Movies and Motherhood

Daemon Leong, *Nanyang Technological University*

In the introduction to her book The Monstrous-Feminine, Barbara Creed says, “All human societies have a conception of the monstrous-feminine, of what it is about woman that is shocking, terrifying, horrific, abject”, signalling an innate awareness that the feminine is to be feared. Creed draws particular attention to maternal figures, suggesting that reproductive ability causes maternal figures to become a source of the abject. My research seeks to update this evaluation, examining the films The Babadook (2014), Hereditary (2018), Halloween (2018), and Us (2019) to consider what the new mother in horror looks like, with a focus on maternal affect and individual identity. It addresses the ways in which recent horror allows mother characters to be presented as complex individuals, with motherhood as merely one facet of their identity. Ultimately, this research may help to expand feminist studies, especially within the horror genre, out of the symbolic and into the applied, prioritising the telling of real experiences and the presentation of complex women rather than reducing them to one-dimensional sources of fear.

Anime Scene Stylization: A Survey

Jiang Yuxin, *Nanyang Technological University*

Cartoon is a popular and underrated style of art that has been widely applied in various settings. Modern workflows of producing anime backgrounds are meticulous and time-consuming. Inspired by the development of deep learning, some well-known algorithms have been created to transform real-scene photos into cartoon-style images. However, this field is also facing several challenges, i.e., the heavier filter sense, unable to retain sufficient background information, the large discrepancy between cartoon and real-world images, lack of faithful evaluation metrics, etc. To the best of our knowledge, there is limited research that has particularly concentrated on the systematic developments of these solutions.

In this paper, we provide a survey of image cartoonization, which focuses on deep learning models that are used in image-to-image translation (I2I) and style transfer. The review starts with an analysis of the characteristics and differences between animation and real-world photos. This is followed by a comprehensive and critical discussion of some classic existing approaches with detailed frameworks, including generative adversarial networks (GANs) and traditional neural style transfer (NST), with an analysis of their respective advantages and limitations. Finally, we present promising insights into the current research challenges and possible future directions. We hope this survey could serve as a sound and valuable guideline for future development of image cartoonization.

21A Society and Culture

Queer counter-publics in digital China: Weibo discourse under state censorship

Shixin Du, *University of Sheffield*

The COVID-19 pandemic has undoubtedly had a negative effect on the effectiveness of adult care services provided by the NHS in the UK. Migita D'cruz describes 'an invisible human rights crisis' when describing the 'marginalised' state of older adults during the COVID-19 pandemic in her October 2020 study. Michael Anderson accredits this marginalisation to the Conservative government's response to the pandemic including limited/slow testing capacity alongside cancellation and postponement of many aspects of routine care in his later May 2021 study. Elsewhere, Mary Daly attributes the slow response to the reality of COVID-19 in care homes to the Conservative government's underhanded, long-term plans to divest the state of responsibilities in social care. From this preliminary research alone, an air of concern surrounding the government's neglect of adult care services is present. In response, this research project will combine previous research, such as those above, made during the COVID-19 pandemic alongside research of adult care services across the UK gathered since to chart the government's neglecting of older adults with care needs in the UK. This combination of studies old and new will allow comparisons to be drawn between the state of care during the pandemic as well as post-pandemic, concluding on what has led to this 'invisible human rights crisis' D'cruz refers to and how it persists beyond the pandemic into the future. This research is timely and important as it explores how the quality of care within the NHS has worsened given the government's lacking prioritisation of social care and so chronicling the development of a crisis thus far left unseen and unspoken.

Caribbean Perspectives: Radical Decolonisation, Reparations and Re-Imagining the Anthropocene

Baht-Ammi Zina Francis, *University of Durham*

For the Caribbean region, discussions of decolonisation and reparations must transcend academic discourse as they constitute veritable channels in securing political, economic and cultural sovereignty. This paper studies cases from the region to redefine 'decolonisation' beyond a political process, re-imagine the critically current and Western hegemonic understanding of the 'Anthropocene' and root the Caribbean and its reparations endeavour at the centre of these radical interpretations. The 'Anthropocene' is defined as the modern epoch where human activity has environmentally altered the planet, with its origins in Britain at the advent of the Industrial Revolution. Using theoretical frameworks provided by Moore's 'Capitalocene' and Yusoff's 'A Billion Black Anthropocene's or none' and empirical evidence from Beckles 'Britain's Black Debt', this research unearths the Caribbean as the nucleus of the bourgeoning of global capitalism and the annihilation of black bodies. Utilising its thesis of the Caribbean Anthropocene account to critically analyse the region's Financial and Tourism sectors, this paper illuminates legacies of colonialism and argues that Fanon's concept of violence should be imbued into the Caribbean quest for reparatory justice, leading to a radical decolonisation. Centring the Caribbean in the Anthropocene account begins to dismantle the dominant discourse upholding Western hegemony: an active engagement in radical decolonisation. Furthermore, applying a 21st century reading of Fanonian violence to the Caribbean reparation endeavour demonstrates how reparatory justice is necessary for an all-encompassing sovereignty for the region. This paper provides a sound justification for radical decolonisation aided by reparations, through the advancement of a holistic interpretation of the Caribbean. Thereby, positioning itself as solid basis for pursuing reparatory compensation through substantial means.

21B Data and the Digital World

Digital Makeup Using Semantic Segmentation and Colour Transfer

Yuqing Zhao, *Nanyang Technological University*

Nowadays, portraits and self-portraits are trendy. Many programs and apps are available for photo editing. They can edit eyes, brighten skin, remove wrinkles, and even take other images' parameters and filters and apply them to their images. However, most of the tools are designed only to edit raster images. Therefore, this research will implement a Digital Makeup Algorithm available to edit vector graphics and provide several practical benefits. The algorithm uses Semantic Segmentation as the first step, which uses the algorithm to distinguish the object and the background. Next, we applied the Reinhard colour transfer method, which transfers the colour characteristics from the original image to the target image. The result shows that although it simplifies and speeds up the algorithm, it fails to synthesize the colour scheme of the target image. Then we improved the algorithm using the N-Dimensional Probability Density Function Transfer. This randomized algorithm resolves the problem and guarantees convergence at low computation costs. The algorithm will reduce the time and effort to polish the facial images. This research provides new ideas for upgrading photo editing apps and programs, which are eligible to edit all kinds of images. Future works will look at these machine learning algorithms in other areas of computer vision.

A Low-Cost Lane-Following Algorithm for Cyber-Physical Robots

Archit Gupta, *Nanyang Technological University*

Duckiebots are low-cost mobile robots that are widely used in the fields of research and education. Although there are existing self-driving algorithms for the Duckietown platform, they are either too complex or perform too poorly to navigate a multi-lane track. Moreover, it is essential to give memory and computational resources to a Duckiebot so it can perform additional tasks such as out-of-distribution input detection. In order to satisfy these constraints, we built a low-cost autonomous driving algorithm capable of driving on a two-lane track. The algorithm uses traditional computer vision techniques to identify the central lane on the track and obtain the relevant steering angle. The steering is then controlled by a PID controller that smoothens the movement of the Duckiebot. The performance of the algorithm was compared to that of the NeurIPS 2018 AI Driving Olympics (AIDO) finalists, and it outperformed all but one finalists. The two main contributions of our algorithm are its low computational requirements and very quick set-up, with ongoing efforts to make it more reliable.

21B Data and the Digital World

Developing a Principled Ranking Framework for Limited Overs Cricket

Peter Matthews, *University of Warwick*

Cricket is the second most followed sport in the world. Despite this, and the growing influence of statistical methods in other popular sports, few statistically motivated ranking systems have penetrated into mainstream consciousness. The standard benchmark of a player's ability continues to be the traditional metrics: averages, strike rate and bowling economy. Bradley-Terry models are used frequently in many areas of science, when analysing binary win/loss data involving contests between two actors. We adjust this paradigm to the contest between a batter and bowler to produce a principled ranking of limited overs cricketers. We constructed two probabilistic models based on Bradley-Terry, where runs scored and wickets lost are sufficient statistics for their respective models - equivalently, runs conceded and wickets taken, for bowlers. This results in a 2-D rating that characterises the two principle aims of cricket: wicket-preserving/taking and run-scoring/restricting. Our ratings are calculated in a statistically-principled manner that accounts for the strength of opposition and other contextual factors that traditional tools fail to account for. We combine the two rating dimensions into a single, easily interpretable metric by answering, through simulation, the question "How much would a team score if player x batted in every position for an innings against the average bowler?". This research opens up a range of new questions about cricket that can be asked, with a methodological perspective with which to answer them. Examples include investigating how playing abilities change over time, which can be achieved by a dynamic extension to the model, and, investigating the interactions between different batting and bowling styles with a latent variable approach.

Developing a Principled Ranking Framework for Limited Overs Cricket

Rikhil Vachhani, *University of Warwick*

Cricket is the second most followed sport in the world. Despite this, and the growing influence of statistical methods in other popular sports, few statistically motivated ranking systems have penetrated into mainstream consciousness. The standard benchmark of a player's ability continues to be the traditional metrics: averages, strike rate and bowling economy. Bradley-Terry models are used frequently in many areas of science, when analysing binary win/loss data involving contests between two actors. We adjust this paradigm to the contest between a batter and bowler to produce a principled ranking of limited overs cricketers. We constructed two probabilistic models based on Bradley-Terry, where runs scored and wickets lost are sufficient statistics for their respective models - equivalently, runs conceded and wickets taken, for bowlers. This results in a 2-D rating that characterises the two principle aims of cricket: wicket-preserving/taking and run-scoring/restricting. Our ratings are calculated in a statistically-principled manner that accounts for the strength of opposition and other contextual factors that traditional tools fail to account for. We combine the two rating dimensions into a single, easily interpretable metric by answering, through simulation, the question "How much would a team score if player x batted in every position for an innings against the average bowler?". This research opens up a range of new questions about cricket that can be asked, with a methodological perspective with which to answer them. Examples include investigating how playing abilities change over time, which can be achieved by a dynamic extension to the model, and, investigating the interactions between different batting and bowling styles with a latent variable approach.

21C Innovations in Medical Diagnoses and Diagnostics

Developing a drug screening platform for PINK1-related diseases

Andrew Amadeus Susilo, *Nanyang Technological University*

The protein PINK1 plays a part in quality control and recycling of mitochondria, the powerhouse of the cell. PINK1 deficiency is a major risk factor accounting for mitochondrial dysfunction observed in familial Parkinson's disease, and is now implicated in various diseases including diabetic and cardiovascular diseases. Traditional herbs have been used for treating the abovementioned diseases. However, their therapeutic mechanisms have yet to be determined. We intend to repurpose herbs for rescuing diseased phenotypes brought by PINK1 deficiency. For testing the effects of traditional herbs, we started with using the HeLa cell line which is extensively used in biomedical research. First, we obtained the highest tolerable dosages of the various herb extracts from Nanyang Herbs through performing a cytotoxicity assay at a range of herb dosages onto unmodified HeLa cells. Within the tolerable dosages, we have then screened for the herb extracts and their optimum dosages capable of inducing clearance of damaged biomolecules for recycling by means of autophagy in unmodified HeLa cells. We will further test the herb extracts capable of inducing autophagy onto appropriate PINK1-deficient cell models. We anticipate these extracts can confer disease protection in terms of mitochondrial recycling, mitochondrial health, and/or buffering of calcium overload and oxidative stress in the cell, thereby preventing cell death. Future work can build on the identified therapeutic mechanisms by validating results onto well-established animal models like zebrafish and roundworms, as a step prior to clinical trials. Insights from evaluating therapeutic mechanisms of the herbs in the context of PINK1-associated diseases will ultimately help in proposing new drug candidates for use in clinical settings.

Two-Dimensional Video Analysis of the Rearfoot Inversion Angle at Initial Footstrike in Treadmill Running

Muhammad Nur Shahril Iskandar, *Nanyang Technological University*

Gait analysis is of interest to clinicians and researchers because it has many practical applications, such as diagnosing and preventing injuries. Two-dimensional (2D) video analysis is frequently used, but it has limitations. When video recordings of rearfoot inversion at footstrike are taken from the back, the other foot may obstruct the clinician's view of accurately measuring the rearfoot angle. The reliability of 2D video analysis varies considerably between studies. As a result, the study's primary goal was to compare the measurement of rearfoot inversion angle at initial footstrike between front and back camera views. The secondary goal was to evaluate the reliability of using 2D video analysis. Twenty female participants were recruited for a single treadmill running session. Seven consecutive steps in the front and back camera views of the rearfoot inversion angle were analysed using paired sample t-test. Reliability was assessed in each foot using intra-class correlation coefficients. The angle measurements differed significantly ($p < 0.001$, $d = 0.883$) between the front (11.7° [10.1°, 13.3°]) and back (7.2° [4.7°, 9.8°]) camera views. In the front and back camera views, both left (0.936, 0.966) and right (0.819, 0.905) feet, revealed excellent reliability. The findings indicate that 2D video analysis is reliable. However, measurements between camera views should not be used interchangeably. With a larger sample size, future studies could conduct a correlation and regression analysis. This allows clinicians to predict the rearfoot inversion angle of the back view, by measuring the front view when the back view is blocked.

21C Innovations in Medical Diagnoses and Diagnostics

Pharmacists and Precision Medicine

Lee Wan Xuan Trena, *Nanyang Technological University*

Precision medicine promises to deliver a better prognosis and diagnosis by using a patient's genes, environment, and lifestyle to improve and personalize patient care. With pharmacogenomics, a rapidly evolving component of precision medicine, medication can be tailored to each individual's needs. Pharmacists with extensive pharmacology knowledge are essential to implement pharmacology effectively. Despite this, no research has been conducted in Singapore on pharmacists' and pharmacy students' perceptions of their roles in providing precision medicine. Using data from semi structured interviews with pharmacists and pharmacy students in Singapore, this study reveals that participants expressed a general understanding of pharmacogenomics concepts. Additionally, participants expressed a positive attitude towards precision medicine. However, participants were divided on the possible responsibilities of pharmacists in the implementation of precision medicine, apart from optimizing medical therapy based on pharmacogenetic results. Participants expressed concerns about their abilities to execute precision medicine-related roles due to a lack of knowledge, manpower, workflow, and time. For Singapore to benefit from precision medicine, (1) increasing pharmacists' knowledge of precision medicine, especially its clinical applications, (2) subsidizing the cost of pharmacogenomics testing, (3) increasing manpower, and (4) having a proper workflow for precision medicine should be implemented. Despite their expertise in pharmacogenomics, pharmacy students and pharmacists have limited authority and power in Singapore's healthcare system. It is therefore critical that the government empowers pharmacy students and pharmacists, or we will be unable to reap the full benefits of precision medicine.

Inflammatory cytokine levels and lymphocyte subset distribution in Multisystem Inflammatory Syndrome in Children at Tygerberg Hospital

Edwin Mohlake, *Stellenbosch University*

Multisystem inflammatory syndrome in children (MIS-C) is a condition of multi-organ dysfunction and systemic inflammation temporally associated with Covid-19 infection. Initially, cases were thought to be Kawasaki disease (KD) due to similarities, however, MIS-C is now considered distinct from KD. Normally children do not present with severe illness when infected with SARS-CoV-2, but previous studies have identified a subgroup of children that develops severe hyperinflammation. Therefore, the study aimed to assess cytokine levels from plasma samples of suspected MIS-C and KD cases at Tygerberg Hospital. Plasma samples were collected at two time points from each patient and a Luminex multiplex assay was used to assess inflammatory cytokines concentration in the patient's plasma samples. Inflammatory cytokines were compared with lymphocyte subset and routine diagnostic markers in the two disease stages using non-parametric tests. Elevated biomarkers were observed in MIS-C patients compared to KD patients in the acute stage of the disease, even though most data were not statistically significant ($p<0.005$). Most inflammatory cytokines and routine diagnostic markers were elevated in the acute stage and decreased as the patient’s received treatment and vice versa for the lymphocyte subset. Furthermore, lymphocyte subsets (such as CD8 and CD16/56 cells) negatively correlated with most inflammatory cytokines in MIS-C patients. A range of inflammatory cytokines and routine diagnostic markers illustrated their potential to be used to differentiate the two diseases. Furthermore, the data generated in this study will aid in elucidating the pathogenesis of these two diseases in South Africa and can be used to inform future research on MIS-C and KD.

21D Interdisciplinary Inequalities in Mental Health and Wellness

Developing a drug screening platform for PINK1-related diseases

Anna Marí Bueno, *Pompeu Fabra University*

This research aims to analyze how Belgium responds to Romas and Travelers' inequities in healthcare. It revises the situation of the country through the Sustainable Development Goal 10, specifically the target 10.2, which seeks to reduce inequalities through the socio-economic and political empowerment of all groups, irrespective of their ethnicity. Following this line, Romas and Travelers represent the largest ethnic minority in Europe and one of the most discriminated groups. Therefore, to manage the issue, I discuss the implications of integration and its relation to the identity of the targeted group. This dissertation recognizes that to achieve the political empowerment of the Roma and Travelers communities, the Belgian authorities should invest in a type of "relational integration," being a two-sided work (Klarenbeek, 2019). Through this concept, the intercultural mediators are a nexus between the Roma communities and the non-Roma society. There are three interviews with different profiles of intercultural mediators —from systemic, local and specialized-health vision— who explain the reality of Roma and Traveler communities with their experiences as professionals. I give the results through the information discussed in the literature review and the interviews to provide appropriate recommendations to the Belgian government, health services, and intercultural mediators. Some of them include the reformulation of the word "integration", working through the prevention, reframing the formation of intercultural mediators, among others. Nonetheless, the research recognizes that the main gap is the lack of first-hand information of the Roma and Traveler communities. Therefore, it encourages the incoming researchers to listen to their proposals and let the subaltern speak (Spivak, 1988).

Thought-action Fusion and Schizotypy in the General Population

Maya Maki, *University of Warwick*

Thought-action fusion (TAF) is a thinking style associated with various psychopathologies. Recently, research has suggested a link between TAF and schizotypy: a cluster of traits resembling schizophrenia on a subclinical level. However, the literature focuses primarily on the positive traits of schizotypy: unusual experiences and disorganised thinking, while disregarding the negative ones: anti-social behaviour and uncontrollable impulses. This study expands on the existing literature by examining the relationship between two forms of TAF (TAF-likelihood and TAF-moral) and four schizotypy traits. Schizotypy subscales were categorised using the O-LIFE Scale (Mason et al., 2005), and TAF was measured using the TAF Scale (Shafran et al., 1996). The hypothesis states that TAF-L and TAF-M would be positively correlated with the positive traits, particularly unusual experiences, but will show no association with the negative traits. Results indicated that unusual experiences were significantly correlated with TAF-M and TAF-L. An incidental but important finding conveyed that the impulse trait was significantly positively associated with TAF-L. This provides preliminary support for the relationship between TAF-L and impulse control, possibly seen in other risk-taking disorders. This is a significant step forward in forming a basis for the factors that drive uncontrollable impulses; a greater understanding of this link with TAF-L may lead to better interventions addressing impulse control. Future research may provide clarity by controlling for confounding factors such as depressive states, religious beliefs, fantasy proneness and OCD. It is important to note that a non-clinical sample was utilised, and a clinical sample's replication may be useful in comparing the difference in effects.

21D Interdisciplinary Inequalities in Mental Health and Wellness

The Role of Aliens in Western Science Fiction Animation in the Early 2000s

Vincci Chung, *University of Warwick*

This study explores the role of aliens in Western science fiction animation in the early 2000s using the Disney animated film Lilo and Stitch as a case study. The research fills a gap of literature of animation and education for young audiences within this genre in more recent contexts. Approaching the research question of how aliens in this film represent science and scientists to young audiences, I argue that the role of aliens in Lilo & Stitch is to positively impact on the cultural anxieties of young audiences and effectively communicate concepts of science and human values. I first outline Susan Sontag's essay on the effects of science fiction films on society in the 1960s, putting forward a discussion on the extent to which the roles of aliens in this case study aligns with Sontag's analysis. The study analyses the relationship between aliens and disaster in the film and contextualises its production in relation to Disney's development in science fiction animation and anxieties affected by major world events at the time. It then outlines narratives of aliens in Lilo &Stitch and how they influence young audiences' conceptualisation of their identities and science. The findings of the study demonstrate how aliens in science fiction animation positively impact on the wellbeing and learning of young audiences, giving merit to the significance of science fiction animation in educating and empowering young people. The research contributes towards the wider study of how artistic productions influence social change as well as one's wellbeing and learning, positively impacting on the sustainability of communities.

Exploring the influence of body-image related cognitive distortions in eating and exercising behaviors among Emirati female undergraduates

Amal Alnuaimi, *Zayed University*

Women's struggle with their body, diet, and exercise is a pervasive phenomenon in the world today. While eating disorders are on the rise globally, there are disordered eating behaviors that remain undiagnosed, especially in the UAE. This is the first study to explore this issue in an Emirati sample with three variables of disordered eating: attitudes, reasons for exercise, and body-related cognitive distortions (i.e., irrational thinking patterns about one's body). The study followed a quantitative design wherein 236 undergraduate students between the ages of 18 and 27 completed an online questionnaire containing three psychometric assessments. Data underwent multiple analyses, like correlations, T-tests, and ANVOAs. Results showed that 37.3% of Emirati female undergraduates have high levels of disordered eating attitudes. There was a significant correlation between high levels of cognitive distortions and disordered eating attitudes. Moreover, high cognitive distortions levels and disordered eating attitudes are significantly associated with appearance-focused reasons for exercise, like weight-control and body-tone. While there was a significant correlation between increased physical activity and disordered eating, physical activity was non-significantly related to cognitive distortions. Lastly, there are no significant differences between age groups in terms of cognitive distortions. The high prevalence indicates that many Emirati women struggle with disordered eating, but do not necessarily have a clinical or diagnosable eating disorder. Furthermore, findings suggest that cognitive distortions are an important factor in the development of eating disorders. Lastly, due to the increasing prevalence of disordered eating in undergraduate students, universities in the UAE must ensure the availability of eating disorder specialists in their student counseling centers.

21E Social Mobility in Europe

R&I Mobility Roadmap

Zarja Hude, *University of Ljubljana*

The “Mobility Roadmap” project has emerged to address the issue of numerous uncertainties related to cross-border work of Researchers. The problem is that currently, Researchers cannot rely on a single source of information to ascertain their legal position concerning migration requirements, social security coverage and personal income taxation in case of performing their duties abroad. Rather, they must dedicate either considerable time to search for their rights and obligations, or significant financial means to hire a professional who does the same on their behalf. Costs, doubts, queries, risks, and other issues arising from the lack of information seem to at least hinder, if not discourage, international mobilities of research and innovation (R&I). In this context, the “Mobility Roadmap” project aims to provide Researchers who wish to work in a foreign country a user-friendly, easily accessible, personalized, and exhaustive set of information about the applicable migration requirements, social security, and personal income tax arrangement. To this end, an extensive legal research on migration, social security, and taxation for several different countries is being conducted on an on-going basis. This research will serve as a database for a two-fold web application. First, the app will ask Researchers to insert the relevant personal circumstances. Based on the inputs, the app will extract only the relevant piece of information and present it deployed in a meaningful order. Thus, Researchers will be able to plan their mobility more easily and smoothly. The ultimate objective is, by providing a greater certainty and predictability with respect to cross-border mobilities, to encourage research and innovation throughout Europe.

Treatment of Ethnic Minorities in the English Justice System

Tassiana Dangin, *University of Warwick*

The 2017 Lammy review concludes that “BAME (Black, Asian, Minority Ethnic) individuals still face bias, including overt discrimination, in parts of the Justice System”. As minorities make up 14% of the population in England but more than 25% of the prison population, protests for racial justice such as the Black Lives Matter movement led to widespread questionings of the fairness of legal institutions. Could it be that some ethnicities are overpoliced, more controlled and thus more likely to be jailed? Cressida Dick defends the police use of stop-and-search as she says black people are eight times more likely to perpetrate violent crimes. This research project adds to the debate by conducting a statistical analysis of the stop-and-search data provided by the English police forces. An analysis of the representation of ethnic minorities and its interaction with gender, age and police forces will be provided. In particular, we investigate the assumption that the data is missing, that is it was not recorded, at random. If it follows a pattern, what effects does this have on the results? In this project we aim to answer the following questions: Are some ethnicities more likely to be stopped and searched? And does the outcome of the stop-and-search differ depending on the offender’s ethnicity for similar objects of search? The results add to existing research on the subject and provide a quantitative evidence base for public decision making and social trends. They can then be discussed with members of the Law department for critical insight.

21E Social Mobility in Europe

Are private tuitions a worthwhile long term investment? The Effects of Early Private Tuitions on Future Outcomes

Paulina Siedleczka, *University of Warwick*

Private tuition has historically been exclusively reserved to the elite. Yet due to increased affordability, the concept appealed to parents from various social classes as tuitions were seen to be an effective means of widening opportunities to less privileged students. Thus this motivated a number of researchers to study the actual impact of tuitions on grades, with varying conclusions reached. However, little was done on the impact of tuitions on later in life outcomes. In order to investigate this, variables (focusing on students receiving private tuition for GCSE exams and implications at ages 21+) obtained from a vast dataset (LSYPE) were analysed using statistical software, modelling additionally relationships. From initial research, the results were staggering as there was little correlation between the two factors. For instance, a student receiving academic tuition would experience a very minor increase in their income, once they're in work. This implies that private tuitions are losing its significance and impact in improving grades, influencing future living standards. This matters hugely as it suggests that tuitions are indeed not a good value for money, especially for working class households. Instead it rather reinforces the existing inequality. Hence this research has opened up new scope by allowing to investigate potential alternatives that could be available for a powerless working class parent, with little connections that still wants the best for their child; and has placed greater responsibility on the government to overcome the issue.

How can the urban design of open cities and inclusive societies welcome refugees in their structure in western Europe?

Yara Taha, *University of Sheffield*

The recent refugee crises and the influx of people to Europe have put pressure on urban centres and governments to find a solution in order to accommodate these population increases. The question of how urban design and inclusive societies can evolve to deal with these new concerns remains at the very basis of this matter and at the forefront of the refugee question. Using Richard Sennet's 'Open Cities' notion where he describes the conceptualised city as "a place that opens up opportunities, connects people to new people, free us from the narrow confines of traditional inclusivity," in his book Designing Disorder, this research explores the implications of this notion, how it can be utilised in western European cities, and what it can provide in transforming urban design. This idea came to oppose the social and physical confines imposed on the city as a result of the 21st-century modernist movement that prioritised functionality and order over diversity and disorder in city design. An example of this notion in practice would be looking at borders between two different urban spaces and creating more permeable boundaries. The research will look at examples of large-scale urban approaches as well as microscale projects in the UK, Germany, and Sweden to explore different possibilities for refugees' social and physical integration in western societies. I argue that modifying our approach to urban design will be beneficial and provides opportunities for cities as well as better integration of refugees into their host society. The result of the research will be presented through a series of visuals that aim to stimulate questions and conversations.

21F Connecting Cultures

The development of Law of pre-Hispanic cultures based on the iconography of the Andean area - the analysis of petroglyphs at Toro Muerto

Natalia Deptała, *University of Warwick*

My presentation will critically examine the issue of the development of Law of pre-Hispanic cultures based on the iconography of the Andean area. My research attempts to look at the problem from a theoretical, legal perspective as well as real-life case studies from archaeology and history, which I hope will contribute to the debate about the evolution and interpenetration of legal traditions. The site of the rock carvings in Toro Muerto is one of the biggest examples of pre-Hispanic iconography of the Andean area which were created in different times – from Wari to Inca times. The rocks mainly depict complex scenes featuring human figures, animals, plants, geometric figures which were made by shamans while performing rituals. This might be an important step to investigate the supremacy of Law and Rule among Peru's societies. In my presentation I will use data and material which I will gain while participating in the excavations in Toro Muerto. I will present the analysis of the petroglyphs found in this area both from theoretical and scientific side. Furthermore, I will refer to written sources, especially 16th century codices and the works of Spanish chroniclers and secondary academic sources from respectable academic journals. In conclusion I believe such a combination will allow me to analyse legal documents and the archaeological data about the petroglyphs in Toro Muerto. The practical application of my research might go far beyond the scope of a theoretical academic legal debate on the law emphasising the importance of the historical heritage.

Investigating the difference in Voice-Onset-Timing in Hindi and English in three speakers from different backgrounds

Riya Jamthe, *University of Warwick*

This research project uses the case study of the researcher's own linguistic background to explore how British and Indian identities can be navigated by Voice-Onset-Timing (VOT). The project acts as microcosm of the wider interaction between subsegmental elements of language and identities. VOT is defined as the amount of time between the release of the oral closure of a stop consonant and the onset of periodic vocal fold vibration. The primary data consists of VOT measurements of 24 utterances of speech in Indian-accented English, British English and Hindi from the speaker, the speaker's mother, and the speaker's paternal grandmother. The VOT of each utterance was calculated using Praat, a software for analysing acoustic data. The researcher created diagrams to help compare the primary data with expected native-speaker VOT. The findings of the research project provide valuable insights into language acquisition in a British Indian environment. The speaker produces Hindi and an Indian-accented English of a similar phonetic quality to her mother's, who comes from Uttar Pradesh, a state where the national language of India, Hindi, is the first language. The speaker also possesses Referenced Pronunciation British English as a separate accent. The phonetics of the grandmother's Hindi and English are significantly different from the other two speakers; the grandmother is from Maharashtra, a state where Marathi, its regional language, is the first language instead of Hindi or English. These micro-level findings point at scholars of multilingualism and socio-phonetics to examine macro-level questions: the influence of environment on multilingualism and the strategies implemented within language policy and used in families with heritage languages to encourage bilingualism.

21F Connecting Cultures

Memory Representation Through Illustrations in "On the Edge of the Abyss"

Eden Waits, *LCC International University*

The thesis explores visual storytelling using tools of narrative analysis and visual rhetoric to interpret the illustrated testimonial book, On the Edge of the Abyss, by Ella Liebermann-Shiber. This study aims to examine how elements of visual storytelling are used to represent the artist's memories of the Holocaust. ¯The given analysis demonstrates the way the visual narrative can explore and transmit memory of the Holocaust in the form of illustrations. In addition, the genesis of the book and a summary of the author's biography is given for the purpose of historical context. This research established seven main interpretive themes that are present in most of the survivors' memoirs and other Holocaust-related literature. They do show a unique perception of the authors' experiences. Besides the widely discussed tragedies, On the Edge of the Abyss notes the less common themes that are not often represented in the Holocaust discourse: cruelty towards mothers and their children, the Death March, and Jewish revolts. The book, On the Edge of the Abyss, is a significant historical document that provides a unique eyewitness testimony of the Holocaust. The book shows the actual horrors of the genocide and the general history of the Holocaust, along with personal testimonies. It bears a reproach and warning to younger generations that almost forget what one person with unlimited power in his hands can commit to another human being.

The economic effects of the COVID-19 pandemic on the music festival event industry

Noemi Jade Sanchez Gomez, *Humboldt-Universitaet*

The event industry is an extremely important economic sector worldwide. In Germany alone, it is the sixth largest industry. Due to the COVID-19 pandemic, the entire event industry, including music festivals, was completely curtailed. For this very reason, my research addresses the question: "What economic impact has the COVID-19 pandemic had on the music festival industry in the Hamburg metropolitan region so far?" The Hamburg metropolitan region serves as an example for the music festival industry and spatial delineation in Germany. In order to determine the economic effects, this study focused on the music festival providers. Music festivals that took place on at least two days in the summer half-year (27 March - 31 October 2022) were examined. Four methods were used. First, a characterisation of the music festival providers using an industry description table. This was followed by qualitative interviews with the aim of determining the business climate index through a business survey. Mapping was also carried out to better understand the spatial relationships. Crucially, the music festival industry largely survived the pandemic without any market exits thanks to the rescue package from the federal government and its own reserves. Finally, it is important to add that there are no significant differences within the Hamburg metropolitan region. The event industry correlates with many other industries, which is why this research is of great importance to better understand past, present and future economic conditions. Music festival research is a relatively new field of research and therefore deserves a lot of attention. Especially since the event industry is the sixth most important economic sector in one of the countries with the strongest economic performance.

22A Communities and Sustainable Futures

Communities and Sustainable Futures

Sheares Toh, *Nanyang Technological University*

Cracks on walls raise the risk of building damage and collapse. Due to its unpredictable occurrence and pervasiveness in concrete infrastructure, rapid crack detection is of utmost importance in ensuring occupant safety. In Singapore, crack inspections are conducted periodically by Town Councils. Between these scheduled checks, therein lies the possibility of sudden crack formations and further crack exacerbation that can go unnoticed. This paper focuses on the development of UnCrack, a user-friendly wall detection kit freely accessible for use by occupants in buildings. The OpenCV library and the VGG-16 convolutional neural network are deployed in the programming. Canny edge detection is found to trace out crack perimeters during testing, but its tracking robustness and accuracy can be improved. On the other hand, the trained classification model serves to track whether a detected crack is previously analysed and recorded by the kit. Cloud data sharing can be explored as an improvement to provide more meaningful crack classification. This includes approximating the type and severity of cracks. Results from this feasibility study suggest the benefits of empowering individuals without domain expertise to take part in the crack inspection process. Computer vision and artificial intelligence are realised to reduce human reliance and boost detection accuracy. Beyond this paper, a smartphone application instead of the kit can be explored to reach a wider group of users.

Fast mathematical modelling to optimise the use of lithium-ion batteries

Toby Sheldon, *University of Warwick*

There are many interacting parameters that influence lithium-ion battery performance, ranging from the battery voltage to changes in ambient temperature. Mathematical models help us to understand how these parameters affect battery performance, allowing us to optimise battery usage in electric cars, for example. However, there is a trade-off between accuracy and simplicity of the idea. To optimise battery management systems, simple and accurate mathematical models are needed. Thus, we have developed mathematical models of the most important parameters affecting battery performance by assimilating data on battery performance, provided by WMG. This involved developing a “grey box” model, which consists of two parts. The first uses theoretical physics to make approximate predictions on how the state of a battery (its voltage, temperature, etc.) will change in time, based on the current state of the battery. Then, a “black box” approach is used to compare these predictions with the observed data in order to correct any inaccuracies in the output of the physics-based approach. Overall, the grey box idea combines theoretical predictions with observed data in order to forecast how the state of a battery changes, based on key parameters, in a realistic and accurate way. Moreover, the simplicity of the model makes it computationally fast, so we can use it in real-time to optimise battery usage. More widely, grey box mathematical ideas could be adapted for other components affected by multiple parameters. Ultimately, our model will help manufacturers optimise battery management systems to improve the efficiency and performance of electric cars.

22A Communities and Sustainable Futures

Facts and Fancies: Victorian Fairy-Science for Children and Environmental Conservation in the Industrial Age

Jia Wen Loh, *Nanyang Technological University*

The thesis explores visual storytelling using tools of narrative analysis and visual rhetoric to interpret the illustrated testimonial book, On the Edge of the Abyss, by Ella Liebermann-Shiber. This study aims to examine how elements of visual storytelling are used to represent the artist's memories of the Holocaust. ¯The given analysis demonstrates the way the visual narrative can explore and transmit memory of the Holocaust in the form of illustrations. In addition, the genesis of the book and a summary of the author's biography is given for the purpose of historical context. This research established seven main interpretive themes that are present in most of the survivors' memoirs and other Holocaust-related literature. They do show a unique perception of the authors' experiences. Besides the widely discussed tragedies, On the Edge of the Abyss notes the less common themes that are not often represented in the Holocaust discourse: cruelty towards mothers and their children, the Death March, and Jewish revolts. The book, On the Edge of the Abyss, is a significant historical document that provides a unique eyewitness testimony of the Holocaust. The book shows the actual horrors of the genocide and the general history of the Holocaust, along with personal testimonies. It bears a reproach and warning to younger generations that almost forget what one person with unlimited power in his hands can commit to another human being.

Analysis of ESG funds in the UK: fund performance and environmental impact

Ananya Kumar, *University of Warwick*

In the wake of a global climate crisis, recent years have seen an increase in ESG (Environmental, Social and Governance) investing. This paper aims to analyse the attractiveness of ESG investment funds to investors in terms of future returns and environmental impact. Previous literature using US data found that ESG funds under-perform compared to non-ESG funds, and hold stock from firms that are more likely to disclose carbon emissions but have higher carbon emissions. I will contribute to the knowledge base by conducting a similar analysis for the UK, evaluating ESG funds by composition and performance. I will use data from Morningstar and statistical software Stata. Time series analysis will be used to evaluate fund performance, and hypothesis testing with multivariate regressions will be used to assess funds' compliance with environmental regulations. I expect I will find similar results for fund performance, but better results for environmental impact as UK regulation is typically stricter. These results will highlight whether ESG funds in their present form are attractive to investors, which is important if we want to encourage investment inflow to sustainable activities. Further research could explore how ESG funds could be redesigned to better meet investor interests and the sustainability agenda.

22B Culture, Media and Information

Self Love; The Other Kind of Love in This Room, Now and Forever More in Margaret Atwood's "The Handmaid's Tale“

Xin Le Ng, *Nanyang Technological University*

This paper tracks the emergence of self love in the absence of interpersonal relationships in Atwood’s "The Handmaid’s Tale", arguing that it aids in the reclamation and preservation of Offred’s diminished sense of self. It begins by establishing the diminished state of love in Gileadean society, distinguishing between an old love that has been eradicated, and the new love that endures in fragmented forms. Referencing the works of Kristeva, Plato, Irigaray and Badiou, parallels will be drawn between the old-new love dichotomy and the realities of academic discourse on love, which conventionally prioritise interpersonal relationships over self-directed loving. The paper relies heavily on these authors' theoretical frameworks to identify the imbalances in power inherent in heteronormative relationships, which constantly threaten Offred's sense of self in the novel. However, they prove inadequate in addressing the nature of self-directed loving, which emerges as a prominent thematic concern given the dire state of love in Gilead. By reframing the individual as site of duality, the paper asserts that self-love can be negotiated from a perspective of difference, examined as a dialogue between two temporally and/or socially disparate versions of a singular individual. This reconceptualisation restores love's value by allowing self-love to enter the domain of conventional discourse as a conceivable counterpart to interpersonal relationships, supplemented by evalutions of the inextricable links between self-love and identity formation. Further, it enables the re-evaluation of love's restorative qualities, which much existing literature contends has been diluted by perceived gendered imbalances in heteronormative relationships.

A computational history approach to The Secret History of the Mongols; Designing, Writing, and Web-based Implementation of an Open and Executable History Paper Using Historical Methods, AI, and ML

Toby Sheldon, *University of Warwick*

The Secret History of the Mongols (SHM) is the earliest Mongolian written primary source. Scholarship dated it to the thirteenth century CE. The SHM reveals critical insights into the Mongolian culture, historiography, and language, making it the subject of extensive academic research in several languages (e.g., Mongolian, English, Chinese, French, Russian). The increasingly large volume of academic literature analysing various aspects of the SHM makes it increasingly difficult for scholars to access all academic literature written worldwide. This research aims to combine historical methods and computational techniques to make the SHM machine-processable and, thus, machine-understandable. The parsing of the critical edition by Paul Pelliot (1949) and the English translation by Igor de Rachewiltz (2006) into an online content management system feeds an application on the Engineering Historical Memory (EHM) platform. This application allows users to access the source via the EHM tools for content search and visualisation. Each SHM’s section/story is tagged with metadata on EHM, including geographical, temporal, and story type information. This application allows the users to visualise historical information using infographics, retrieve online relevant resources automatically and in real-time, and get sentiment-analysis insights yielding concept parsing, emotion recognition, intensity ranking, and aspect extraction results. The SHM is linked to other primary sources on EHM through the Chronicles and Travel Accounts of Afro-Eurasia application. This new EHM application for the SHM showcases how computational history can manage and present research online with powerful ICT techniques and philological rigour.

22B Culture, Media and Information

The representation of countries in Global TV news channels

Pau Torres-Pagès, *Pompeu Fabra University*

Global TV news channels are paramount actors in determining what are the most important news stories of the world. They can shift public opinion and create a specific view of how countries are perceived. Historically their representation has favoured Western countries over the others, but during the past twenty years, new television networks have changed the international communication landscape. This dissertation looks into what countries appear the most in relevant channels from all over the world. The research uses a content analysis methodology that gathers data from one news bulletin a day for one month from six networks: Al Jazeera (Qatar), BBC World (UK), CGTN (China), CNN International (USA), DW (Germany) and RT (Russia). For each piece of news, all the countries that take part in it were noted. The main world powers, such as the US, Russia and China are still the most present in the news. It is also observed that almost all news networks over-represent their home country, dedicating more pieces to it than other channels do. The quantitative analysis of this paper adds to the existing literature and supports the idea that countries are a determining factor in Global TV news channels. This project can be amplified to deepen the area of geopolitics applied to international news and the role of media as a representative of a country. It can also be expanded to arise inequalities and to explore what are the most underrepresented countries in international media.

Meta and Misinformation: Cross-Platform Differences in User Engagement with Misinformation on Facebook, WhatsApp and Instagram

Ashling Tai, *Nanyang Technological University*

Scholars have focused on individual characteristics that drive perceived beliefs and sharing intentions of misinformation. Yet limited attention has been paid to cross-platform user opinion and engagement with misinformation. The study examines how platform differences affect the belief and sharing intentions of misinformation across Meta-owned platforms — Facebook, Instagram, and WhatsApp — as Meta has been scrutinised for its handling of misinformation. Given cognitive ability's role in previous literature, we explore if misinformation belief and sharing intentions vary with it. A survey experiment was conducted in the US where participants were randomly assigned and exposed to the same piece of misinformation altered to resemble the different Meta platforms interfaces. Participants rated their post-exposure belief and sharing intentions. The results suggest that participants perceived the misinformation to be more accurate in the Instagram condition than Facebook and WhatsApp. Yet sharing intentions across platforms are not statistically significant. We observe that low cognitive ability individuals are more likely to share misinformation. These results support that perceptions of misinformation vary across social media platforms, but cognitive ability can act as a buffer against misinformation engagement. The findings emphasize the need to study cross-platform differences in theorizing the role of social media in public engagement with misinformation. Additionally, it shows that public trust can be exploited by malicious agents and policymakers should consider cross-platform differences in building policies around misinformation. Further research can also be done into how cross-platform differences affect misinformation in concrete ways such as during a democratic election.

22C International Influences, Processes, and Behaviours

Ticket to Success in Amplifying Student Engagement: A Study on the Mobile-based Exit Ticket Application SymphoNIE as a Formative Pedagogical Tool

Nurin Jahaya, *Nanyang Technological University*

Revision is an integral part of the learning process as the forgetting curve theorised by Hermann Ebbinghaus (1913) suggests that information is forgotten quickly within a span of days. This study examines the perspectives of students and instructors on the use of SymphoNIE, a mobile-based web-app designed to facilitate revision and consolidation of learning. The SymphoNIE strategy transpires through a three-stage process. Firstly, students were tasked to reflect on a learning point by submitting their Exit Ticket reflections on the SymphoNIE web-app after attending a lesson. Secondly, responses elicited from the class were consolidated and an email was sent to prompt students to rate their peers' reflections on SymphoNIE. Lastly, a summary of the reflections and ratings were compiled into a report and furnished to both students and instructors to revisit the collective reflections for clarity and revision. The current research examines perspectives of students and instructors who have had experience using SymphoNIE previously. Six participants (3 students and 3 instructors) took part in the one-to-one online semi-structured interviews. Several key findings emerged from the analysis of interview data. Most distinctly, SymphoNIE was viewed as a useful educational tool that engages students' metacognition by broadening the outlook of learners and a feedback medium for instructors to reflect on their strengths and opportunities for further refinement. Lessons learned pertaining to the study will help polish the application and demonstrate the potential of integrating SymphoNIE into higher education institutions to promote student's revision, emerging as the golden ticket to success in education.

Markov Chain Approaches to Payoff Optimization in the Self-Organizing Network Coloring Game

Zeyi Chen, *Nanyang Technological University*

The model of Network Coloring Game (NCG) first proposed by Kearns et al. is used to simulate conflict resolving dynamics and consensus reaching procedures in social sciences. Constrained by a network, each player chooses a color greedily and selfishly from a color collection at each round and wins certain payoff, until nobody has any incentive to improve on his personal payoff via selecting another color. Individual's payoff depends on preference mechanism and is zero when a player shares the same color with someone in the neighborhood. Applications of NCG include resource allocation, timetable scheduling, etc., hence it is essential to investigate on choice adjustments before and after conflict, discover the optimal situation and approximate the convergence rate. In this work, we adopted some Markov Chain techniques to further research on NCG. Firstly, with no less than $\Delta + 2$ colors provided, we proposed and proved that the converging time is stochastically bounded by $Op(\log n)$, by introducing an absorbing Markov Chain to approximate upper bounds for its expectation and variance, which is an improvement on Chaudhuri et al.'s result. Here n is the number of vertices and Δ is the maximum degree of the network. Secondly, we focused on post-conflict adjustments among the players when a Borda preference mechanism is applied. Markov Chain Monte Carlo (MCMC) methods like Metropolis-Hasting Algorithm and Simulated Annealing Heuristic were employed to simulate payoff-optimizing behaviors and estimate both local and global optimal social welfare. Supporting experimental results were given to illustrate the corresponding procedures.

22C International Influences, Processes, and Behaviours

"Strangers or friends, Singaporeans are helpful": Compliment effect on compliance among friends and strangers

Yun Hui Chwee, *Nanyang Technological University*

Giving a compliment is an effective strategy to increase compliance in various situations. Research has shown that the compliment effect exists because compliments invoke the reciprocity norm, whereby the person being complimented feels a need to repay the complimenter's kindness by agreeing to their request. However, the reciprocity norm applies to exchange relationships (strangers, acquaintances) but not communal relationships (friends, families). As past studies on the compliment effect only focused on strangers, this current research investigated whether this effect can be observed among friends. 100 strangers and friends were recruited and randomly assigned to the compliment or no compliment condition. In both conditions, participants were interviewed about the types of local compliments they have received before, and this served as a cover story. Afterwards, depending on their condition, participants either receive a compliment or no compliment. They were then asked for a favour, and their 'yes/no' responses were recorded. Results showed no significant difference between the compliment and no compliment conditions, regardless of whether the requestor was a stranger or friend. This goes against the results found by past studies which were conducted on strangers, and this may be due to cultural differences and thus, a need to adapt a culturally sensitive methodology. If future studies can confirm the research hypotheses, it would advance our theoretical understanding of compliments as an effective compliance tactic in different types of social settings.

The impact of time zones on commuting and patent cooperation

Siyun Wang, *University of Sheffield*

Concerns related to reduced face-to-face interaction and collaboration following the COVID-19 pandemic, resulting in reduced productivity and lack of knowledge spillover. The project will investigate the impact of geographical frictions on impeding business collaboration and knowledge exchange by considering the time zones between neighbouring counties in the US. This research project is linked to previous studies that have analysed related topics. stein & Daude (2006) used a gravity model to find that time zones have a negative impact on investment location and trade. We will investigate our research question by applying several econometric methods, as gravity models as previously applied in the trade literature, difference-in-differences methods and regression discontinuity analysis. In particular, to identify a causal effect, we will consider US counties that have recently changed time zones and confront them with the initial construction of time zones within the US based on historical data about cross-country rail services and geographical characteristics. We will estimate the impact of time zone differences on economic activities by comparing commuting patterns of workers between counties located within or across time zones. Similarly, we will also compare the co-patenting activities of businesses and other institutions located in contiguous counties within or across time zones, and their change when some of these counties switch to a different time zone. This study will have important policy implications to understand the role of geographical frictions in hampering economic activity and the exchange of information in an ever more knowledge intensive economy, providing significant insights to better understand the impact of working from home on productivity and knowledge creation.

22D The Perspectives of Caregivers of Children Who Stutter - A Scoping Review

Ticket to Success in Amplifying Student Engagement: A Study on the Mobile-based Exit Ticket Application SymphoNIE as a Formative Pedagogical Tool

Kauthar Daniels, Kristen Du Plessis, Biance Nieuwenhuys, Suewellyn Zimmerman, *Stellenbosch University*

Caregivers of children who stutter (CWS) play an influential role in the intervention process. Their attitudes, emotions, perceptions, and experiences could have a significant impact on the holistic management of their child's well-being and communication. The aim of this scoping review was to provide an overview of available research related to parental attitudes, emotions, perceptions, and experiences of CWS and to identify knowledge gaps in the literature. A review of literature published between 1970-2022 was conducted based on the PRISMA-ScR framework for scoping reviews. The search was limited to English, peer reviewed studies and data was analysed using thematic analyses. The search yielded 26 articles that were assessed for eligibility and nine studies (five qualitative, three mixed-method, one quantitative) met the inclusion criteria. Analysis of the findings of the selected articles revealed that limited information about caregiver perspectives of children who stutter is currently available and that the perspectives of caregivers of CWS have not been adequately researched before. The themes that emerged pertained to the role of caregivers' knowledge about stuttering, their perceptions about their child who stutters, and their own emotions toward stuttering. Based on the results of the review, we can draw the conclusion that caregivers of CWS are significantly impacted by their child's stuttering from the moment of onset. A myriad of emotions is experienced by these caregivers, including feelings of uncertainty, hopes for recovery, fear, and concerns about restricted social involvement. Therefore, successful intervention should not only consider and support the child who stutters but also their caregivers.

Navigating they/them pronouns in society and the mind: A sociolinguistic study into the grammatical comprehension and processing time of the definite singular they.

Molly Gardiner, *University of Warwick*

Personal pronouns have recently become highly discussed within linguistics, the LGBTQ+ community and general public. This is in response to the recent innovative uses of they/them pronouns, particularly by non-binary individuals as pronouns of reference in a linguistic act of self-determination. This paper combines previous research to investigate the cognitive processing cost of they/them pronouns in relation to social factors and attitudes. This was measured through a survey requiring participants to read sentences including she, he, or they pronouns. This was followed by a choice between two images featuring either an individual or group engaging in the described activity. The results of this study showed social factors and attitudes impacted an individual's ability to grammaticality recognise they/them pronouns in reference to a singular person, as well as the processing time it took them to answer. This paper argues that these results are due to different cognitive conceptualisations of grammatical gender. These vary along a scale from completely contrastive between 'he' or 'she' for all people, to 'they' until specified otherwise. Findings also suggest that individuals may be more attentive to they/them pronouns to index alignment with or support for the LGBTQ+ community, or generally a more progressive political stance. This study adds to the limited contemporary scholarly work on the cognitive and social impact of they/them pronouns. It illustrates a need for a flexible approach to introducing inclusive language in interactional contexts, adjusting to diverse mental, grammatical, and social understandings of gender held by different demographical groups.

22D Learning through Language

A comparative study of vowel hyperarticulation in human-human and human-AI interactions across generations

Holly Taylor, *University of Warwick*

Historically, the role of communicator within spoken interaction had been confined to humans. However, with the recent proliferation of computational devices with spoken interaction abilities, artificially intelligent virtual-assistants, such as Apple's Siri, are now fulfilling this position. This paper explores hyperarticulation (the physical exaggeration of vowels resulting in perceptually clearer speech) when communicating with AI. Despite the aforementioned technological advancement, current literature centres on hyperarticulation in other dyadic interactions, such as with hearing-impaired listeners, foreigners, and infants. Therefore, this paper questions whether speakers adapt their speech clarity when conversing with AI in comparison to human-human interaction and whether these results vary across generations. To do this, speech analysis software was used to compare recordings of participant's speech when communicating with AI or another human. Three distinct measures were taken to evaluate the degree of hyperarticulation: vowel exaggeration; fundamental frequency (pitch); and speech rate. The results demonstrate that speakers, across all age groups, systematically modify their speech to computational communicative partners through phonetically clearer and slower speech, ultimately demonstrating hyperarticulation. The findings appear to be driven by the speaker's perception of the linguistic needs of the computational device, assuming their capabilities are significantly inferior to that of humans. Overall, these results not only characterise how speakers adapt for their addressees, but also contribute an improved understanding of the nature of variation in human-AI discourse. This study may help develop virtual-assistant's ability to process speech in a wider variety of contexts allowing for the implementation of more natural communication across different domains.

When Poetry Writes Language: How and why French poets write in minority languages

Luka Benedičič, *University of Ljubljana*

As part of the ongoing debate about cosmopolitics, patriotism, borders, human rights, and belonging, the research investigates writing poetry in a traditional minority language in France. It deals with concrete people, drawing on approaches on how to describe the experiences of marginalized individuals. But it is also concerned with a larger setting in which tradition is clashing with the changing world. This particular research is valuable due to its twofold orientation: it is straightforwardly interested in politics, yet it focuses on identity from the viewpoint of art, namely, poetry. This allows poetry to become a research object if viewed as a place of struggle between traditional and contemporary currents. Through ethnographic fieldwork (participant observation and interviews), I engage in literary events and social activities. I talk to poets about why and how they use a minority language in their work, as opposed to writing in French. The data analysis suggests that poets do so, in part, to perform those experiments in poetry that no longer seem possible in the real world. The use of a dialect in written work is in creative dialogue with the dialect's status in the social world, but also the status of its speakers and, sometimes, their customs and lifestyles. In the research, I point to poets and artists as valuable sites of socio-political self-reflection. This can be a useful reference for organizations that seek to understand and/or promote not only culture, but a critical vision of an inclusive society – since one of the main concerns of the participants was the poor status of their language in power structures.

22E Social Change and International Development

Does Charity Begin at Home (or School)?: The Demographic Determinants of MPs' Foreign Aid-Related Speech in UK Parliamentary Debates

Saskia Poulter, *University of Durham*

This research uses computational methods of quantitative text analysis to discern an individual-level relationship between legislators' secondary educational backgrounds and their propensities to deliver speeches on foreign aid during United Kingdom Parliamentary debates. Its key finding – that comprehensively educated MPs give such speeches with significantly lower frequency than their grammar and independently educated counterparts – is robust to alternative model specifications controlling for MPs' genders, party affiliations and ethnic minority statuses, and for the profiles of their constituents. This result runs contrary to theoretical expectations grounded in the liberal conceptualisation of foreign aid as an extension of the domestic welfare state abroad: given that comprehensively educated persons tend to come from less affluent backgrounds, and that working-class MPs are most likely to advocate for left-wing causes during domestic policy debates, one might expect such MPs to be the most vocal advocates for overseas aid. Since survey data has found socioeconomically disadvantaged people to be least likely to support aid expenditure, this article's findings also go some way to vindicating claims that diversifying Parliament's socioeconomic composition would improve the substantive, as well as descriptive, representation of working-class voters. Although a significant body of literature examines the determinants of foreign aid expenditure at the country level, determinants of individual MPs' prioritisation of and attitudes towards the topic remain conspicuously understudied. Moreover, to the author's knowledge, this article is the first to quantitatively examine the relationship between MPs' secondary educational backgrounds and their parliamentary speech on any topic in the United Kingdom context.

Gender Inequality in Peru's Informal Economy Market

Daira Povez Gamboa, *University of Warwick*

According to the Peruvian National Institute of Statistics, 75% of the female labour force is in the informal economy market (2018). The informality rate in Latin America is 53% and the Peruvian, 77%, the fourth in the region, just surpassed by Guatemala, El Salvador, and Honduras (Muñoz, 2021). Moreover, Peruvian traditional structural discrimination against women worsened the female situation. This paper aims to investigate the main factors of gender inequality in the Peruvian informal food market by utilizing a mixed research method: the analysis of databases (2019 and 2020 Gender labour gap, INEI) and the information collected doing 30 interviews (with women working in the informal food market). My study finds that most of the women interviewed highlighted family pressure and incomplete education as two main factors in their entrance to the informal market. The traditional stereotype of the male as the main family provider made these women feel vulnerable and not worth enough to ask for a better position/salary. The interview findings match the factors shown in the databases. The research undertaken is relevant because although we have seen significant improvements regarding the gender gap in the economy, this progress has not impacted all population sectors. This project potentially brings awareness and further work towards the development of real-life solutions for this issue such as government policies. Currently, some companies around the world are developing resource female groups, mentorship schemes, and leadership masterclasses. Will this arrive someday in Peru, a country where just 2 of 19 ministers are women?

22E Social Change and International Development

A Feminist Case for a Universal Basic Income

Blanche de Moidrey, *University of Warwick*

Historically, the role of communicator within spoken interaction had been confined to humans. However, with the recent proliferation of computational devices with spoken interaction abilities, artificially intelligent virtual-assistants, such as Apple's Siri, are now fulfilling this position. This paper explores hyperarticulation (the physical exaggeration of vowels resulting in perceptually clearer speech) when communicating with AI. Despite the aforementioned technological advancement, current literature centres on hyperarticulation in other dyadic interactions, such as with hearing-impaired listeners, foreigners, and infants. Therefore, this paper questions whether speakers adapt their speech clarity when conversing with AI in comparison to human-human interaction and whether these results vary across generations. To do this, speech analysis software was used to compare recordings of participant's speech when communicating with AI or another human. Three distinct measures were taken to evaluate the degree of hyperarticulation: vowel exaggeration; fundamental frequency (pitch); and speech rate. The results demonstrate that speakers, across all age groups, systematically modify their speech to computational communicative partners through phonetically clearer and slower speech, ultimately demonstrating hyperarticulation. The findings appear to be driven by the speaker's perception of the linguistic needs of the computational device, assuming their capabilities are significantly inferior to that of humans. Overall, these results not only characterise how speakers adapt for their addressees, but also contribute an improved understanding of the nature of variation in human-AI discourse. This study may help develop virtual-assistant's ability to process speech in a wider variety of contexts allowing for the implementation of more natural communication across different domains.

Effect of Culture on Economic Growth in Far East Asia: Case of Republic of Korea

Hanibal Ghebrehiwet, *Zayed University*

Since the formation of modern states, the task of leaders has been to adopt policies of security and economic growth. Many states in the west have adopted a liberal economic growth. This was highly compatible with their culture and reflected various priorities that aligned with their values. After the end of the Cold war, many developing countries attempted to increase ties with the western hemisphere and adopt liberal development model. Thirty years later, their progress is nothing more than a phenomenon of being pulled by the global economy. However, many countries in East Asia have made enormous strides with privatized economies. This begs the question, how have they been successful down that path vis a vis the countries mentioned above? This research studies the effect of culture, specifically the more widely shared Confucian culture, on socio-economic development in far East Asian societies. A large influence of Confucian culture on these economies showed how developing countries could structure their policies in ways compatible with their core values and traditions. The most significant finding of this research was the effectiveness of incorporating state-level strategies with traditional values to charter a successful development path. This research highlights the importance of explicitly considering values when making development schemes and how other underperforming states can, and must, include traditional values when making policies. The aforementioned countries in East Asia, especially South Korea are an epitome of this and as such shall be taken as examples on how to widely implement it.

22F The Environment: Novel Perspectives

Identifying Supernova Remnants in NGC6946

Daniel Robins, *University of Warwick*

When some stars reach the end of their life, they explode in rapid events known as supernovae. The galaxy NGC 6946 is the most prolific supernova host that we know of, but many of its supernova remnants (SNRs) are unconfirmed as detections only exist at radio wavelengths. Despite having such unique data, a high-resolution search for SNRs has not been carried out for NGC 6946 at optical wavelengths. In order to produce an optical catalogue of SNRs in NGC 6946, we use spectroscopy, which involves analysing the patterns of light from each source. A series of (4 million) spectrographs from the SIGNAL survey is used to measure the properties of every point in the galaxy. This includes the ratio of certain sulphur and hydrogen fluxes. Where this ratio exceeds a minimum threshold, the site is proposed as an SNR candidate. We test these results against candidates identified using other methods, allowing the most complete distribution of SNRs to be mapped. The result is important as it broadens our knowledge of the distribution of supernovae within galaxies. SNRs are important reference points within galaxies, and transient phenomena like these are increasingly significant in astronomy as we aim to follow up gravitational wave events. This method can be applied to other galaxies within the SIGNAL survey, in order to test how typical NGC 6946 is, and to expand our understanding of supernova distribution across the whole observable Universe.

Gravitational Wave Emission From Short Period Binary Stars

Stefano Beni, *University of Warwick*

The direct detection of gravitational waves in 2015 has heralded a new era in astrophysics. Unlike gravitational detectors on Earth, detectors in space will not be limited to the detection of high frequency waves by the Earth's seismic activity. This project aims to identify binary stars, which are two-star systems, for space-based gravitational wave detection and to see whether we can measure the effect of gravitational waves on their periods. A list of known short-period binaries was drawn from existing literature. Plots of the luminosity (a measure of power) per unit area we receive from the systems over time, called light curves, were downloaded from a leading database. These were then searched for the known orbital periods of the sources. The systems that yielded positive detection were analysed for (a) period stability and (b) period drift by fitting periodic signals. The project also aimed to detect new systems. The systems that were studied are of high interest due to them being strong sources of gravitational waves. Therefore, they could assist us in understanding gravitational waves, as well as the composition and evolution of stars and stellar binaries. A satellite mission to detect gravitational waves, called LISA, is funded for launch in the 2030s. The systems that will be studied are thought to be the strongest and most numerous of the sources that LISA will see. It is essential to understand how many there are and their properties in the run-up to LISA.

22D The Environment: Novel Perspectives

Key factors influencing brand loyalty among LCC International University students

Viktoriia Samusieva, *LCC International University*

Understanding the factors that influence brand loyalty plays a fundamental role for the companies that want to make their brands sustainable. The goal of this study was to identify the key factors influencing brand loyalty and its increase in the clothing industry among LCC International University students. Also, it aimed to find out the relationship between brand image, brand trust, corporate social responsibility, and brand loyalty. This research was conducted through survey of LCC students. Based on the 5-point Likert scale it was determined that the most important metrics for brand loyalty are brand trust, meeting the customersâ needs, and price. The research also found the positive correlation between brand trust and brand loyalty.

23A Dynamics of Gender, Power, and Social Care

Mad, Bad, and Beautiful: How Women's Accounts of Psychiatric Institutions Create Narratives of Abjection and Discipline

Phoebe Greenwood, *University of Warwick*

While Barbara Creed revolutionised abject theory in The Monstrous Feminine, very little research has since been conducted considering how the abject intersects with the daily life of mentally ill women. Further, as Kristeva herself recognises the innate connection between the feminine and the abject, there is a clear lack in scholarship exploring the intersections between women and the abjected subject. Having conducted a digital ethnography of female psychiatric patients on TikTok, I examine the extent to which: 1) mentally ill women within psychiatric instiutions are forced into the role of the abject woman; 2) instances of abjection that arise within psychiatric instiutions consequently result in strained patient-staff member relationships; and 3) these instances of abjection consequently result in increased discipline and ultimately hinder patients' treatment. These findings indicate that instances of the abject that occur within female patients often result in increased use of restraints and sedatives, and similarly that the abjected woman's autonomy within the psychiatric instiution is always at threat. Ultimately, these findings illuminate women's mistreatment within psychiatry, highlighting the possible misogynistic thought that continues to permeate such instiutions and practices. Such findings therefore open up the possibility of reimagining psychiatry and mental healthcare through a feminist lens.

Shut Up and Swallow: Performing Contraception

Emily Nicholson, *University of Warwick*

The contraceptive responsibility in heterosexual relationships disproportionately falls upon women, the ways in which this responsibility disrupts, controls, and regulates women’s bodies and lives are often ignored. Shut Up and Swallow: Performing Contraception is a data-driven interdisciplinary project which provides a new perspective on the unequal distribution of reproductive responsibility by delineating contraception as an embodied performance and ritual act; reframing the way we view the role of contraception in women’s lives. For the first time, this thesis provides a framework for reading contraception as a performance; approaching contraceptive labour as a gendered performance of everyday life. Combining performance and feminist theorists such as Butler and Federici, this interdisciplinary research explores the social coding, normalisation, ritualisation, and corporal dimension of taking contraception to contribute to wider discussions of unpaid fertility work and reproductive labour. Primary survey and interview data are combined with interdisciplinary research from feminist theory, medicine, and sociology to explore contraception from the macrolevel of sociocultural, biotechnical, and medical structures which uphold the status quo, down to the microlevel of each dose of contraception as an individual embodied performance. This framework is then built upon and applied to the worked example of the oral contraceptive and to the lived experiences of the women surveyed and interviewed to explore how gender inequality is (re)produced through each individual encounter with contraception. By exploring the disruption and negative impacts experienced by women due to contraception, this thesis aims to use performance studies to provide a new contribution to feminist discourse supporting the improvement and equalisation of reproductive healthcare for all.

23A Dynamics of Gender, Power, and Social Care

The UN's Sustainable Development Goal 5.6 in Poland: Abortion, reproductive justice, and the Church in the Polish post-Communist society

Alicia Garcia Moll, *Pompeu Fabra University*

Approved in January 2021, Poland's near-total abortion ban has pushed more than 30,000 women to seek abortion services outside the country. Poland's reproductive services are deeply limited by the government's Catholic viewpoint on the topic. Nonetheless, abortion's radicalization should be regarded in a broad sense, extending far beyond its conventional religious connotation. The new abortion rule represents one of the consequences of the rule of law crisis that the country has been suffering since 2015. It is argued that the limitation of abortion corresponds to the limitation of individual rights and thus, freedom. Several international organisations, such as the United Nations and the European Union, have underlined the importance of abortion rights as a vital part of women's rights. Scholars agree that abortion restrictions do not lower abortion rates, but they do raise mortality rates. This thesis examines the relationship between reproductive rights, democracy, and gender equality. An assessment of Poland's reproductive policies across time, as well as the legal and moral barriers to free abortion, is presented to answer this question. The legal case study (Alicja Tysiac v. Poland) serves to illustrate the European Union's limitations in preserving women's right to abortion and self-determination. The awfulisation of abortion as a process of moral judgment carried out by anti-abortion actors contributes to its decriminalisation. The findings of the study reveal Poland's unwillingness to comply with international gender equality requirements. This dissertation emphasises the need to liberalise abortion in accordance with universal human rights standards.

Imperialism Through a Gender Lens in Textbooks: Analysis and Didactic Proposal

Paula Hernández Carceller, Rosa Milian Costa, *Pompeu Fabra University*

Educational legislation both in Europe and Spain dictates the incorporation of a gender perspective in secondary school classrooms. However, Spanish teachers and students still use textbooks marked by an androcentric bias. Thus, this research project presents a didactic proposal that aims to effectively incorporate a gender lens in textbooks for teenagers aged 15 to 16 through the reformulation of the historical discourse on high imperialism (1860-1914). First, we investigate the meaning of introducing gender as a new analytical category in historical research. Second, we detect the problems that currently hinder the introduction of a gender perspective in Spanish History courses. Third, we analyse the historical account of high imperialism in three Catalan History textbooks in order to determine their particular shortcomings in this regard. Finally, we create a new didactic resource about this historical period adopting a gender lens. Namely, we introduce women as historical subjects and explore how gender structures societies. Furthermore, we avoid the war and economic-centric linear discourse that usually characterises androcentric approaches to History. Therefore, this project offers a new discourse that bridges the gap between the available teaching resources and the academic historiographical innovations on this subject. It thus aims to be an example of how the introduction of gender perspective into secondary education learning resources can be achieved. It is also another step forward in feminist studies since, in bell hooks words, "the classroom remains the most radical space of possibility in academia".

23B Urbanisation and our (Social) Environment

"What does history mean to us?' A study of young Berliners' perceptions of the memorialisation of history"

Maxine Borden, *University of Warwick*

In 2020 the statue of Edward Colston was toppled in Bristol and the debate on whether to keep statues of controversial figures intensified. Are statues glorifying, or do they force us to confront our past? This is particularly pertinent in Berlin, where the historical monuments truly keep history tied to the city. My project looks at monuments in Berlin post-1990 to understand how united Germany has dealt with its complex past through these monuments. I will research responses to specifically chosen monuments at the time of installation using relevant newspapers and compare this to the perception of the monuments now, by interviewing both young and older Berliners. Interviews will have consistent questions, determining which monuments they know, how they know them, and their opinions on them. I expect to see a difference in attitude and perception towards these monuments between society at the time of installation, the younger generations, and the older generation of Berliners, thus impacting the conversation on how history is remembered, and from this leading on to how it should be remembered. This project contributes to the debate on the matter of historical monuments and memory culture, helping to uncover the most effective ways for societies to reconcile with their past and thus progress with their future. This further adds to the discussion of how to deal with controversial statues in Britain, and questions how Germany can best progress with its memory culture, a controversial topic since the rise of German far-right political groups.

Liberating housing

Lovre Mohorič, *University of Ljubljana*

Overviewing the conclusion inhabitants which are creating the city atmosphere are crucial as well as visitors escalating profit and buissnes to residents. Combining both in a regulated, well-established environment creates healthy and open communities for both locals and foreigners engaged with them. In the case of housing, it could work similarly as if it's happening now that foreigners are taking away opportunities from locals but a shared system that would benefit both, a symbiosis. Liberating the apartments from »ownership« and renting them to others when you are not staying home, making them more accessible and efficient. That would lower the yearly renting cost for the inhabitants, by earning the difference of short-term renting the apartment as well as lowerig housing cost in general. The shared economy of flats has to potentially become a new social housing model, that actually can give you something back and potentially ease the financial problem that most people who don't own a flat. By liberating people from places and objects, the system becomes flexible and eases survival in the city, offering the inhabitants everything that they need. The flat exchange would happen more scattered across the city, dissolving the commercial touristic attractions as visitors would be attracted more towards locals as the urban tissue would consist of mixed residences and making them appear almost random in both time and urban communities. Resulting in combined housing, affecting the city and bringing it back more convenient to locals and sustaining the atmosphere they are creating and the travellers or visitors are coming to observe and experience. Case model was made for Lisbon.

23B Urbanisation and our (Social) Environment

Urban Agriculture in the UK: A Review

Hannah Corsini, *University of Warwick*

As climate change and food insecurity are two of the most predominant issues facing our planet, it is important to look at the context in which we produce our food and make efforts to revolutionise these production systems. This paper examines urban agriculture in its aims to mitigate the environmental harms of traditional agriculture and as a burgeoning social movement. The objectives of this study were to fill some of the gaps in knowledge about the place of urban agriculture in the wider agricultural production system; to reflect on the strengths and weaknesses of existing urban agricultural schemes; and to make informed predictions about the future of urban farming in this country. This study's methodology has two components: firstly, the review of the existing knowledge on urban farming, and secondly, the practical observation and critique of urban farms in UK cities such as London, Manchester and Liverpool. In visiting large-scale vertical farms and community gardens across the UK and conducting interviews with urban producers, consumers, and traditional farmers, along with amalgamating existing secondary research, I find that urban agriculture has applications in improving food security in food deserts, in decentralising food production systems and thereby reducing transportation emissions, and in boosting public health and well-being within communities. Concerns raised are the difficulties in funding large-scale urban farming, along with the trade-offs made between sustainability and production efficiency in commercial urban farming. Suggestions for resolutions are made, though further quantitative research is needed to address these concerns as best as possible.

Urban Heat Islands in NYC: Exploring the Role of Social Network in Building Resiliency

Samia Alam, Nikala Daguiar, Jenny Ho, Amaris Navarrete, *Baruch College - City University of New York*

In late 2021, a study by Climate Central ranked New York City the third-hottest out of 159 cities- approximately 7.6 Fahrenheit degrees hotter than neighboring areas. This is known as urban heat island where central cities experience significantly hotter temperatures than surrounding suburban areas. Our research aims to uncover the existing social network between community members, local organizations, and the local government, in regards to how they prevent and respond to extreme heat. Our focus was on six neighborhoods within Queens, Brooklyn, and the Bronx. We first created a contact list for each neighborhood consisting of community centers, libraries, and senior centers and distributed a survey to gauge knowledge of their impact. We then conducted outreach through phone banking, emails, and virtual meetings to locations that operate as cooling spaces. We were able to identify with who and how they communicate, their access to city resources, and their ability to help neighborhood residents. As opposed to other works that focus on quantifying the impact of extreme heat, we are taking a social advocacy based approach. Exploring the social network will allow us to connect the vulnerable residents to existing resources and decrease their risk of presentable heat related illness/deaths. Future studies will continue to understand the underlying social network to facilitate discussion about heat, conduct in-person outreach, encourage connectivity between communities, and increase urban heat island literacy.

23C Materials and Innovative Manufacturing

Geometry of a model for ship capsize

Alex McSweeney-Davis, *University of Warwick*

Establishing safety criteria for ships relies on accurate mathematical models to evaluate the probability of capsizing. One such model has been proposed in (Bujorianu et al, 2021) where a ship is modelled as a rigid body with six degrees of freedom (DOF), which are directions of motion/rotation, subjected to aperiodic forcing. To better understand this model, this project considers a ship with only two DOF which will be roll and heave. The initial conditions leading to capsize are determined by computing the “stable manifold”, the collection of initial conditions which converge to the point of capsize. By considering what side of the stable manifold a point is, we classify which initial conditions lead to ship capsize. The notion of a dividing manifold, which is introduced in (Bujorianu et al, 2021), can be used to determine the time to capsize. The distribution of points leading to capsize and the time taken to capsize are determined and are represented visually for different forcing types, to improve the geometric understanding of this system. By taking probability distributions over initial conditions and the forces, this procedure could be used to determine the probability of a ship leading to capsize given the initial state of the ship. It is expected that the methods used here could be extended to the six DOF system. Further research is required to study this system, which could then be used to develop safety criteria for ocean vehicles.

Antifungal activity of antimicrobial polymeric materials created with peptides from the tyrothricin antibiotic complex.

Priyata Mitha, *Stellenbosch University*

The surface colonisation of microorganisms plays a pivotal role in the upsurge of healthcare-associated infections in the medical industry and the production issues in food industry. The tyrothricin complex, consisting of a mixture of antibiotic peptides, has been reported to exhibit antifungal activity that is synergistic with the caspofungin antifungal drug. However, the antifungal activity of treated materials has not yet been tested. Previous studies have shown that the peptides have two self-assembly modes, one that favours hydrophobic interactions and one mediated by hydrogen bonding. Furthermore, the peptide alters its self-assembly mode depending on the environment it is present in; aggregates favouring hydrophobic interactions are formed in more aqueous solutions. The present study investigated the effect of acetonitrile and isopropanol solvent systems on the oligomerization of the peptides (tyrocidine mix, tyrocidine A, tyrocidine C and tryptocidine C), assessed the subsequent effect of the oligomerization changes on association to cellulose and investigated the effect of the oligomerization and binding on the antifungal activity of the treated cellulose against Candida albicans and Aspergillus fumigatus. Of the peptides tested, it was found that the cellulose treated with single analogue peptides are more effective at inhibiting Candida albicans than the tyrocidine mix. Additionally, the peptide exhibits better antifungal activity in the acetonitrile solvent system than in the isopropanol solvent, which could be attributed to the chemical structure of isopropanol. Both acetonitrile and isopropanol solvents hold promise in facilitating the antifungal activity of the peptides against yeast-like and filamentous fungi.

23C Materials and Innovative Manufacturing

Growth and Investigation of Thin Epitaxial Topological Nodal Line Semimetal Films

Enoch Ko, *University of Warwick*

Topological nodal line semimetal (TNLS) is a special class of quantum material that bears enormous potential for ultra-low energy computing, which is important as the use of communication technologies will account for an estimated 21% of global electricity use by 2030. In this project, we aim to grow a new TNLS, InBi in thin film epitaxial form, over a standard semiconductor InSb. If successful, this will help future scientists realize and implement TNLS into computers. The materials will be made at Warwick using molecular-beam epitaxy (MBE), which occurs in an ultra-high vacuum (UHV) for growing clean atomic layers. We aim to use our MBE recipe to make ultra-thin InBi films on InSb, and check that they have the structure we want. Then, the grown samples will be taken to CY Cergy Paris University, where we will use angle-resolved photoemission spectroscopy (ARPES) to study their surface states and topological structures. By exploring different MBE growth conditions, we aim to terminate a cleaved bulk InBi sample with a single layer of either Indium or Bismuth atoms and observe the effect on its electronic structure. This will form a critical contribution to the collaboration between Warwick and Cergy on a research proposal in “quantum materials”. Furthermore, a successful growth and investigation of InBi could attain global significance with topological material's massive ramifications in the development of ultra-low energy computing, spintronics and other advanced technologies. Future projects can also utilize methods developed in this research to grow and further investigate other types of TNLS.

Development and Characterization of Biomimetic Micropatterned surfaces

Gulana Anwar, *University of Leeds*

Biological systems serve as consistent beacons of inspiration to mimic optimized evolutionary design traits. Micro/nano-patterned surfaces have found increasing applications in various emerging technologies, however, the task of developing techniques to fabricate large areas of such surfaces in well-controlled and cost-effective manners remain challenging. Conventional microfabrication processes are costly and non-scalable, and thus this research aims to explore fluid-based patterning techniques which harness intrinsic self-assembling forces in an inherently energy-efficient process. This research is concerned with the microstructure found on the wings of the Cicada insects, which promote a wide range of enhanced material-functionality relating to hydrophobic and self-cleaning properties. These surfaces were successfully fabricated by coating the base solid surface with meta-stable polymeric film. The structure of the replicated surfaces was characterized using electron microscopy. The functionalities of these surfaces were then tested to evaluate the effectiveness of the technique, with the fabrications displaying a significant improvement in hydrophobicity from the flat control polymer. This work demonstrates a quick, efficient and cost-effective manner of patterning polymer surfaces, making it an effective way of fabricating micropatterned surfaces that possess key biological properties such as anti-reflection, anti-fouling and hydrophobicity. Following this research, the results can be used to manufacture materials in a scalable, cost-effective and adaptable manner, and this technology can be translated into real-world applications such as biomedical antibacterial coatings, optical communications, lenses, solar cells and increasing the efficiency of photonics.

23D European Law, Policy, and Protest

The protest movements in Romania and the state of democracy. From the Collapse of Communism to the Anti-vaxxers' movement.

Izabelle Apostol, *University of Warwick*

I am pursuing to answer how protest movements can be used to analyse the development of a political system, and more specifically democratization. I use the case of Romania in the last 30 years to answer this question. Overall, I am trying to establish a connection and breach the gap in literature between history and social sciences, as I use historical events to describe political developments. In my research I take a historical approach and analyse four protests from Romania (which cover anti-communist, anti-corruption, and anti-restrictions protests) and see if and how they influence the democracy. For this I consulted the National Library and Archives for testimonies and academic papers, as well as the news coverage of the events. I conclude that protests act more as an indicator than facilitator for democracy, as they are subject to what the protest campaigns for. Moreover, based on how much resistance protesters meet from the government, the protests indicate the level of cooperation between the civil society and political elite, a key component of democracy. The level of resistance reduces through the years which leads to the conclusion that the democracy did improve in Romania, while other issues highlight space for improvement. I consider this research to have a significant impact in opening the historical studies towards the political sciences, as historical events, such as protests, can be used together with socio-economic indicators of democracy to best describe the state of a political society. Lastly, this research can be extended to other contexts, as my hypothesis is that this is a universal indicator (valid outside the Romanian society).

Between interdependence and autonomy - What we can learn from ultra-vires judgements about European Legal Integration

Johanna Ritter, *University of Oldenburg*

The question of who has the final say in the relation between EU law and national law is debated in legal and political literature since decades. In the last years however, oil was poured into the fire of heated debate, since the highest courts of the Czech Republic, Denmark and Germany have delivered the first ultra vires rulings. These judgements claim that certain judgements of the EU Court of Justice (ECJ) are not binding in the national states. The paper will consider these judgements as phenomena in the context of EU legal integration and answer the question: What can we learn from ultra vires judgements for the future of EU legal integration? The paper examines the underlying controversies expressed in the judgements and gains an insight into a deeper lying conflict between the ECJ and the national courts. Because the EU is a political and a legal community, the paper will explore this question from both, a legal and a political perspective. It will clarify what role courts have in a political system and what special nature constitutional courts hold. Furthermore, the concept of legal integration will be discussed, followed by an analysis of the three rulings. Based on this analysis, it will be examined what understanding of sovereignty underlies these judgments; what role the national constitutions play and how institutions involved are seen by also considering the impact of such rulings on public opinion. These findings will be complemented with insights from the political science and jurisprudence literature.

24A Thinking Through Space, Place, and Health

Morphometric and anatomical characteristics of the Anterolateral Ligament (ALL) of the knee: Cadaveric study

Megan Calitz, *Stellenbosch University*

The anterolateral ligament (ALL) of the knee, is believed to have an important role in knee stability. Knowledge on the prevalence and attachments of this ligament can alter the way in which orthopaedic surgeons reconstruct the knee after common sports injuries such as an anterior cruciate ligament tear. Various studies conducted have shown considerable variation in its anatomy and morphometry. This variation is possibly due to the varying geographical locations of the previous studies. This is a quantitative, descriptive study on 34 formalin-embalmed cadaveric knees of the South African population. The aim of the study is to describe the anatomical characteristics and morphometrics of the ALL. In addition, the study will also evaluate its histological composition. Currently there is limited research on a South African population describing the ALL. Current results indicate a low prevalence of the ALL in a South African population. Unlike previous studies, this study has found the ligament to insert closer to the anterior aspect of the fibular head rather than midway between the fibular head and Gerdy's tubercle on the tibia. The length of the ALL generally range between 21 and 43 mm and the width from 3 and 6 mm. This study will aid in future studies to understand the possibility of geographical variation of the ALL between populations. Furthermore, the study will aid clinicians and surgeons in having a deeper understanding of the ligaments of the knee needed for knee reconstruction surgery.

How are Students with Special Educational Needs Supported in Accessing Higher Education?

Michael Cavaliere, *University of Warwick*

In 2019/20, only 17.5% of students identified as having special educational needs (SEN) started higher education by age 19, compared to 47.5% of those without SEN. Students identified as having SEN, meaning they require extra support to access education due to their disability or condition, are underrepresented in higher education and face challenges in accessing university. Through surveying current undergraduate students identified as having SEN during their schooling and current educators working with post-16 students with SEN, and then exploring responses from follow-up interviews conducted with four students with varying needs and one specialist SEN teacher, this research aimed to identify what factors affect the continuation of these students to higher education and how schools and universities could adapt the application and transition processes to be more accessible. This gave an insight into what barriers and supports are in place for students with SEN from first-hand experience, insights which are generally missing from the existing discourse around widening participation in higher education. The research highlighted the importance of SEN-specific advice and support being provided throughout the process and the importance of schools and universities being proactive in addressing any issues arising. Furthermore, ideas around the implementation of a formal handover system were explored, including best practice in sharing information between schools and universities and how to address any possible difficulties in developing independent living, study and advocacy skills in students with SEN. These findings could be used to develop a more suitable and informed system for supporting the transition from school to higher education for students with SEN.

24A Thinking Through Space, Place, and Health

Period pain: Student perceptions of ongoing menstrual stigma at the University of Warwick and potential interventions to counter such stigma.

Naomi Carter, *University of Warwick*

With ongoing menstrual stigma maintaining a culture of silence and secrecy regarding menstruation in academic institutions, this research reveals student perceptions of such stigma at the University of Warwick, and highlights their suggestions for how the University can provide better support. Despite recent progress towards gender equality, the topic of menstruation and menstrual management remains deeply stigmatised, resulting in insufficient empirical research into menstruators' experiences, and exacerbating ongoing inequalities in education, healthcare and the workplace. This research takes a critical, intersectional feminist lens to understand how the experience of menstruation is connected to structural inequalities, ongoing marginalisation, mental and physical health, and access to sexual reproductive rights. Drawing on findings from a focus group of 6 menstruating students at the University of Warwick, this research suggests that students are increasingly countering cultural pressure to remain silent about menstruation, instead expressing frustration with the lack of institutional support for menstruators. This frustration was directed towards poor understanding of, or accommodation towards, the complex experiences of menstruation, including debilitating pain, negative and sexist assumptions about the body, inaccessible products, inadequate hygiene facilities and continued dismissal of menstruators through patriarchal and capitalist discourses of individual menstrual management. Participants called for the University to implement proactive measures to improve menstrual education, counter stigmatising assumptions and help menstruators mitigate the impact of pain and menstrual management on their wellbeing and academic performance. This highlights the need for more wide-scale research on the feasibility of proposed interventions and the experiences and needs of differing student demographics, and particularly demonstrates the need to focus on the intersecting difficulties faced by marginalised students.

The functions of refugee shelter for non-migrants

Lois Hornby, *University of Warwick*

This paper analyses the causal relationship between current account deficits(CAD) and fiscal deficits(FD) in the United Kingdom over the period 1979:q1 to 2021:q2. The traditional theory which postulates a relationship between them is the twin deficit hypothesis, which suggests CAD and FD move one to one in the long run, with FD causing CAD. The theory has been underexplored in the United Kingdom, with existing literature providing conflicting results confined to the pre financial crisis era. The theoretical model employed is the traditional Mundell-Fleming model which provides a transmission chain for the twin deficit hypothesis. A Vector Error Correction Model (VECM) was employed to analyse the long run relationship and a Structural Vector Auto Regression(SVAR) was employed to study the dynamics in the short run using Impulse Response Functions(IRFs). The Results suggest the twin divergence view is more valid for the United Kingdom although not one to one (1:0.36) in the long run, with reverse causality from CAD to FD i.e. a Current Account Deficit causes a Fiscal Deficit. The long run relationship holds even after considering a single structural break. The twin divergence result is relevant for policy, given the high fiscal deficit during the COVID-19 crisis. The results indicate in the short run an increase in fiscal deficit would be followed by a temporary rise in CAD, however in the long run leads to an improvement in the Current Account. Examining their relationship over the business cycle in a Markov-Switching Model would be the next step.

24C Identity and Culture

The Impact of Children's Gender on Divorce: Empirical Evidence from China

Jiarui Song, Zhang Xiyu, *University of Warwick*

Gender inequality is one of the overarching problems perplexing society. Usually, scientists focus on the disparities in social behaviour or resource allocation. Ideological preferences, however, such as gender selection at birth, can be easily ignored but negatively affect family relationships. Therefore, it is crucial to figure out gender inequalities at the family level and how to eliminate such inequalities. This paper raises a question: are there son preferences such that parents are more likely to divorce if their first-born child is a daughter than a son? If so, why does this happen, and are there any negative consequences for wives and daughters? This paper focuses on the impact of children's gender on divorce among parents in China. Using robust logistic estimation of 2010 Chinese Census data covering more than 2 million individuals, we found that parents with a first-born daughter are more likely to divorce than those with a first-born son. Besides, this child-gender effect is age-specific and time-varying, supporting Dahl and Moretti's (2008) theory of sons' preferences. Furthermore, since our analysis also proposes a substantial decrease in the welfare of first-born daughters and wives, we believe this gender difference is indeed gender inequality. Our findings give sociologists and economists justifications to promote relative policies and legislations, including educating the public and forbidding sex selection. Although it is robust to conclude the biases against daughters and justify policy implications, this gender inequality cannot be eliminated by simply balancing the sex composition of the next generation. Therefore, further research could be done on how related public policies can eliminate this gender inequality.

When Ritual Confronts a Changing City: A Study of Mikvah Throughout New York City History

Elisheva May, *Baruch College - City University of New York*

The mikvah (plural: mikvaot), a Jewish ritual bath, has been a vital structure in every Jewish community since at least the Second Temple period. Historian Celia J. Bergoffen traced the shift of New York mikvaot from synagogue properties to private businesses and bathhouses, demonstrating how mass immigration impacted the structure and practice of this ritual. My research broadens this analysis to include the colonial period and examines the mikvaot of the earlier Atlantic world to lend further context to the main thesis. My research is based on archaeological evidence from former colonies in the Atlantic and from New York City, NYC government documents and primary sources from Jewish organizations. I conclude that immigration made Jewish religious authority less cohesive as reflected in the proliferation of mikvaot outside of synagogues. It also indirectly led to a fraught relationship between mikvaot and government agencies such as the Department of Health that worked to improve health and hygiene in the tenements.The mikvah was also impacted by the popularity of scientific studies around race as some scientists began to promote the ritual as a means of preventing certain cancers, further complicating the relationship between scientists and the Jewish authorities who oversaw the practice. My research on mikvah can be used to examine how religious authorities can come into contact with and be affected by secular authorities during a time of great change. If given the chance, I would do more research on how these factors impacted the women who patronized the mikvah, as I currently focus on how they affected the institution itself and its leaders.

24C Identity and Culture

The Nepalian Alternative – Can legal practice accommodate extreme ethnic diversity in the environment of Constitutional Nationalism?

Jakub Babuska, *University of Warwick*

The goal of the research is to make an inquiry into the way national law and legal practice treats ethnic diversity in the Federal Democratic Republic of Nepal. Even though Nepal's society lacks any ethnic group which might form a clear majority, the State maintains a nationalist Constitution which is rooted in religion and identity-based. This situation is relevant in the British context, as a strong national identity is not usually associated with inclusiveness. Hence, the research outcome might bring unexpected conclusions and challenge our thinking about the interplay between the law and legal practice in safeguarding diversity and tolerance. The main hypothesis is that legal practice can alleviate the discriminative effects of legislation. Assuming that the implementation of a similar law in the UK would be unacceptable, the reasons that make the reception of the law so different in both contexts will be identified. To achieve that, the research compares the way British and Nepali lawyers are educated at Universities and the significance of unwritten code of conduct in the legal community. The source material for the analysis consists of the Focus Group Discussions with students of the law of Tribhuvan University; Individual In-depth Interviews with legal practitioners and lecturers teaching legal subjects; and literary research (academic papers, press and curriculums). In conclusion, the research will contribute to our understanding of the relationship between ethnic diversity and national identity. It will be also argued that many evaluations of law overly focus on the analysis of the written law while ignoring the specificity of each country in terms of the everyday work of legal practitioners.

Parallel Braids: An Examination of Gay Identities

Shreshth Jain-Hutchison, *Baruch College - City University of New York*

Representation matters. Americans now recognize the importance of seeing characters of diverse racial backgrounds and sexualities in our popular media. But is all representation good representation? This paper looks at the depiction of gay men in US popular discourse to construct a philosophical theory of gay identity that allows room for those who conform to the idealized image of a gay man, those who deviate from it, and everyone else in between. This paper is inspired by Jose Jorge Medina's theory about racial identity of a braid of whiteness in which three distinct strands interweave to create an identity that cannot be truly understood as simply a sum of its parts. I examined Lisa Duggan's conception of the homonormative, secondary research on gay male identities, first-hand accounts by marginalized gay men from a collection by Mattilda Bernstein Sycamore, and discourses around prominent American gay men. Thus, I construct a theory of gay identity where the three strands of physical aesthetic, gendered performativity, and socio-political goals intertwine forming two parallel braids of identity, one prominent in national discourse featuring the gay archetype reflected by figures like Pete Buttigieg and Anderson Cooper, and another pushed to the margins, namely those who don't conform to each of three strands. Using this more comprehensive theory of identity in examining popular discourse on queer representations, I ask not just if but also how gay men are being represented in media, and what effect these representations have on those that media does not reflect.

24D Health and Wellbeing: Exploring the World of Medicine

Natural product extracts from soil samples in Pennsylvania exhibit potent activity against Bacillus anthracis

Annalee Schmidt, *Pennsylvania State University*

Deadly bacterial infections such as anthrax continue to pose a significant threat to human health worldwide. This disease is caused by Bacillus anthracis, which is classified by the CDC as a potential weapon of bioterrorism due to its ability to form spores that are resistant to severe environmental stress conditions, including antibiotics. Identifying new antibiotics against this pathogen is therefore crucial for combatting anthrax infections. In this research, crude extracts from soil samples in Pennsylvania were purified using various chromatography methods resulting in five natural products, which were assessed for their antimicrobial properties. Two of these compounds, AMS002 and AMS003, exhibited growth inhibitory and bactericidal activity against B. anthracis at 0.8 mg/ml and 0.2 mg/ml, respectively. Both compounds inhibited greater than 80% of protein synthesis relative to the control samples in cell-based and in-vitro fluorescent reporter assays, suggesting that these compounds could be targeting the bacterial protein synthesis pathway as their primary mode of action. Structural analysis by mass spectroscopy was used to confirm their molecular mass, indicating a novel discovery. This discovery is significant because new inhibitors of B. anthracis are essential to tackle deadly anthrax infections. To further identify genes associated with the antibacterial activity of these two compounds, resistant mutants of B. anthracis were generated through serial passaging to induce drug stress. Whole genome sequencing analysis will be used to identify mutations that facilitate the observed resistance and help distinguish which components of the protein synthesis pathway are targeted by the isolated natural products.

Unravelling the anti-cancer effect of a new medication on pancreatic cancer in mice models

Neima Ebrahimian-Roodbari, Qais Wahdan, *University of Sheffield*

Pancreatic cancer (PaCa) is a devastating disease with an insidious onset and is often life-threatening at diagnosis. Fewer than 1 in 5 patients survive beyond a year after diagnosis. Not only has the survival rate not improved since the 1970s but the incidence of PaCa is increasing by approximately 1% annually. Today, the curative treatment options available for patients are slim and many are started on end-of-life care from the time of diagnosis. Further research into the causes of PaCa growth may aid in improving treatment options for the disease. Our hypothesis is that a cell receptor (AM2R) facilitates PaCa collagen growth and causes immune cells to invade PaCa tissue and, therefore, may be responsible for PaCa disease progression. To prove this, we will use tissue staining techniques to detect the effect of our treatment (an AM2R blocker) on the amount of collagen and the number of immune cells invading PaCa tissue from mice models. We will compare the changes between mice given our new treatment, standard-of-care chemotherapy, or no treatment. Our goal is to pioneer the innovation of new disease altering PaCa medications. The results from this research will form a jigsaw piece that outlines the effect of the target receptor and helps to complete the puzzle of preclinical data that will push the development towards clinical trials. By laying the foundation for future research, we can strive towards improving survival rates amongst PaCa patients and change the poor prognosis that has haunted these patients for decades.

24D Health and Wellbeing: Exploring the World of Medicine

A comparison between the antimicrobial effects of theobromine and fluoride on oral decay-causing microorganisms

Ismaeel Rafiq, *University of Leeds*

Fluoride is the cornerstone of dental public health and is used to prevent decay, the world's most prevalent disease. Theobromine is a novel agent showing promising comparisons to fluoride. Antimicrobial activity is one of fluoride's main properties. The present study is the first to appropriately compare antimicrobial activity between fluoride and theobromine. Decay-causing Streptococcus mutans and Actinomyces naeslundii bacteria were cultured in various mixtures of artificial saliva, basal media, theobromine and fluoride solutions. A control group with no agent was completed for comparison. These suspensions were cultured on each microbe's selective media; colony-forming unit per millilitre (CFU/ml) was then calculated. The viable count was different across all groups. Using one-way ANOVA, all experimental conditions showed a significantly lower bacterial abundance against both microbes in comparison to the control (p0.05). Theobromine and fluoride are therefore equally antimicrobial against S.mutans and A.naeslundii,, and consequently, theobromine can be considered as a potential adjunct or alternative to fluoride. This research can contribute to the implementation of a new dental agent with worldwide/future implications. Fluoride use raises concerns regarding the emergence of fluoride-resistant microbes and acute/chronic poisoning e.g. dental fluorosis. Theobromine use can mitigate concerns of resistance, fluorosis, and safety. Many individuals also avoid fluoride products but may use theobromine, thus this dental inequality within disease prevention can be equalled. Overall, the societal benefit is from a decrease in decay via theobromine-containing oral hygiene products. More directly, further research is now justified using higher theobromine concentrations and complex microbial cultures.

Supramolecular Heparin-peptide Materials as Injectable Anticoagulant Depots

Sopida Pimcharoen, *Pennsylvania State University*

Heparin, a potent naturally derived carbohydrate anticoagulant, is widely used blood thinner for clotting disorders that include deep vein thrombosis and cerebral hemorrhage (stroke). Heparin is typically administered as an intravenous infusion, and due to its short serum half-life (approx. 60-90 minutes) has to be administered frequently to counter its rapid clearance. However, frequent dosing increases the likelihood of user error and infuser malfunction, both of which can lead to heparin overdosing and severe bleeding complications. Herein, we develop a heparin-peptide biomaterial (HMG) that can be readily injected as a subcutaneous depot to sustainably release heparin into circulation; thereby allowing less frequent dosing and reduced incidence of overdose complications. The results demonstrate that HMG was able to improve the anticoagulation life cycle up to 6 hours without imposing strong inflammatory or erythrocytic toxicity response as determined by in vivo and in vitro studies. Moreover, the results suggested that, by utilizing HMG, we have reduced the chance of overdosing while increase the lifespan of heparin bioactivities in vivo. In addition, the shelf-stable, easy-to-administer heparin formulations described here may also open opportunities for their use in global non-clinical settings (e.g., battlefield). For the next step, we will further design HMG for aerosolize delivery to combat M. tuberculosis infection that seek refuge in macrophage in which traditional drugs deemed ineffective. We will apply HMG in model mammal species such as monkey or mouse to measure its therapeutic efficiency.

The legal impact of Article 31 of the TRIPS Agreement on enabling access to medicine worldwide

Justyna Michalak, *University of Warwick*

My presentation will critically examine the legal impact of the TRIPS Agreement Article 31 on enabling access to medicine. It will focus on the clause about allowing WTO's members to use a patent 'without the authorisation of the right holder, including use by the government or third parties authorised by the government (...) in cases of national emergency" (Article 31). This provision is significant in Global Intellectual Property law because it attempts to, in one way, loosen patent protection worldwide, but the sacrifice is made for the wider good of enabling access to medicine. Nonetheless, this claim is not clear once one looks deeper into this area of law, and especially at real case studies from Rwanda, Thailand, and the COVID-19 pandemic. Therefore, the research goes beyond the scope of a theoretical academic legal debate which enhances existing research by analysing real-world application of this legal question. It will conclude that case studies reflect that Article 31 lacks successful legal enforcement mechanisms that would significantly improve access to medicines. The research uses primary sources, such as the TRIPS Agreement, as well as the Doha Declaration. Furthermore, those are analysed with relation to secondary academic sources from respectable academic journals, such as European Intellectual Property Law Review. Deliberating between primary and secondary sources will allow me to discuss legal documents and different academic opinions and theoretical aspects about the wording of international agreements by showing them in a wider context. The presentation is filling a gap in existing research by emphasising the real-life implications of Article 31 rather than solely focusing on theoretical legal analysis.

Feminicidio: Misogyny and Murder in Latin America

Zoe Grant, *University of Warwick*

My first presentation of research on the murder of women in Latin America was at the EUTopia Conference 2022 in Paris, where the conference's focus on minority rights and legal history prompted me to think about how I could extend and enrich this research project on women's rights. I wanted to strengthen my research to construct a more focussed narrative, and through my studies I found the tragic experiences of transgender women within this epidemic. Ideally I will be able to conduct this further research through LGBTQ+-specific literature and access to archival resources to supplement it. What is compelling me to undergo this research is my interest in human rights, highlighting areas of history which deserve more scholarly attention, and hopefully providing trans victims greater visibility within academic spheres. I am aiming to integrate this project within the discipline of legal history as I discuss how the term 'feminicidio' emerged into academia and also national and international legislation. Finally, I will be able to contextualise this project contemporarily and emphasise its relevance by researching how the COVID-19 pandemic has affected domestic abuse rates, the controversial impact of international influence and intervention, and how the trans community continues to exist and suffer under a corrupt and hostile regime.

Lüffi

Tobias Boelsen, Tobias Groza, *University of Warwick*

During the ongoing coronavirus pandemic, schools, universities and kindergartens, in particular, continue to be places of large gatherings where large numbers of people congregate in confined spaces.

For the health of people who spend time indoors, it is important to maintain indoor air quality at a high level, especially in terms of protection against airborne infections such as SARS-CoV-2.

This is ensured by air exchange, which replaces indoor air with uncontaminated outdoor air, thus reducing aerosol and CO2 concentrations in indoor air. The air exchange is regulated by ventilation concepts that specify the duration and timing of the air exchange. However, such ventilation concepts are usually not specifically tailored to individual rooms and different room uses and can therefore fail to achieve the targeted indoor air quality. In addition to air exchange, air filtration systems can be used to reduce the risk of infection by removing virtually all aerosol particles from the processed air. The efficiency of air filtration systems depends on their position in the room. Our bachelor thesis addressed the need to review and optimize ventilation concepts and effective positioning of air filtration systems. For this purpose, an existing system for monitoring the temporal-spatial CO2 concentration was extended with new functionalities, such as an application for simulating ventilation concepts. The new system, called “Lüffi”, can be used to create, check and optimize ventilation concepts and to evaluate the positioning of air filtration systems. Measurements have confirmed the system's usefulness. In addition, the system can be set up and used independently by educational institutions to help maintain adequate indoor air quality.

25A Behavioural Science and Social Systems

Does forcing teenagers to remain in school improve their labour market outcomes in early adulthood?

Matthew Oulton, *University of Warwick*

Every day, across the world, millions of children are compelled, often against their will, into the classroom. At enormous cost to parents, the taxpayer, and young people themselves, time, effort, and money are expended on schooling. Military conscription aside, this is the only issue for which so many hours of youth and so much societal resources are expended. However, it is therefore incredibly important that we get a return on this investment. Did recent changes in the age at which young people can leave education help to spread opportunity, or did they merely waste the time and energy of unwilling youths? Exploiting devolution, which limited the policy roll-out to England, and age variation I examine the impact of the policy using an Event Study Design model. This identifies a causal impact of the policy with mixed results: the policy improved labour market outcomes unambiguously for young people, reducing the incidence of NEET, increasing employment, and cutting unemployment. However, it reduced hourly wages. My findings suggest that the policy was successful in its goals. Educational attainment was improved, NEET reduced, and employment increased for young people. Similarly, the policy had a profound positive impact in continuation to higher education. However, increasing compulsory education appears to have cut hourly wages for the treated group, perhaps indicating a diminishing of the signalling power of education or low short-run productivity gains. On balance, this is a powerful illustration of the power of compulsory schooling, suggesting that the change should be maintained and replicated.

Using positive reinforcement training to reduce aversion to restraint in laboratory mice

Maya Bodnar, *University of British Columbia*

Mice used in research often experience stressful procedures such as physical restraint. Providing increased agency (i.e. the ability to act independently) to animals undergoing stressful procedures through positive reinforcement training (PRT) can improve welfare. We assessed whether PRT can be used to alleviate anxiety in mice undergoing restraint. We used three treatment groups: trained, habituated, and naïve. Mice were trained to voluntarily enter and remain in a restraint tunnel. Habituated mice received exposure to the scenario without training, while naïve mice received no prior exposure. Behavioural indicators of anxiety were documented during training and habituation sessions, and willingness to approach the handler was assessed. Baseline anxiety was assessed with the light-dark box test and reassessed following restraint. It was anticipated that trained mice would display less anxiety compared to habituated and naïve mice following restraint. Final training criteria was not reached, though findings demonstrate that trained mice dropped fewer fecal boli and displayed less freezing behaviour than habituated mice. Trained mice interacted with the handler more frequently than other treatments during preliminary handler approach testing, which may indicate positive associations with humans due to PRT. Compared to baseline levels, light-dark box results indicate negligible differences in anxiety between treatments. We conclude that PRT has the potential to reduce anxiety during training, though PRT may not alleviate anxiety in mice undergoing a restraint procedure. While the current study focused on mice, PRT can be employed across captive animal settings to improve welfare in typically aversive scenarios. We suggest that future research investigates practical implementations of PRT for a variety of routine procedures in laboratory animals.

25A Behavioural Science and Social Systems

On the Algebraic Generalisation of Microeconomic Comparative Statics

Carlos Merardo Angulo Zumaeta, *University of Warwick*

Constrained optimisation is a mathematical method applied in microeconomics for comparative statics, analysing how consumers and producers respond to changes in prices subject to their budgets. This is a topic that numerous undergraduate students find difficult to grasp and is particularly challenging to visualise due to its sequential complexity. Furthermore, the issue may also stem from a tendency of current pedagogical practices providing relatively non-interactive material to students, thus limiting their intuition-building through independent experimentation and visualisation. My research encompasses the derivation of generalised solution equations through the Lagrange method for the Constant Elasticity of Substitution and Cobb-Douglas forms, whose purpose lies in producing an online visualisation tool showing the mathematical application of comparative statics to microeconomics through calculations and graphs subject to the user's input values. By equipping the software with input-value boxes and scroll-through bars, the user will be able to freely explore comparative statics and thus strengthen their intuition through hands-on experience. A website was developed and divided into sections: About the Creator, User Guide, Theoretical Framework, and Graphic Visualisation. The latter contains my own Wolfram Mathematica Demonstrations, which are embedded for user interaction in numeric calculations and graphic displays. I expect the finalised online visualisation tool to be ready for use by students and lecturers to complement in-class learning as a potentially revolutionary instrument for contemporary pedagogy. Additionally, I firmly believe that my research, showing the integral value of utilising technology to communicate ideas, will spur the interest of other undergraduate students to produce similar tools to stimulate the understanding of different topics for applied mathematics in economics.

Exploring the effects of ambient near-infrared radiation on cognitive performance and heart-rate variability

Yeon Soo Seo, *University of British Columbia*

Human exposure to near-infrared radiation (NIR), a key component of sunlight, is decreasing as people are spending more time indoors where NIR has been removed from lighting sources as an energy-saving measure. However, NIR, now known to be biologically active, is being investigated for potential benefits to human well-being. Although studies have reported improved cognitive performance following NIR administration via laser or light-emitting diode (LED) directly to the head, no research has yet examined cognitive performance during exposure to ambient NIR. 154 participants (120 women) performed cognitive tasks under two counterbalanced lighting conditions (i.e. standard LED office lighting with and without NIR) in a booth resembling a typical workspace while HRV was measured by electrocardiogram. Data collection is complete and results will be presented at the conference. It is hypothesized that there would be (1) improved cognitive task performance and (2) increased resting HRV and decreased HRV reactivity, which have been associated with improved cognitive performance, under NIR. If hypotheses are supported, this would be the first demonstration that NIR in ambient lighting can have beneficial effects on human physiology and cognition. Such results would suggest a need to re-evaluate the current architectural trend toward the reduction of NIR from indoor lighting. This study opens the door to new lines of research for a novel application of NIR. Future studies could examine effects of adjusting administration parameters, such as length of exposure, and effects on different populations, such as other age groups, to determine conditions for maximal benefits.

25B Teaching for Learning, and Learning for Teaching

Exploring the process of physical literacy as experienced by Paediatric movement specialists in South Africa: A Phenomenological study

Robyn Allies, Hannah leRoux, *Stellenbosch University*

Physical Literacy's (PL) ambiguity as a term makes it challenging to develop a method of implementation to address its appropriate delivery. The term's complexity and its ramifications for children's physical activity and holistic development has undergone debate. Paediatric movement specialists (will be referred to as Kinderkineticists during the study) focus on the holistic development of children through the use of gross motor activities and therefore, have experience with physically illiterate children. As a result of their lived experiences, we were able to reach a conclusion as to the meaning of the term 'physical literacy'. In this qualitative study, Kinderkineticists in the Western Cape (n=3) were investigated in order to understand and describe the process of PL from their lived experiences of teaching and assessing it. Semi-structured interviews were used as the primary data collection tool and seven major themes were generated: understanding, training, confidence, competence, a devalued physical education (PE) system, specialists and experience. Findings indicated that PL is ineffectively developed in PE and therefore there has been a noticeable decline in PL, consequently affecting the children's development. Three major causes of this decline were found to be 1) Children and their motor struggles; 2) PE and the devaluing of the system; 3) The importance of Kinderkineticists. A practical application of Kinderkineticists' expertise can add value to the PE system as it is currently underdeveloped and undervalued. This can be done by providing a platform from which PE teachers are able to gain an understanding of the importance of PL and its impact on the movement development of children.

The Impact of School Gender Composition on Girls' Mathematical Ability

Amogh Patil, *University of Warwick*

The gender gap in maths is evident across many countries and institutions from a young age. With girls performing worse in maths, this can link to why they are less likely to enrol in STEM degrees and subsequently less likely to work in more quantitative fields that pay more - giving a clear policy rationale to reduce the gender gap in maths. I examine the effect of a school's gender composition on girls' mathematics ability, looking at their attitudes to gender competition. I use survey data from the Programme for International Student Assessment (2018) administered to 15-year-olds in schools worldwide. My cross-sectional analysis, comparing the maths scores of girls with similar observable characteristics from different schools with varying gender compositions, shows that a 1percentage point increase in girls at a school leads to a significant increase in scores for girls by 0.58 points on the test. My findings show that increasing the female gender composition of a school can improve girls' maths ability. It may be unrealistic to solely aim for all schools to be single-gender - instead, it can provide information to schools or local districts to not construct school environments where the proportion of girls is far below half. Further research of a cross-country analysis can show why the relationship between a school's gender composition and girls' maths ability varies so much between countries. The explanation behind this variation can possibly allude to the exact mechanism why girls perform better when they're in an environment with more girls.

25B Teaching for Learning, and Learning for Teaching

A Mixed Reality Guidance Tool for Healthcare Training

Rohit Krishnamurthy, Vanessa Lo, *University of British Columbia*

Mixed reality technology has great potential to foster groundbreaking advancements in healthcare training and ultimately revolutionize the field of healthcare education. Its use in medical training has emerged as a high-tech solution for enhancing the quality of education, leading to many innovative developments, prototypes, and applications. Inspired by these advancements, we created a mixed reality training solution aimed at improving the delivery of clinical content to support educators in instructing and guiding students in healthcare. With the solution, instructors can upload any virtual replicas of physical objects with step-by-step instructions on operating them. As a demonstrative example, we utilized an intravenous infusion pump assembly as a skill to be learned by students. The assembly instructions are projected to the students wearing the Microsoft HoloLens headsets, allowing students to complete each step properly before moving on to the next. Students can use the application to practice the skill(s) without an instructor's presence. This research strives to not only bolster engagement in learning, enhance knowledge retention, and aid in skills consolidation, but also provide students with an alternative method to learn where physical lab time, medical supplies, and instructor presence are not necessarily required. Over the past few years, the use of disruptive technology in the field of healthcare has increased exponentially. Its use in training and education has shown immense progress. We believe our mixed reality guidance tool will enhance the quality of students' training experience and enable more educators to incorporate cutting-edge technology into healthcare curriculums.

Assessing the effect implicit letter priming has on cognitive performance - A versus F: A replication study

Inchara A U Athreya, Anannya Gupta, Diya Malhotra, Diya Mehta, Hannah Schmidt, *University of Warwick*

Can exposure to just one letter enhance or impair performance? Due to the academic grading scales, the letters A and F hold evaluative connotations - A being positive and F being negative. This study is a partial replication of the study by Ciani and Sheldon (2010), which focused on the effects of exposure to letter grades on future performance, and implicit and explicit motivation goals. Undergraduate students were randomly assigned to one of three experimental conditions of the independent variable: A – which was expected to have a positive impact on performance, F – which was expected to have a negative impact, or the neutral J condition. Participants' performance in an anagram task was measured. Implicit motivation was measured through a word-stem completion task and explicit motivation was measured through a goal motivation survey. The study followed a between participants' design and was conducted online using Qualtrics. We hypothesised participants in condition A would score highest, and those in condition F lowest. Furthermore, higher mastery approach and word completion task scores were expected in condition A due to assumed higher motivation. A one-way ANOVA failed to establish any significant effect. As the results differed from the original study, it is important to hypothesise the reasons for this outcome. While undergraduates were the sample for our research, other samples such as high schoolers may have been more responsive to these primes. With some current grading scales being more number based, there may be a difference in perception of evaluative connotations. Hence, another path that can be investigated is using numbers as primes as opposed to letters.

25C Modern Perspectives: The World of STEM

Errors in DNA Structure: How often do DNA Tautomerizations occur?

Benjamin Herrera, *Baruch College - City University of New York*

DNA serves as the genetic blueprint for all living things. DNA consists of two anti-parallel strands made up of four different nucleotides: adenine, thymine, guanine, and cytosine. During the DNA replication process, it is important that nucleotides maintain their typical structure. Changes in base pairs known as mutations can result in diseases including cancer. This study looks at the probability of a specific mutation reaction called tautomerization, in which protons get rearranged in the molecule, occurring in guanine-cytosine base pairs. The likelihood of a tautomerization is increased by a phenomenon called tunneling which allows the reaction to take place using less energy than it otherwise would. A well-defined energy barrier is necessary for tunneling to occur. This study chooses tunneling in guanine-cytosine base pairs as its focus, since current research finds that the energy barrier for tautomerization in guanine-cytosine is more well-defined than in the adenine-thymine energy barrier. The study conducts computational calculations in computer programs to find how much energy is needed for the tautomerization and how much tunneling contributes to speeding up the reaction rate. The presence of tunneling is found to increase the reaction rate of tautomerization by 29%. This suggests tunneling plays a considerable role in making tautomerizations more likely to happen. Future research in this field should investigate whether the mutated DNA formed by this process is stable and enduring enough to be replicated and transcribed. The results of this research could contribute to finding that tunneling-driven tautomerizations are a root cause behind genetic diseases.

Polynomials, Roots and Number Fields: An Exploration of Cyclotomy

Lucie Gatzmaga, *University of Warwick*

Despite being some of the most fundamental concepts in algebra and number theory, polynomials and number fields are still a thriving source of cutting-edge research in mathematics. In this vein, we will both describe a special class of number fields and study the Cauchy-Mirimanoff polynomials, which were first introduced in 1903. These functions were a promising approach to solve the famous Fermat's Last Theorem in the twentieth century, but to this day, many fundamental questions about them remain unanswered. We will use modern mathematical techniques to gain new insight into both number fields and Cauchy-Mirimanoff polynomials, most of them relating to the idea of symmetry between the solutions of an equation, a concept called cyclotomy. For instance, we plan to employ powerful tools from Galois theory to show that the Cauchy-Mirimanoff polynomials are irreducible, which means that they cannot be expressed as the product of other polynomials. The ideas explored in the presented research project are integral to two thriving Warwick research groups in number theory and algebraic geometry, both also areas of intensive international study. Most notably, showing that the Cauchy-Mirimanoff polynomials are irreducible is still an unsolved problem that has been studied by mathematicians for over a hundred years.
Moreover, finding the roots of a polynomial relates to deeply intriguing ideas of symmetry in geometry, cyclotomic arithmetic and the theory behind the famous Fermat equation. Hence the project may achieve an improved understanding of these crucial concepts and their interrelationship in algebraic number theory. It might even result in a proof of or a new approach to the irreducibility of the Cauchy-Mirimanoff polynomials.

Investigation of tumour-associated stroma infiltrating lymphocytes in oral and oropharyngeal cancers according to International Immuno-Oncology Biomarker Working Group

Elaine Marti, *University of Sheffield*

Tumour-infiltrating lymphocytes (TILs) in histopathologic specimens represent the immune infiltrate in tumours, and the assessment of TILs has been suggested to be a predictive biomarker to identify patients that are likely to respond to immunotherapeutic agents in several solid tumours. In this project, I aim to assess TILs in haematoxylin and eosin (HE) stained specimens of head and neck cancer using a light microscope with initial pilot and calibration period to explore the prognostic value of TILs. High ratio of TIL presence in the tumour stroma indicates that anti-tumour immune activity is strong and therefore may contribute to favourable survival rates(Huang et al., 2019). The international immuno-oncology biomarker working group (Working group) has published a method for standardised quantification of TILs in HE stained specimens in breast cancer. This method of overall TIL quantification has demonstrated to be reliable in determining prognostic value in breast cancer, which is also transferrable to head and neck cancer. Considering the routine implementation immunotherapy in practice, the clinical demand for reliable yet accessible immunooncology biomarkers has been clear. TILs in histopathologic specimens represent the immune infiltrate in tumours, and the assessment of TILs has been suggested to be a predictive biomarker to to identify patients that are likely to respond to immunotherapeutic agents. In this project, I aim to assess TILs in HE stained specimens of HNSCC using a light microscope with initial pilot and calibration period to explore the prognostic value of TILs. To conduct a reliable assessment of TILs in HNSCC, the method to be used in this study will follow the published practical guide for pathologists by the Working group with recommendations for cancer locations in the head and neck.

26B Global Challenges and Governance

Did the COVID-19 pandemic have a positive impact on job quality in the UK

Amir Ayazbayev, *University of Warwick*

Genetic control is essential today as it improves control of the products we get from organisms. Whether it's increased production of penicillin in industry or decreased production of harmful proteins in medicine. Currently, the most popular genetic control method is transcriptional modulators which stop or allow the production of mRNA from DNA. However, they feature problems such as possible effects on non-target genes and possible physiological disruptions in the cell. Therefore, other methods of gene control should be studied, something that can control the genes like a switch. Aptamers are single-stranded DNA/RNA sequences that fold into structures to bind to a specific molecule. By forming a loop, aptamer permits a specific drug to bind to it. The drug binding to aptamer on mRNA disrupts protein production. To determine how beneficial this system is, this project aims to analyse the aptamer by quantifying the speed of the effect and responsiveness to the drug input. For aptamers to show inhibitory function, it is reliant on the drug. Therefore, we expect the inhibition to be drug concentration-dependent, providing improved control of gene expression. The results would provide quantitative data for comparison against transcriptional modulators and provide system characteristics for future implementation. The aptamer system provides a new tool for synthetic biology, allowing to control the gene expression via engineering the aptamer. This system can be widely utilised as a bioswitch for tighter product control in the pharmaceutical industry or as a biosensor for specific molecules, working as a diagnostic tool for bacterial toxins or viral presence.

The Roadmap to Stability: Uniting Business and Governance in the Third World

Liam Velani, *University of Warwick*

Attention to Third World governance, and identifying the causes of political and economic insecurity, is crucial to promoting solutions and ensuring wider stability. The current direction of study suggests that pre-existing political practices, institutions, and nationalistic sentiment, play an extensive role in this instability. Yet, there has been limited focus on linking these areas of insecurity, with the lack of effective governance, and whether this could be reduced through business management initiatives. This investigation, focusing on Sri Lanka in particular, concentrates on the overlaps between these business and political frameworks. Given contemporary instances of instability in this country, this research is a valuable step in coherently analysing current practices, whilst also formulating mechanisms that could be instituted in the future. Data and analysis have been collated from domestic and international literature, involving journal and media articles, and ensuring up-to date commentary on recent events in the country. Utilising valuable commentary such as that by President Ranil Wickremesinghe, as a benchmark for the vision of the country’s leadership, I argue that this is valuably aligned with key business-management practices. With limited prior research attention, this project offers useful insight into further areas to explore, as well as practical foundational support that can be provided to relative government actors and societal stakeholders. In the future, this line of enquiry would be beneficial for other localities, both in the Third World but also increasing within Developed Nations.

26B Global Challenges and Governance

To what extent does Carl von Clausewitz's 'On War' accurately explain the factors amounting to the 2014 Russian annexation of Crimea, and the subsequent conflict between Ukraine and Russia?

Benjamin Galbraith, *University of Warwick*

For centuries, conflict theorists have sought to understand the causes of war, with none having as much of an impact as General Carl von Clausewitz, a figure whose work in Vom Kriege (On War) continues to influence the academic field of international security. Localising his two-hundred-year-old text within the context of the 2014 annexation of Crimea by the Russian Federation will facilitate the evaluation of whether his theories of conflict continue to hold true to this day. Such a case study-based methodology will allow us to interpret Clausewitz's writings within the current technologically driven socio-political climate of Europe, while remaining sensitive to the military developments within Ukraine that are taking place at the time of writing. This approach will, in turn, primarily rely upon theoretical interpretations of Vom Kriege, and primary and secondary source analyses of the conflict itself, thus allowing us to suggest that Clausewitz's ideals remain pertinent to the current security environment. From this research, one will be able to evaluate whether a pre-eminent theorist remains relevant to academia, while inspiring ourselves from how his ideas interweave with an emblematic modern conflict so as to put forward suggestions as to how we can ensure the perpetuation of peace. It will thus be demonstrated how it is of great importance that both scholars and policy institutes pay more attention to how hallmark theories of conflict can be situated within contemporary case studies so as to draw out the pre-eminent factors that may come to prevent future conflicts.

The Gun Control Paradox in the States: Evidence from National Polls - Presentation Abstract

William Rose, *Baruch College - City University of New York*

The regulation of firearms is an incredibly poignant issue in the politics of the U.S. One particularly concerning phenomena of firearms regulation in the U.S. is that support for strengthening gun laws is high, yet gun laws remain incredibly relaxed. This phenomena, known as the gun control paradox, has been heavily researched at the national level, but has not seen nearly any research at the level of individual U.S. states. To provide insight into whether a gun control paradox exists in the states, my study used the disaggregation of existing national polling on gun control support from the past decades to estimate levels of gun control support in a selection of six U.S. states. These state support estimates were compared to legislation of each state to calculate how likely their government was to pass a gun control policy that enjoyed support from a majority of its citizens. This calculation provided insight into what is known as government responsiveness and congruence. My research found that a majority of the states selected showed low correlation between support and the passing of gun control policies. This suggests that state governments show low congruence and responsiveness to gun control, and the phenomena known as the gun control paradox likely exists for many individual state governments. These preliminary results from my research suggest more detailed insight should be made into the gun control paradox at a state level, likely requiring the use of more advanced methodologies and research into all fifty states.

26C Drugs

A study into the effects of different models of legalisation and decriminalisation

Jack Parkinson, *University of Warwick*

Each year, hundreds of thousands are arrested on marijuana related charges, and billions spent on policing, yet despite this, prohibition has failed to dissuade drug use. A rich literature exists up to date detailing such harms in detail, while offering both decriminalisation and full/open legalisation as alternatives to combat them. Since 2013, more and more states have begun to loosen restrictions on the consumption of cannabis, and while this shift should be welcomed, many of the approaches taken to looser restrictions have failed to address many of the worst problems generated by prohibition, such as addiction and illicit markets, while creating new ones, such as increased consumption and expanded public health and safety risks. Building on existing literature, utilising new studies and data, as well as factors usually outside the scope of study (such as traffic safety), a comprehensive outline of the impacts of different models of legalised and decriminalised drug markets can be drawn. It will show that many models of decriminalisation and legalisation promoted by academics and activists do not effectively combat the many social ills created by prohibition in some cases actually increase drug use, abuse and harms. The report shows that commodified and open legalised markets, incentivise increased consumption, fails to absorb current illicit markets and ignores potential health dangers. Instead, the findings show that only models of legalisation that emphasise non-profit Cannabis social clubs can offer a responsible alternative to tackle prohibition, prioritise harm reduction and regulate the market effectively, while not incentivising increased consumption or forcing gangs and dealers into other forms of organised crime.

Method Improvement for Multi-Drug Screening by Altering Standing/Mixing Time of the Blood Samples

Angela Kim, *University of British Columbia*

Multi-drug screening is used in Forensic and Clinical Laboratories for its efficiency, quick and reproducible extraction. The blood drug panel used at the Provincial Toxicology Centre (PTC) qualitatively and quantitatively analyses 177 drug analytes. Quality control (QC) samples are used to monitor the performance of the method. Over time, variability of the analyte recovery in QC samples was noted which presented as a deviation from the target concentration. This suggested that the method required improvements to provide clients with more reliable, accurate results. Potential causes for this variability include insufficient standing or mixing time of either the drug analytes or the internal standards (IS), to disperse thoroughly into the blood matrix. In this study, the standing/mixing time of the analyte and IS was optimized in the blood matrix, prior to extraction. The following standing/mixing time points were tested: 0, 15, 30 min for the analyte, and 10 sec and 10 min for IS. I observed that a longer mixing time improved the percent recovery of 65 analytes out of 70 by 10%, but not significantly for IS. Higher percent recovery results yield reduced variability of the percent recovery (from 4~13% to 0~7%), improving the accuracy and precision of the results. This optimization will be applied to the blood drug screen done at PTC to improve confidence in the test results. In addition, the concept of increasing mixing time to enhance analyte-matrix interaction can be used to reassess additional analytical methods where analyte and IS recoveries show variability.

26C Drugs

'Enrique Camarena: Was there an accurate historical portrayal of the DEA's in Mexican and Western media'

Jolaade George, *University of Warwick*

Looking to the relationship of Modern Mexican History and the involvement of US governmental agencies specifically to that of Narcoculture, I could see an absence of literature looking at the media representation of the Drug Enforcement Agency (DEA) and its respective roles in states within Latin America and even in the world geopolitics in comparison to great amounts of dramatized historical media published into the world. Using the case of Enrique "Kiki" Camarena Salazar popularised by the TV anthology series, Narcos: Mexico (2018), my project aims to produce a documentary looking at the accuracy of how the DEA has been represented in different forms of media. The story of the torture and murder of Enrique Camarena by the Guadalajara cartel is often told through the lens reflecting the interests of Guadalajara cartel. I aim to use this case as a way of exploring the DEA representations in Latin America media. I will analyse Western pop culture mediums looking at the Camarena case and its consequences on the DEA's portrayal. I will also analyse Mexican media using relevant newspapers and government documents, primary sources found in Mexico City national libraries and secondary historical literature. For example, Douglas Valentine and his analysis of DEA personalities and the impact of the Enrique Camarena case. The project's intended findings also takes a unique perspective by focusing on the accuracy of how the DEA has been represented in different forms of media. This project would expand on historical scholarship about the perspectives of the origins of the 'drug war' and on historical accuracy in pop culture mediums, using media itself.

A Clinical Framework for Assessing Cannabis-Related Impairment Risk

Carly Pistawka, *University of British Columbia*

Clinicians play an important role in promoting safe and responsible medical cannabis use. One essential component to safe use is considering a patient's risk of neurocognitive impairment. However, there remains a lack of practical guidance on how clinicians can evaluate this risk for medical cannabis patients. With the inability to do blood tests, and a plethora of factors to consider, current impairment guidance is extremely variable. Here, a practical framework is presented for clinicians to assess and stratify cannabis-associated impairment risk. This framework is intended to guide healthcare providers through a comprehensive review of a patient's impairment-related factors, and can be used to assess impairment risk for patients using or considering medical cannabis. The authors developed this piece using expert clinical opinion, common questions in medical education sessions, and available literature. Healthcare providers managing patient's medical cannabis or those conducting assessments to determine risk of impairment for safety-sensitive workplaces can utilize this framework to stratify patients' risk of impairment. Such assessments can inform patient-specific needs for support, education, and guidance, to ensure cannabis is used safely and responsibly. Increasing knowledge of cannabis-related impairment factors can further improve informed occupational policies, reduce stigma, and promote safer use of cannabis inside and outside of the workplace. Although the framework discussed is commonly used in-clinic by authors, it has not been formally evaluated. Despite this, the current lack of available guidance on the topic gives merit to share available guidance while more standardized processes are developed. Future directions in this work should look at the reliability and validity of this framework.

Poster Session A

Differences in Cognitive Flexibility Impairments in Obsessive-Compulsive Symptom Subtypes

Sashka Samarawickrama, *Monash University Australia*

Obsessive-compulsive disorder (OCD) is characterised by intrusive thoughts that cause anxiety (obsessions), and repetitive actions performed to decrease anxiety (compulsions). Obsessive-compulsive symptom manifestations are heterogeneous, with symptoms differing greatly between individuals. Six symptom subtypes are generally accepted: checking, ordering, obsessing, hoarding, washing, and neutralising. It is suggested that impairments in cognitive flexibility may drive obsessive-compulsive symptoms. However, there is a lack of literature determining whether cognitive flexibility impairments are different for each obsessive-compulsive symptom subtype. Given the phenotypically distinct symptom presentations of OCD, cognitive flexibility may differ between subtypes. This study therefore investigated associations between performance on tasks of cognitive flexibility and symptom levels for each obsessive-compulsive subtype. It was hypothesised that poorer cognitive flexibility would be significantly associated with greater obsessive-compulsive symptoms for each subtype. 708 participants completed neurocognitive tasks assessing two components of cognitive flexibility (task switching as measured by the Category Switch Task, and reversal learning as measured by the Value-Modulated Attentional Capture Reversal), and the Obsessive-Compulsive Inventory Revised, assessing obsessive-compulsive symptoms levels for each subtype. In partial support of our hypothesis, impaired cognitive flexibility was associated with greater obsessive-compulsive symptoms for checking, obsessing, and neutralising subtypes. Contrary to our hypothesis, cognitive flexibility was not impaired in ordering, hoarding and washing subtypes. The present findings provide support for future neurocognitive research to assess impairments in obsessive-compulsive symptom subtypes, rather than treating OCD as a unitary disorder. Moreover, our findings have clinical implications for personalised treatment. For example, interventions that aim to improve cognitive flexibility in individuals with OCD may be better suited to checking, obsessing and neutralising subtypes.

Evaluating the Feasibility of Psychoeducation in improving socio-emotional wellbeing of children with ADHD

Bryan Koh, *Nanyang Technological University*

Existing evidence on parenting for children diagnosed with ADHD supports it as a major influence in child development, suggesting a parent-focused approach may be beneficial in strengthening support for children with ADHD. Currently, there are limited resources available providing ADHD-related information for parents. Therefore, the implementation of a novel psychoeducational video may serve as a widely accessible and easily understandable resource for parents. The feasibility of a new online psychoeducational ADHD-video created for this study is evaluated. It is hypothesised that participants' understanding of ADHD and related interventions will increase after watching the video, and that participants will perceive the video as acceptable for both parents and themselves. This preregistered study recruited 30 participants who have interacted with ADHD children in professional or personal settings. Participants watched the video and subsequently rated its feasibility. Data was analysed using paired-samples t-tests and one-sample t-tests to determine any significant influence of the video. For both interventions, there were significantly higher post-video mean ratings of understanding compared to their pre-video mean ratings of understanding. Participants perceived the video to be significantly acceptable for both parents and themselves. Overall, findings suggest that a psychoeducation video is highly feasible in improving understanding of ADHD and is well-received. Psychoeducation media can help to strengthen parents' understanding of ADHD, equipping them with the knowledge to improve the support they can provide for their children. The evidence from this study could establish psychoeducation media as a viable platform to educate the public on special needs in the future.

How does dance contribute to cross-cultural communication in China

Jingyi Yu, *Monash University Australia*

In China, due to cultural diversity, promoting cultural integration can be a very long process. As a country composed of fifty-six ethnic groups, each ethnic group has created beautiful myths, legends, epics, music, dance, painting, and architecture with national characteristics that express their own culture. These cultural and artistic heritages are an important part of Chinese culture and a significant achievement of human civilization. This paper analyzes the influence of Chinese art exams—the exam for entering a dance school on cultural dissemination, by studying the system of Chinese dance art exams and the reasons for formulating the content of the exam. Since 1988, the Chinese Education Bureau has drawn up the system of art exams, which stipulates that each candidate needs to choose a minority dance to be assessed as a repertoire. For the education of the younger generation of Chinese people, it is not only learning to dance, but also a good way to learn about different national cultures. In addition to the dance art exam, there are many ways to spread national culture, such as hip-hop music made in minority languages, which has become very popular in recent years. These various novel ways inspire Chinese young people to be more interested in minority cultures. This research can provide people all over the world with a lot of knowledge about the origin and development of Chinese culture. At the same time, this research can encourage and inspire many people to wonder how the traditional art of their own country originated and developed. When people learn to appreciate the history and culture of their country, they will know more about who they are.

How does self-efficacy affect students' choice of study strategies and academic achievement in Singapore?

Faith Tan, *Nanyang Technological University*

Self-regulated learning involves self-monitoring and self-reflecting on progress towards academic goals. There is consistent evidence that several aspects of self-regulated learning are closely associated with academic achievement. Higher levels of self-efficacy – the belief in one's abilities – were strongly correlated with better academic results. Additionally, the use of effective metacognitive strategies such as planning and regulating as well as cognitive strategies such as rehearsal and organisation was found to garner better academic performance. Nonetheless, little is known about how individual differences in self-efficacy affect the use of metacognitive and cognitive strategies simultaneously. Furthermore, the importance of self-efficacy in an Asian context where students are exposed to different teaching methods and possess strong fears of failure is yet to be explored deeply. To investigate the generalisability of the abovementioned findings, 43 Singapore undergraduates were asked about their self-efficacy, study strategies and grade point average (GPA) in an online survey. Findings indicate that while self-efficacy influenced metacognitive and cognitive strategy selection, it had no direct relationship with GPA. Choice of study strategies was also found to have no relationship with GPA. Hence, it appears that while self-efficacy significantly determines the study strategies chosen by Singapore undergraduates, employing either metacognitive or cognitive study strategies may not always produce better results. Furthermore, it seems that Singapore students' self-efficacy has little influence over academic performance. These findings have implications for refining pedagogy by aiding in the incorporation of more explicit instruction on selecting and using well-validated self-regulated study strategies. Lastly, this research opens avenues for uncovering potential factors beyond self-efficacy that may be specific to the Singapore learning environment.

Investigating on how plastic degrading bacteria can solve the marine plastic pollution

Bhagya Indeewari Abeygunasekara, Yuvin Methsuka Amaradasa, *Monash University Malaysia*

Plastic accounts about 80% of all marine garbage discovered from surface waters to deep-sea sediments, and annually 14 million tons of plastics ends up in the ocean. Plastic waste is ingested or entangled by marine creatures, causing serious injury and death to organisms. Currently, numerous studies suggest the usage of microbes such as bacteria for plastic degradation as an effective solution. This literature review aims, to investigate on how plastic degrading bacteria can be used to degrade marine plastic. This will examine on the academic literature about plastic degrading bacteria and plastic pollution. Especially, this will mainly focus on how plastic has affected marine environment and the efficiency of using plastic eating bacteria to solve the marine plastic pollution issue. Thereby, the findings of these studies will be used for the analysis about bacterial usage to degrade marine plastics. Moreover, plastic pollution threatens food safety and quality, human health, coastal tourism, and contributes to climate change. Venkatesh (2021) shows microbes receive nutrients from the plastics whereas plastic debris provides them with energy and carbon. Plastic degradation is a vital aspect of the natural ecosystem's resources recycling which can used to solve the plastic pollution issue. Further studies are required on how biotechnology tools can improve the efficiency of plastic eating bacteria with applications in genomics, proteomics, metabolomics and synthetic microbial community. Additionally, gene edited tools as CRISPR, ZFN and TALEN could be utilized to incorporate into bacterial genome with function specific gene to degrade plastic efficiently.

Sensing Deepfakes: Examining Credibility Evaluations and Sharing Intentions of Different Forms of Deepfakes

Hui Wen Chua, *Nanyang Technological University*

In the digital age, where the virtual landscape is populated with misinformation, staying vigilant and straying away from fakes is challenging for our senses. This study is one of the first to investigate how sensory modalities (perceptions via one or more of our senses) influence individuals' tendencies to believe and share different forms of deepfakes, an audio-visual (AV) manipulation through artificial intelligence (AI) to mimic humans. To test the impact of single versus multimodality on an individual's perceived claim accuracy and sharing tendencies, participants in an online survey experiment (N = 306) conducted in the US were randomly assigned to one of three disinformation conditions: video deepfakes, audio deepfakes, or cheap fakes (deepfakes made using cheap software resulting in dissonant AV elements). Additionally, we investigated how cognitive ability affects perceived claim accuracy and sharing intentions across conditions. The results suggest that individuals are likelier to perceive political video deepfakes as more accurate than cheap fakes, but not audio deepfakes. Yet, individuals are more likely to share political video deepfakes than cheap fakes and audio deepfakes. We also found that high cognitive individuals are less likely to perceive deepfakes as accurate or share them. Lastly, those with high political interest were likelier to perceive the disinformation as accurate. Overall, the findings emphasize that deepfakes are not monolithic, and associated modalities should be considered when studying user engagement with political deepfakes. Practical implications suggest policymakers and companies strategically reduce misinformation's impacts, while broader theoretical implications are also discussed.

Staff Perspectives on Addressing Suicidality in Huntington's Disease Patients: A Qualitative Study

Sravya Chintalapudi, Nicole Masango *Monash University Australia*

Huntington's Disease (HD) is an inherited progressive neurodegenerative disease involving motor, cognitive and affective dysfunction. Suicide is the leading cause of death in HD. Clinicians are integral to assessing and responding to this with preventative measures. However, little is known about their current preparedness and confidence, their training needs and the unique nature of suicidality in HD. To date only one study can be found by Scerri and Cassar (2013). The present qualitative study included purposive sampling to recruit approximately 5 participants, all clinicians that have come across a patient with HD at risk for suicide at least once within their role. Semi-structured interviews up to 60-minutes long were conducted, recorded and transcribed via Zoom. They were then evaluated via reflexive thematic analysis, currently the most popular method for identifying themes and evaluating qualitative data. Understanding how clinicians address suicidality in HD can bolster the quality of existing suicide interventions for HD. In this way, staff will be better equipped to deliver quality care which can mitigate the elevated risk for suicide in HD. Suicide interventions better tailored for HD can also improve quality of life for patients. The interviews provide a wealth of knowledge about the strengths and pitfalls of existing suicide interventions for HD. From these findings, future studies can capitalize on the strengths of the protocols and attempt to rectify any weaknesses to develop new methods that better prepare staff to address suicidality in patients with HD.

Poster Session B

The historical and political insurgence behind Barbados's Republicanism

Jorja Oladiran, *University of Warwick*

In late 2021, the former colony, Barbados announced that they would now be a republic state; severing ties with the mother country. In the form of a short documentary, I will be conducting interviews and visiting historical sites, to explore the political and historical discourses that went into the decision to make Barbados a Republic. It is important to address questions such as why the country wanted to become a republic? And what 'political freedom' might the republic actually bring in comparison to before? etc. I want the audience to have a greater understanding of the sentiments felt by local Bajan's and the Bajan diaspora as a whole because although this decision was widely accepted by Bajans, it was a decision made without a referendum. The lack of open information and the ambiguity of what a Republic will actually bring has left many critics calling this decision merely symbolic – I will explore and challenge how true this opinion is. The country has been an independent nation for nearly 50 years, yet limited change has been seen in the political structure and relationship that the former colony has with Britain. Through the open nature of my interviews, the documentary will hopefully provide some transparency and voice what is being expressed on the ground level of the country. My research will expand on this 'symbolic' debate – addressing whether the republic is simply a way of Barbados cleansing itself from its colonial past or an actual law which seeks to reform the organisation of the country. This research will be contextualised within the wider debate of neo-colonialism and decolonisation. Emphasising on the significance of the wider Caribbean region and its historically interdependent linkages with its former colonials.

Modelling and characterising flatness in human feet

Marcus Tranter, *University of Warwick*

The human foot is an organ with a complex structure serving the function of standing and controlling movement. For healthy feet, the load of body weight can be withstood without the arch in the foot significantly changing shape. This contrasts people with flat feet, where this change is more noticeable. The project sought to construct simple models of the foot, with rigid bones forming the skeleton held together and connected by elastic ligament tissue modelled by a combination of springs. From the various models, equations were obtained that connected the geometry of the individual bones to the quantities describing the connective ligament tissue, allowing for a physical classification of feet into healthy and flat. This modelling of the human foot and the characterisation of flatness may improve the clinical treatment of flat foot disorders and aid the design of robotic feet, in addition to possessing applications in the fields of biomechanics and palaeontology, thus motivating its study in this project.

The effect of reproductive health and oestrogen on cognition in female university students

Francesca Runnacles, *University of Warwick*

Oestrogen is a female sex hormone which has been found to influence cognition. Oestrogen levels fluctuate over the menstrual cycle, and oestrogen is used in hormonal contraception (HC) to prevent ovulation. Whether oestrogen's cognitive influence has implications for the menstrual cycle and contraception is not well researched. Additionally, little is known about the effect symptoms of gynaecological and menstrual disorders may have on cognition. This study recruited 179 female university students to complete 5 cognitive tasks as well as a survey of their gynaecological health. Women taking HC were found to have significantly higher average scores of cognition compared to women not taking HC. This effect was seen for all HC types, oestrogen containing or not. Women with endometriosis showed significantly lower average scores of cognition than women without endometriosis. This impairment was controlled for with HC use. Finally, HC use mediated reduced verbal cognition scores in women with PCOS. These results indicate HC as playing a role in cognition, and gynaecological disorders, particularly endometriosis, as impairing cognition. These findings provide more information on a research area in its infancy, and a springboard for further research. If these findings are replicable they may have applications on the use of HC, as well as on the diagnosis and treatment of endometriosis. Future research should aim to employ more rigorous methods of testing, such as analysing blood hormone concentrations, to provide a more detailed picture of this research area.

Modelling Bird Flock Dynamics Using the Statistical Treatment of Thermodynamics

Jarryd Parker, Nikki Hobman, *Monash University Australia*

Understanding entropy has revolutionised our understanding of physical systems and can be an important tool for understanding non-mechanical systems. Entropy is often referred to as a measure of a system's randomness. Mathematically, maximising entropy guarantees that the prediction of a system's state is the least-biased prediction given the available data. By applying Maximum Entropy Methods, statistical mechanics can be used to model the dynamics of systems in steady state equilibrium with unknown forces. A system in steady state equilibrium is one that is free of external forces and the state averages such as the average velocity of the system's particles are static. This modelling method has already been used to model species migration which can be an important tool for conservation [1], this allows for extrapolations to be made when determining the viability of habitats under different climate change models. For this project, bird flocking dynamics will be simulated using an algorithm, where the interaction strength and interaction range between the birds were obtained by finding the average correlations between the birds. A Maximum entropy model was applied to predict future flocking dynamics. This research has been previously conducted by Bialek et al. (2012), and the model determined that the interaction range between birds was independent of flock size and density. Maximum Entropy Models require systems to be in steady state equilibrium limiting the nature of problems we can solve. We recommend understanding methods which can solve problems in non steady state equilibrium allowing a wider range of systems to be modelled.

Mitochondrial mediated plasticity: do mitochondrial haplotype and temperature interact to shape body mass in Drosophila melanogaster?

Katherine Robertson, *Monash University Australia*

Plasticity is one mechanism through which species can adapt to rapid environmental change. A ubiquitous process, plasticity is the ability of a single genotype to produce multiple phenotypes in response to a transforming environment. However, despite its prevalence, much remains unknown about the underlying processes responsible for plasticity. In particular, the role of the mitochondrial genome requires further investigation. Thus, this study aimed to assess whether mitochondrial genome and temperature interact to shape body mass plasticity. Using a fully factorial design, eight strains of fruit fly (Drosophila melanogaster) were devised to test the hypothesis: four independently replicated strains, each with a different combination of mitochondrial and nuclear genome. Strains were divided and exposed to two temperatures, 16°C or 25°C. After six days, flies were individually weighed. A linear mixed-effect model was used to test the effect of mitochondrial genome, nuclear genome, temperature, and sex, on body mass. Other than sex, no significant effects or interactions were found. Results indicated that the mitochondrial genome does not play a key role in shaping body mass plasticity. This observation contradicts the findings of several previous papers and suggests that laboratory-based studies may not be accurate reflections of the plasticity that occurs in nature. Future research will need to reconcile these differences. If laboratory-based studies are erroneous representations of a species' ability to adapt to environmental change, this will have critical ramifications for a variety of research areas and beyond, from ecology and evolutionary biology to species distrbution modelling and climate change policy.

Social-Ecological Systems Analysis of REDD+ vs Palm Oil in Indonesia: Which Yields the Most Benefits for Social Sustainability?

Khadija Nur Latifa, *University of Warwick*

Recently, Indonesia has updated its carbon pricing and market laws signifying its readiness to harvest the economic and environmental gains from selling carbon credits—as it potentially supplies 75-80% of the global carbon market by sequestration (Junida and Difa, 2019). Similar carbon credits initiatives such as reducing emissions from deforestation and forest degradation (REDD+) projects have been initiated in the country since 2010. Existing literature often concludes that the environmental benefits of preserving the forests are clear or suggest that REDD+ would not be able to outcompete oil palm financially. However, there is still no clear outlook on REDD+ social benefits against the palm oil industry that supports the lives of 7.8 million Indonesian workers, yet primarily relies on forest conversion (Purnomo et al., 2020). The study explores the overall social impact of REDD+ projects compared to palm oil plantations in Kalimantan, Indonesia. Mainly utilising the social-ecological systems (SES) framework to identify the relevant social and ecological variables to be analysed. Data collected are a variety of secondary quantitative and qualitative from the REDD+ projects' and palm oil corporations' annual monitoring reports. This study's findings showcase no significant differences in the type of social benefits that REDD+ and oil palm offered. While the magnitude of the impacts given by palm oil corporations is more significant than REDD+, many are exclusive to their employees. Substantially, REDD+ projects focus on developing independent sustainable livelihood opportunities for the community without jeopardising the environment. Thus, this investigation informs a nuanced understanding for the government of Indonesia to strengthen its carbon payment schemes to reap the best possible societal outcomes.

Beheading the Hydra: Hydra games and Unprovability

Luke Dowling, *University of Warwick*

Peano arithmetic (PA) is a system of axioms and definitions commonly used to formally describe natural numbers and numerical operations. However, Godel's incompleteness theorems affirm the existence of true statements concerning the natural numbers, that are unprovable in PA. For instance, in each turn of a hydra game, the player beheads one of the heads of a hydra tree, before the tree grows new heads under a specific set of rules. The goal is to eventually remove all heads. Kirby and Paris (1982) show that any strategy employed to win is successful, yet the statement "every strategy is successful" is unprovable in PA. The goal of this project is to elucidate on Kirby and Paris' claim that "every strategy is successful" is unprovable in PA, through comparison with another true statement unprovable in PA. Namely, for any starting natural number, the corresponding Goodstein sequence eventually terminates to zero. Hence, we will devise an explicit strategy to win, alongside a sequence to map natural numbers to hydra trees, to show that on any of these trees, the number of steps needed to win via the strategy, exceeds the number of steps needed for the corresponding Goodstein sequence to terminate. Subsequently, we will elaborate on Towsner's (2020) reasoning that Goodstein's theorem is unprovable in PA due to step size for each input, to similarly illustrate that demonstrating the success of the given strategy above for the identified family of hydra trees, additionally cannot be proven in PA. This project is intended to simplify the reasoning used to demonstrate a complicated result in the existing literature.

Unravelling the dynamics of E. coli phages

Kavirang Biswas, *University of Warwick*

The problem of antimicrobial resistance is very severe worldwide and according to the first paper published by the Review on Antimicrobial Resistance, drug-resistant infections are expected to kill an extra 10 million people across the world every year by 2050 if they are not tackled. The expected cost in lost output is around $100 trillion, an amount higher than the size of the current world economy. It is therefore of high importance to identify different ways to solve the problem of antimicrobial resistance. One potential solution is the use of bacteriophages, viruses that specifically target their host bacteria and thus can be used as antibacterials. We focused on phages that target Escherichia coli and we will try to unravel the dynamics between phage and host. Using different Escherichia coli strains and their corresponding phages, at different concentrations and time to optimize the conditions in which phages have their best killing efficiency towards Escherichia coli strains. These phages can then be utilised as alternative antibacterials that hinder the rise of resistant strains. This has applications in hospital, care home, and other healthcare settings where the common treatment of wide ranging antimicrobrial drugs can be replaced with phages that achieve the same outcome, at a fraction of the risk of promoting resistant strains.

Cervical cancer primary prevention knowledge and practices of women visiting Tygerberg Hospital, South Africa.

Elana Marais, *Stellenbosch University*

The aim of this research was to determine what adult women visiting Tygerberg Hospital, know about the Human Papilloma Virus(HPV) and HPV vaccination in relation to the primary prevention of cervical cancer in South Africa(SA). HPV vaccination acceptance and practices were also investigated. This research aimed to identify existing knowledge gaps and thus assess the need of the implementation of education programmes in parallel with HPV vaccination programmes to improve vaccination practices. This was a descriptive study that followed a cross-sectional quantitative study design. Data was gathered by distributing a previously-validated, self-administered, paper-based questionnaire among adult women at the obstetrics and gynaecology outpatient areas of Tygerberg Hospital. The average score for the knowledge questions were 63.4%±16.8%, which was low when compared with a similar study. With regards to practices, a high number of participants were willing to receive the vaccine and allow their daughters to receive the vaccine. This study highlighted the study population's knowledge gaps on the basics of HPV and HPV vaccination. It is essential to address these knowledge gaps in order to increase understanding and decrease uncertainty, which will result in HPV vaccine uptake and thus decrease cervical cancer morbidity and mortality in the future. Cervical cancer contributes to 10.3% of cancer deaths in SA. More studies on cervical cancer prevention should be done in countries like SA where cervical cancer is one of the leading causes of death. Similar studies should enquire about the women's sources of information to enable the effective implementation of education programmes.

The effects of obesogenic diets and a green Rooibos extract on skeletal muscle weight and extra-muscular fat appearance of male Wistar rats.

Siyanda Vilakazi, *University of Warwick*

Diet-related disorders place an enormous burden on global healthcare system due to their association with increased mortality rates. This is linked to availability and overconsumption of high-energy diets with detrimental consequences, including functional limitations in skeletal muscle. Due to its high polyphenol content, various health benefits are associated with consumption of Rooibos. This study aimed to investigate the effects of high-sugar and high-fat diets, as well as a green Rooibos extract, on the muscle somatic index and extra-muscular fat appearance. Six-weeks-old male Wistar rats (n=60) were randomly assigned to one of three diet groups: control (rat chow:C), high-sugar/medium fat (HS) and high-fat/high-cholesterol(HF), for 17-weeks. From week 11-17, half of rats in each group received a green Rooibos extract daily (60mg/kg body weight). After 17 weeks, rats were euthanized, and rectus femoris was harvested. Body and muscle weights were obtained. Extra-muscular fat tissue was scored by visual inspection using a colorimetric scale. Diet had no overall effect on muscle somatic index ($p=0.19$), but Rooibos had a significant effect on this index ($p=0.012$) and was significantly reduced in control-rooibos group compared to the control ($p<0.05$). In contrast, colour scoring revealed diet to have dramatic impact on colour of fat tissue ($p<0.0001$), which may be indicative of changes in mitochondrial content. However, Rooibos had no significant overall effects on fat tissue colour ($p=0.36$) but showed interaction with diet conditions ($p=0.03$). Thus, under specific dietary conditions, green rooibos supplementation may reduce muscle somatic index and modulate effects of obesogenic diets on extra-muscular fat. Future studies will evaluate morphology and glycogen content of muscle tissue to further investigate these changes.

The Impact of Economic Sanctions on Russia's Economy and Warfare

Katarzyna Petru, *University of Warwick*

This research aims to examine the impact of economic sanctions imposed on Russia in response to its invasion of Ukraine on Russia's economy and its ability to continue warfare. It aims to assess their effectiveness which may help to tackle similar problems in the future and prevent wars. Findings are based on Robert A. Pape's (1997) thesis that economic sanctions rarely work in achieving their political objectives. This applies in Russia's case as the sanctions have failed to thwart warfare, despite significantly influencing Russia's economy. I rely on International Monetary Fund's analyses and predictions, inflation data, and Richard N. Haas's report stating that economic sanctions are short-term, causing a global economic shock that takes its toll on the poorest and prove counterproductive. The expected effects will be noticeable only in the long-term scenario. The research primarily examines financial sanctions, such as the freezing of Russia's gold and foreign exchange reserves stored in the West ($ 630 billion), which have resulted in a high inflation rate and the fall of the rouble in value. Removing Russia from the SWIFT system has delayed payments to Russia for energy exports. Nevertheless, Russia's position as a prime energy exporter renders it less susceptible to the impact of the sanctions. My findings show that the long-term impact of the sanctions on Russia's economy can be severe but will not hinder warfare in the coming months. Therefore, rethinking the usefulness of the economic sanctions may show that the search for more productive reactions to hinder warfare and punish aggressive countries is necessary to bring more peace to the world.

Assessing the instrumental value of education in the empowerment of marginalised communities: The Case of the Roma in the Balkans

Ozge Yilmaz, *University of Warwick*

Education is seen as an effective empowerment tool due to its instrumental value in empowering individuals. However, whether education empowers marginalised communities remains a question. This research takes a case study approach and examines the Balkan Roma, which is one of the most marginalised communities in Europe. It aims to put the 'identity' that marginalises such communities at the centre of the analysis of their empowerment. For this purpose, key areas of improvement are identified and examined through the lens of 'Roma identity'. Secondary resources on the empowerment and education of the Balkan Roma are analysed. This study concludes that the role of education in empowering the Balkan Roma is somewhat limited. Similar patterns of discrimination and exclusion of the Roma in Balkan countries show that the empowerment of the Roma is likely to be a long-term process that cannot be completed with education solely. Given that the discrimination against the Roma persists in education, as well as other areas, education is not likely to be an effective tool for the empowerment of the Roma in the short run. These findings are significant for showing that discrimination against marginalised communities remains the most important obstacle to achieving equality between them and society. Given that the UN Agenda for Sustainable Development aims to reduce inequalities within and among countries (Sustainable Development Goal 10), these findings are important for any country that is home to marginalised communities. This study facilitates further research on the empowerment of marginalised communities since it makes a case for the conditions under which even education may not be sufficient.

Soft actuator based on modified graphene oxide nanoparticles

Mantas Drelingas, *University of Warwick*

Soft actuators are devices which can induce motion and are made of soft deformable materials. As opposed to conventional actuators, this type of actuator was inspired by physically adaptive, agile, reconfigurable, and multifunctional soft-bodied animals and human muscles. This work aims to combine hydrogels and state of the art nanomaterial graphene oxide (GO) to produce a soft temperature responsive actuator. Characteristic platelet shaped one atom thickness carbon sheets of GO are flexible and can be chemically modified via reactive unsaturated bonds or polar moieties. To achieve temperature responsiveness, a poly(ethylene glycol) based polymer was synthesised, which undergoes a hydrophilic to hydrophobic change at ~50 °C. Upon grafting (attaching) this polymer to GO via its reactive sites, the whole composite turns stimuli-responsive. Upon heating, polymer chains turn hydrophobic and greatly reduce their hydrodynamic volume, while flexible GO sheets harness this and crumple upon itself. This produces overall volume change which results in change of shape – actuation. To direct this motion in one direction, a sodium alginate based hydrogel with modified GO sheets was subjected to flow-directed assembly with the use of rheometer, leading to arrangement of sheet in a linear anisotropic configuration. This allows to create a unidirectional motion using hydrogel and insightfully designed and modified graphene oxide sheets. Such actuator could be used in soft robotics to recreate biological muscle structures and facilitate the development of robots with continuous and fluid human like movement abilities.

Poster Session C

The Development of a Web Application for Centralized Querying of Biobank Data

Stephanie Quon, *University of British Columbia*

Biobanks are large collections of biological data often used in research. A major challenge with the management and analysis of biobank data is the inconsistency of descriptors of the data, which makes combining datasets difficult. In this project, we demonstrate how semantic web technologies can be used to improve the process of querying and integrating biobank data. We developed Next-Generation Biobank Ontology, a web application that precisely defines the meaning of biobanking data terms and relations. This framework for shareable data helps define and categorize data for real-life biobanking use cases. The web application then allows users to import, query, and retrieve data efficiently. This project illustrates how data models and semantic web technologies can help expand the use of existing biobank datasets. Future research could explore applications of Next-Generation Biobank Ontology on larger and more diverse data sets.

Hello from the Other Side (of the Screen): COVID-19 and the Use of Telepractice in Speech Therapy Services in Singapore

Jamie Jian, *Nanyang Technological University*

Speech therapy has been a growing industry in Singapore in recent years (AHPC, 2020). The COVID-19 pandemic has, however, revolutionised many of such industries. Strict safety measures and restrictions forced many “non-essential” healthcare services, including speech therapy, to be brought online (via telepractice). However, little to no research has yet been done on the use of telepractice in speech therapy services in Singapore following the outbreak of COVID-19. 80 practicing STs and 31 students of speech therapy programmes, aged between 22-60 years (82 female) with experience using telepractice after the outbreak of COVID-19, completed an online survey of 25 questions exploring their use, experiences, attitudes and preferences on telepractice relative to face-to-face therapy. Data was collected primarily quantitatively, with some questions allowing further qualitative elaboration. Participants reported that despite the pandemic, face-to-face sessions were still more prevalent compared to telepractice. Where telepractice was delivered, Zoom, WhatsApp, and laptops were the most commonly used tools. Ease from travelling, clients’ increased accessibility to therapy, and increased caregiver involvement were the top benefits of telepractice cited by STs, while the most frequently encountered challenges included a lack of hands-on approach and issues with the use of online technology. Overall, participants had a largely positive experience with the use of telepractice, and planned to continue using telepractice, although most preferred a mixed mode of services delivery with more face-to-face therapy. This study provides a preliminary outline of the use of telepractice in relation to the ST landscape in Singapore, post-outbreak of the COVID-19 pandemic.

An Examination of the Prevalence of Depression and Anxiety in Patients with Cystic Fibrosis

Moha Chaturvedi, *University of British Columbia*

Data from the International Depression Epidemiological Study (Quittner, et al., 2014) shows that patients with Cystic Fibrosis (CF) and caregivers of children with CF are more likely to display elevated symptoms of depression and anxiety compared to the general population (Quittner, et al., 2014). This study was conducted as part of the Mental Health project undertaken by Cystic Fibrosis (CF) clinics in British Columbia (BC), Canada with the aim to assess the prevalence of depression and anxiety in CF patients in BC. This analysis examined the anxiety and depression assessment scores for both patients and caregivers, as well as, scores before and after appropriate interventions were provided using descriptive statistics and Wilcoxon analyses. This study also evaluated whether these CF Clinics meet the criteria for recommendations issued by the International Depression Epidemiological Study, the International Committee on Mental Health in Cystic Fibrosis (ICMHCF) to address mental health concerns in patients.The results of this study found elevated rates of moderate to high depression and anxiety scores in patients with CF. Additionally, mothers of children with CF were more likely to display symptoms of anxiety and depression compared to fathers. However, both the PHQ-9 and the GAD-7 scores declined after appropriate interventions. Finally, it was found that BCCH and SPH mental health interventions were markedly inadequate compared to the ICMHCF guideline. As such, this study will be impactful in demonstrating a need for funds to support the mental health project at these clinics. Further research is needed to look into the specific aspects of CF treatment programs that predict good long-term health outcomes in CF patients.

Engineering Coking Resistant Catalysts for CO2¬ Utilisation: Effects of Catalyst Composition

Jiang Rong Li, *Nanyang Technological University*

The fixation of carbon dioxide via dry reforming of methane (DRM) has garnered much attention in the past decade as potent greenhouse gases are converted to valuable raw materials. Currently, the most widely studied DRM catalysts based on precious metals show high activity but rapidly deactivate due to carbon deposition at high reaction temperatures. Transition metal carbide catalysts, such as MXene-based vanadium carbide (VC) catalysts, are promising alternatives owing to their high thermal stability, catalytic activity, and coke-resistant properties. To realise the industrial application of these catalysts, density functional theory calculations were used to study adsorption properties of oxygen on the 100–surface of the VC catalyst. An initial site stability check showed that the most stable adsorption site for oxygen is the hollow site with the lowest binding energy of –2.08154 eV. The total energies and optimised electronic structures of 38 surface configurations, from 1 to 13 oxygen adsorbates on the hollow site, were calculated. This revealed that attaching an additional oxygen at higher surface coverages was less favourable, explainable by repulsion between oxygen atoms on the catalyst surface. A phase diagram constructed based on grand potentials under different pressure conditions at a constant temperature also illustrated that the catalyst most stable under all pressure conditions had 10 oxygen adsorbates. Further analysis on the adsorption properties of oxygen, carbon and both species on the catalyst surface will help determine the specific pressure conditions needed to minimise catalyst deactivation via coke formation to make catalytic DRM a viable industrial process.

Cervical Traction: A Device to Alleviate Neck Pain

Kavishni Nanayakkara, *University of British Columbia*

Neck pain is a common symptom relating to an array of age-related degenerative conditions collectively termed Cervical Spondylosis. Out of numerous treatments, traction can be highlighted as a non-invasive physiotherapy method that can promote natural recovery. However, existing traction devices in the market are complex and often need the guidance of a medical professional. But our modern-day lifestyle has raised the need for a simple device that can be used independently, even by the elderly. Therefore, this research consists of the development and optimization of a traction device hypothesized to produce effective traction without any complex electro-mechanical or pneumatic components. The device was catered for the elderly and does not require professional medical guidance. Existing designs from previous research under this project were reviewed and retested based on their feedback, user comfort and feasibility. The final prototype was then optimized, 3D-printed, and its efficacy tested in a user trial. Here, a quantitative measure of traction efficacy was obtained by adapting techniques that measure changes in upper torso length. The optimal period of device usage was also tested where the users were randomly assigned to two trial types of different time periods (device usage for 15 minutes versus 30 minutes). While comparative results from these two groups were statistically insignificant, the improved design proved effective in producing traction overall. However, some negative feedback on device comfort indicates that further studies in increasing user comfort may be a potential line of enquiry to pursue under the development of this device.

Measurement of steroids in avian peripheral tissues by LC-MS/MS

Emma Lam, *University of British Columbia*

Aggression is a highly conserved social behaviour that is important for gaining access to limited resources, like food and mates. Male song sparrows (Melospiza melodia) are territorially aggressive year-round. In the breeding season, this behaviour is supported by gonadal steroid hormones, like testosterone (T). In the non-breeding season, blood T levels drop to non-detectable levels, yet males maintain territorial aggression. While there is some evidence for local steroid synthesis in the brain, peripheral tissues can also produce steroids and might also support non-breeding aggression. Here, we validated a method to quantify 12 steroids in liver, pectoral muscle, and testes using liquid chromatography tandem mass spectrometry (LC-MS/MS). We found that the percent recovery for steroids was best in 2 mg of liver (82-108%), 4 mg of pectoral muscle (82-107%), and 1 mg of testes (75-127%). We also examined the effect of a simulated aggressive encounter on steroid levels in peripheral tissues of male song sparrows in the non-breeding season. Preliminary data show that T was significantly higher in the testes during a simulated territorial intrusion (STI) compared to a control. Corticosterone was significantly higher in the liver and pectoral muscle during an STI compared to a control. This study, to our knowledge, is the first to look at peripheral steroid regulation under different social contexts. It will provide novel insights into steroid synthesis pathways and the potential modulatory effects they have on territorial aggression. These results can be expanded to other model species and social behaviours.

Adaptive Behaviours and Well-being of Higher Education Students: Does Growth Mindset Matter?

Alexis Wong, *Nanyang Technological University*

Growth mindset refers to an individual's belief that one's ability can be developed and refined over time and with effort. Recent research has found that a growth mindset could impact on many facets of an individual's life, such as in learning new skills, developing emotional hardiness and successfully adapting to stressful circumstances. In the Singapore higher education context, research on student mindsets in relation to their adaptive behaviours and well-being is still limited. Furthermore, it is uncertain whether there may exist a gender difference among higher educations' mindsets, adaptive behaviours and well-being. Therefore, this study examined the predictive relationships among growth and fixed mindsets, academic buoyancy, career optimism, and satisfaction with life using a convenience sample of 107 higher education students in Singapore. Participants completed an anonymous online questionnaire. Multiple regression analysis was conducted and results indicated a positive significant and predictive relationship between growth mindset and satisfaction with life, but not between fixed mindsets and satisfaction with life. Results also found no significant relationships between growth and fixed mindsets on academic buoyancy and career optimism. Results from the independent samples t-test indicated a significant gender difference for academic buoyancy but not for growth and fixed mindsets, career optimism, and satisfaction with life. The empirical findings of this study have implications for student development policy and practice in the higher education contexts.

Domestication Syndrome: Mechanisms and Consequences

Shab Molan, *University of British Columbia*

Humans and domestic animals share morphological, neurobiological, and behavioural traits called Domestication Syndrome (DS). They have pedomorphic bodies, disproportionately smaller brains, and exhibit juvenile behaviour into adulthood. The shared phenotypes indicate a shared selection pressure shaping our and their evolutionary path. Belyaev (1979) argues selection for tameness leads to incidental byproducts associated with DS. Have we changed our evolutionary paths by favouring tameness? And if so, what are the underlying mechanisms and consequences of DS? I reviewed the literature to evaluate the evidence supporting various hypotheses explaining the mechanism underlying DS. The neural crest (NC) cell hypothesis suggests neurocristopathy leads to the DS and predicts downregulation of the NC development (Wilkins et al., 2014). A comparison of the 7q11.23 Williams region, promoting NC development, between archaic and anatomically modern humans reveals hyper-methylation, and thus downregulation of NC development, in anatomically modern humans (Zanella et al., 2019), supporting the hypothesis. Understanding the mechanism underlying DS might be the key to understanding our origins. The neurobiological consequences of DS shape our uniquely human cognitive processes, such as language and theory of mind. For example, FOXP2 and other genes associated with language development (Lai et al., 2001) are downstream of and regulated by the 7q11.23 Williams region. Individuals with Williams-Beuren syndrome and autism spectrum disorder, neurocristopathies caused by deletion and duplication of the 7q11.23 Williams region, respectively, exhibit characteristics associated with hyper and hypo-domestication. Extensive study of genetic markers of these developmental disorders might bring us one step closer to understanding our origins.

Prevalence of Eye Diseases in Alzheimer's Disease and Mild Cognitive Impairment

Zheting Zhang, *Nanyang Technological University*

With the global aging population, Alzheimer's disease (AD) and age-related eye diseases pose an increasing burden. However, there is limited understanding on the association of AD and cognitive impairment, no dementia (CIND) with age-related eye diseases. In this cross-sectional, memory clinic-based study of multiethnic Asians aged 50 and above, participants were diagnosed as AD (n=216), cognitive impairment, no dementia (CIND) (n=252), and no cognitive impairment (NCI) (n=124) according to internationally accepted criteria. Retinal photographs were graded for the presence of age-related macular degeneration (AMD) and diabetic retinopathy (DR) using standard grading systems. Multivariable-adjusted logistic regression models were used to determine the associations between neurological diagnosis and odds of having eye diseases. Over half of the adults had at least one eye disease, with AMD being the most common (60.1%; n=356), followed by DR (8.4%; n=50). After controlling for age, sex, race, educational level, and marital status, persons with AD were more likely to have moderate DR or worse (OR=2.95, 95%CI=1.15-7.60) compared with NCI. In the fully adjusted model, neurological diagnosis was not associated with AMD (OR=0.75, 95%CI=0.45-1.24). Patients with AD have an increased odds of having moderate DR or worse, which suggests that these vulnerable individuals may benefit from specific social support and screening for eye diseases. With more older individuals requiring medical care for both neurological and ophthalmic conditions, multidisciplinary management in clinical practice will be increasingly vital.

The SARS-CoV-2 Infection: Which Immunological Factors Can Explain Severity Variations?

Arsh Jassal, *University of British Columbia*

Aggression is a highly conserved social behaviour that is important for gaining access to limited resources, like food and mates. Male song sparrows (Melospiza melodia) are territorially aggressive year-round. In the breeding season, this behaviour is supported by gonadal steroid hormones, like testosterone (T). In the non-breeding season, blood T levels drop to non-detectable levels, yet males maintain territorial aggression. While there is some evidence for local steroid synthesis in the brain, peripheral tissues can also produce steroids and might also support non-breeding aggression. Here, we validated a method to quantify 12 steroids in liver, pectoral muscle, and testes using liquid chromatography tandem mass spectrometry (LC-MS/MS). We found that the percent recovery for steroids was best in 2 mg of liver (82-108%), 4 mg of pectoral muscle (82-107%), and 1 mg of testes (75-127%). We also examined the effect of a simulated aggressive encounter on steroid levels in peripheral tissues of male song sparrows in the non-breeding season. Preliminary data show that T was significantly higher in the testes during a simulated territorial intrusion (STI) compared to a control. Corticosterone was significantly higher in the liver and pectoral muscle during an STI compared to a control. This study, to our knowledge, is the first to look at peripheral steroid regulation under different social contexts. It will provide novel insights into steroid synthesis pathways and the potential modulatory effects they have on territorial aggression. These results can be expanded to other model species and social behaviours.

Examining the Dominance of Various Pathways involved in Metabolic Function

Anqi Angela Zhang, Amrit Pal Bhela, Priya Leghari, *University of British Columbia*

Leptin and estrogen are key hormones in regulating reproductive function, metabolic health, and body weight. Understanding how leptin and estrogen interact will better inform the management of gestational diabetes, provide insight on energy homeostasis in post-menopausal women, and serve as the foundation for further scientific inquiry into the metabolic intricacies of estrogen and leptin signaling. We assessed peer-reviewed articles containing the keywords “estrogen,” “leptin,” “STAT3,” and “hypothalamus” using Medline, PubMed, and Google Scholar. Over 50 articles were reviewed for our narrative literature review. Leptin and estrogen interact through two major pathways: genomic (estrogen receptor [ER] as a transcription factor) and non-genomic (ERα-, GPR30- and STAT3-mediated signal transduction) routes. However, an informational gap regarding the relationship between these hormones still exists. Characterization of the neuroendocrine action of hormones such as leptin and estrogen may provide the insight needed to better understand and manage many metabolic diseases. The understanding of neuroendocrine regulation of body weight by key hormones such as estrogen and leptin is paramount to combating metabolic diseases. Evidence supports the claim that the STAT3 pathway is central to body weight modulation, mediated by the relationship between estrogen and leptin. We believe that both ERα and GPR30 are capable of initiating STAT3-activating pathways, and through our experiments, we hope to determine whether one pathway predominates over another to better inform potential therapeutics.

Poster Session D

Why Britain's antitrust approach to digital economy is a disaster in making

Justin Yu, *University of Warwick*

Digital technology has transformed the way we live. However, the unprecedented concentration of power amongst a small number of digital firms is holding back innovation and growth. Competition law helps unlock the potential of the digital economy, but it caught itself between the difficult political and economic climate of Brexit and Coronavirus. This project aims to analyse the UK government's approach and how it will fit in the post-Brexit world. It started by thoroughly examining proposals for digital economy regulation from both the UK government and the European Union. It also considered research reports that reflect each body's regulation philosophy, not to mention academic literature and research reports from think tanks. The UK government is slow to react to the dominance of tech undertakings. What it has proposed is not convincing. The biggest losers when competition is reduced will be the poorest households. The relaxed attitude adopted by the UK will be a devastating blow to the international effort to regulate big tech. This research is important as Brexit allows the UK to legislate freely, similar ideology could be applied to other industries. It is important that it maximizes the benefits and position itself as an impactful player on the global stage. Or it risk resembling its geographic location: isolated.

Can small molecule drugs have beneficial effects on mammalian placenta development?

Rebecca Hobbs, *University of Warwick*

The placenta is a complex organ that supplies nourishment for a growing foetus. It contains many subtypes of trophoblast cells with differing functions. The differentiation of the trophoblast stem cells (TSCs) to produce these subtypes is dependent on the chromatin remodelling factors present. I investigated how small molecules, such as ACBI1, compound 19 and PFI-3, which influence chromatin remodeller function, can be used to influence trophoblast development and function. I used the small molecule inhibitors to inhibit specific chromatin remodelling complexes to study the effect this has on trophoblast gene activation and development. I allowed the TSCs to differentiate under these conditions and observed the effects using quantitative RT-PCR to observe markers of specific trophoblast subtypes. From my research, I discovered the effects of these small molecules on trophoblasts that replace the lining of maternal blood vessels during pregnancy. Identifying how chromatin remodellers influence trophoblast differentiation and function leads us to regions of the genome which may be implicated in pregnancy complications. It also allows us to understand how placenta development occurs and how chromatin remodellers control vascular functions and efficient foetal-maternal exchange. This research allows further research into how mutations and genetic variation in specific parts of the genome may make an individual more susceptible to pregnancy complications, such as preeclampsia. Using small molecules and continued research into how they affect differentiation of trophoblast subtypes may provide a therapeutic potential for pregnancy complications.

Investigation of the mode of delivery and type of digital media that females of childbearing age (18-49 years) in Bishop Lavis, Western Cape, South Africa prefer to engage with

Jenna Lovegrove, Annabel McCaig, Nadia Visser, *Stellenbosch University*

Infant and young child nutrition (IYCN) and health is of concern in South Africa. Breastfeeding initiation is good, however continuation is poor and complementary feeding practices are suboptimal. Lack of knowledge and inconsistent messages on IYCN hinder improved child health outcomes. It is therefore important to improve IYCN education targeted at women. The aim of this study was to investigate the modes of delivery and digital media that women of childbearing age prefer to engage with. A cross-sectional descriptive study with an analytical component was conducted at Bishop Lavis primary health care (PHC) clinic in the Western Cape Province, South Africa. An educational video on IYCN, including pictures, words, sound, animation and real people was loaded onto tablets and presented to women (n=368) attending Bishop Lavis PHC clinic. A researcher-administered questionnaire was used to assess participants' preference regarding the different modes of delivery used in the digital media presentation. Results indicate that participants preferred real people (57%; n=210) portrayed in the video, followed by pictures (48%; n=178), sound/voice (37%; n=137), words (30%; n=111) and animation/cartoon (15%; n=55). Most participants (81%; n=297) reported daily usage of digital media, mostly via mobile phones (91%; n=334). Our findings are consistent with the limited evidence nationally and internationally that real people are preferred in digital media. Evidence suggests that this type of educational content can lead to better engagement and behavior change. These findings should inform the improvement of health education provided to women attending PHC facilities within this digital age.

Comparing environmental damages of waterborne polyurethane gloves and traditional gloves: Lessons for a post-COVID world.

Yujing Zhang, *University of Warwick*

During the COVID-19 pandemic, demand for surgical and examinational gloves surged significantly due to their effectiveness in reducing the risk of infection. However, the market-dominating nitrile gloves contain toxic additives that leak into the environment. In 2020, a Chinese company invented a waterborne polyurethane glove (WPG), which successfully obtained international certification. These gloves perform similarly to other disposable gloves while allegedly being more environmentally friendly since they use significantly less fresh water compared to nitrile gloves. Therefore, this project asks whether adopting WPGs can reduce environmental damage compared to nitrile gloves. In my summer research project, I took three economic approaches to compare WPG with other types of gloves: Firstly, to estimate the environmental impacts of nitrile gloves, I conducted secondary research, as those products are relatively mature with many resources available. Secondly, I conducted an online interview to obtain similar information about WPG (unavailable on the internet). Thirdly, I currently use valuation to convert data and qualitative information into monetary values, making the two gloves' adverse impacts comparable from an economic point of view. This research can reinforce the idea of innovations and technological improvements to tackle COVID-19 and future pandemics. Moreover, in the future, this research topic can be explored from the point of view of environmental science, conducting a "cradle-to-grave" analysis and evaluating two gloves' contribution towards environmental indicators like ozone depletions or soil contaminations.

Does equivalence fill the post-Brexit gap in financial services? Views from both sides of the markets: firms and regulators

Zuzanna Sus, *University of Warwick*

After Brexit, the UK is a 'third country' and no longer has 'passporting rights' i.e. access to EU markets. One of the solutions addressing this is equivalence, that is the determination that the regulatory and supervisory standards align within the two jurisdictions, hence access is granted. The study (conducted in August-November 2021) explored whether equivalence can fill UK's loss of passporting rights, whether it is sufficient for firms to continue operating abroad. The research involved review of primary and secondary sources, as well as collecting views from firms and regulators. The study shows that equivalence is not uniform, depends on particular financial instruments, and if granted is time-limited and can be easily withdrawn, hence is very uncertain. The UK and the EU seem to approach equivalence differently, and the issue became political. UK firms face more complexity, in order to continue operating in the EU they need to comply with rules that are specific to each individual Member State. The EU seems to be reluctant to grant more equivalence decisions at the moment because of the uncertainty surrounding UK's future divergence, while it is very desired by the UK who has already given a package of equivalence decisions in favour of the EU. Generally firms did not experience disruption in their provision of services, as they prepared in advance for no equivalence scenario. Firms value stability, certainty and uniformity. Equivalence does not fill the post-Brexit gap as it cannot be relied upon by firms because of its uncertainty and tardiness.

How can we tell how healthy a plant is?

Luca Ciao, *University of Warwick*

For researchers and growers alike, understanding the health of their plants is a valuable asset. Better equipped, we can grow our food more efficiently and avoid undesirable growth that ultimately would lead to waste. Current indicators like leaf colour or symptoms of disease can be too indirect or may only be useful after it's too late. A measurement, Brix, is already used to test fruit quality for sweetness but could be used to measure plant health. This measures the sugar content in a leaf which provides an insight into the condition of the plant that may otherwise be unknown. Here, we tested the methodology of using Brix as a measurement for plant health on vertically grown cucumbers and tomatoes and pepper plants. Leaf height, position and desiccation were found to affect Brix significantly. Some plants received a biostimulant (Liquid Ice or Bud Honey) which was expected to improve plant health however Brix detected no significant difference. Finally, Brix was able to reflect the stressful effects of a heat wave. The project can guide future research into plant health and we suggest further investigation into the utility of Brix considering its accessibility and simplicity. We look forward to seeing this methodology used both in research and in a commercial context. A better understanding of our plants' health is paramount to our approach to food security as we try to feed a growing world population approaching 8 billion.

How The Emergence of Legal Rights For Women During the Period of 1850-1900 is Reflected Upon in Nineteenth Century Feminist Literature.

Amber MacOscar, *University of Warwick*

This thesis will explore how the emergence of legislation for women was reflected upon in nineteenth century feminist literature. Focusing on married women's entitlement to property, custody of children, and access to divorce. Firstly, at the point of marriage, a woman's legal identity became engulfed by that of her husband, and all her property and assets became his. In the eyes of the law a woman and her property became owned by her husband. The Married Woman's Property Acts of 1870 and 1882 chipped away at this rigid legal concept, and for the first time allowed married women to retain ownership over some of her pre-marital property. This is reflected upon in the literature, with The Tenant of Wildfell Hall being published before the enactment of this legislation, and Romance of a Shop being published after the enactment of the Married Woman's Property Act 1882. In the 50 year time period between these two novels, it is evident that society's relationship with women and property developed. Secondly, the issue of divorce is best depicted in the landmark legal cases of Caroline Norton and Henrietta Greenhill. These cases provide real-life case studies of women who were deprived equal rights in divorce and custody. Alongside the case law, the literature reflects upon the accessibility of divorce and rights of the mother to retain full custody of her children. Both legal issues are explored in The Tenant of Wildfell Hall, and The Woman Who Did. Even today women are still striving for equal recognition to that of their male counterparts in the eyes of the law.

Optimisation of Plant Diversity with GIS Analysis in Context of Peri-Urban Gradient

Yizhou Gu, *University of Warwick*

The study of plant diversity in urban areas can promote the construction of urban ecological civilization and provide essential directional guidance for future planning of plant diversity in cities. In this research, three important indicators of species diversity were selected for the study of Gaochun District in Nanjing: the relative importance index, the richness and evenness index, and the habitat diversity index, as the basis for establishing a plant diversity assessment system. In this paper, the study site was divided into three suburban gradients: the central area, the suburban area, and the remote area. The research extracted plant species data from the GIS, using the established species diversity assessment index system to compare the differences between the three indicators to study the species composition and plant diversity distribution patterns in the suburban gradient. Based on this, we propose the optimisation of the diversity of plants in the study: (1) to make great efforts to develop and utilise native plant species and to build an urban biodiversity pattern with urban characteristics. (2) Reduce artificial intervention in the central sample zone, promote the healthy development of plant communities, and enhance the diversity and evenness of distribution of plant species in the central sample zone. (3) To raise public awareness of the importance and urgency of biodiversity conservation and to promote a virtuous circle between urban construction and biodiversity conservation, in order to provide a valuable reference for other similar regions.

Oxygen Evolution Reaction in Microgravity Environments

Alvia Mohammad Yousuf, *University of Warwick*

In 2018, NASA published a memorandum announcing its plans to build a US led gateway in space. This is significant for the advancement of human space exploration. However, one of the main challenges in the development of these platforms is the lack of an efficient system that can produce a continuous supply of oxygen in reduced gravitational environments. The aim of this project is to investigate the possibility of oxygen production in microgravity environments using a water splitting device. Several factors currently deem this system insufficient. Among these is the present issue of the electrocatalyst degrading off the surface of the electrodes in an inadequate amount of time. This leads to a decay in current and hence renders the system unsustainable. Terrestrial data was collected to improve the stability of the electrocatalyst by understanding the effects of different variables. Two different substrates, namely, hematite and titanium were tested. A ruthenium electrocatalyst was deposited onto both surfaces, which were studied in different electrolytes to realize the optimal pH for their performance. It was determined that a buffer solution with a pH close to 7 provides optimal stability for both electrodes. Additionally, the applied potential was varied, which showed that an overpotential that is redundantly large is detrimental to the system, causing the Ruthenium to decay off the surface even quicker. Surpassing such challenges could eliminate the need for the cumbersome process of regularly transporting oxygen to space platforms and hence facilitate NASA's current goal of building cis-lunar research platforms.

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