

ACUR

Australasian Council
for Undergraduate
Research

**ACUR 2019
CONFERENCE**

2-3 OCTOBER 2019

HOSTED BY



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Welcome

On behalf of the Australasian Council of Undergraduate Research (ACUR) and the University of Newcastle, I am very happy to welcome you all to the 2019 Australasian Conference of Undergraduate Research. In line with the mission of ACUR to promote and advance the spread of undergraduate research in Australasia, the Conference showcases the great achievements of undergraduate researchers across all areas of scientific research. It encourages students to look beyond their own fields, engage with the wider student research community, and explore interdisciplinary approaches to scientific research. This year we have an exciting program representing the diversity of research conducted by students. The abstracts this year were excellent and we are looking forward to some great talks and posters.

If you are not a member of ACUR, please consider joining. Help support our activities in advancing the spread of undergraduate research in Australasia. Visit the ACUR website at www.acur.org.au and like us on Facebook (Australasian-Conference-of-Undergraduate-Research), to receive updates of ACUR activities.

Your feedback is very important to us. Please let us know what you think of this year's conference and make suggestions for next year by completing our feedback questionnaire. On behalf of the ACUR Executive committee we hope you enjoy the day and we wish you every success for your research.



Prof. Liz Milward, Deputy President of the Academic Senate (Teaching and Learning) The University of Newcastle, Australia, and ACUR Conference Convenor 2019



ACUR 2019 Executive and National Student Committee Attending Members and Plenary Speakers

Emeritus Professor

Angela Brew



Professor

Liz Milward



Emeritus Professor

Eric Pawson

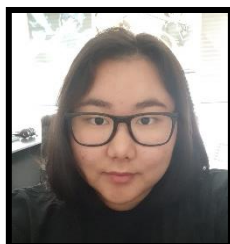


Dr Daniel

Johnstone



Seak Lin Ly



Alicia Kirk



Gavin Height



Australasian Conference of Undergraduate Research 2019

Conference Program

Weds 2 nd Oct	DAY 1
8:30am	Registration (NewSpace)
9:00	Welcome; Acknowledgement of Country and Plenaries – The Conservatorium
9:20	Plenary 1 Professor Angela Brew, Chair of ACUR
9:50	Plenary 2 Jake Ridgeway, University of Newcastle
10:10	Morning Tea
10:40	Parallel Student Talk Sessions NewSpace Meeting Rooms
12:30	Poster Presentations
1:00	Lunch
1:40	Parallel Student Talk Sessions NewSpace Meeting Rooms
3:30	Afternoon Tea
4:00	Research Tips Workshop/Panel Session NewSpace Meeting Rooms
4.45	Break with Pre-Dinner Music featuring Jake Ridgeway (TBC)
6:00	Italian Fiesta Dinner NewSpace Ground Floor Social Space
7:00 to 9:00	Trivia Quiz NewSpace X101

Thursday 3 rd October	Day 2
8:30am	Welcome back and Day 2 Plenary session (TBC) – The Conservatorium
8.35am	Plenary Dan Johnstone
9:00	Parallel Student Talk Sessions NewSpace Meeting Rooms
10:30	Morning Tea
11:00	Parallel Student Talk Sessions NewSpace Meeting Rooms
12:30	Lunch and poster collection
1:00 to 3:00pm	AGM, Awards, Acknowledgements and Handover for ACUR2020

STUDENT PARALLEL TALKS - WEDNESDAY OCT 2 MORNING					
<p>MIND AND MENTAL STATES</p> <p>Chair: Dr Mark Babic <i>University of Newcastle</i></p> <p>10.40 Elyssa Hannan <i>Macquarie University</i> Gesture and children's theory of mind</p> <p>11.00 Sophie Cornett <i>Western Sydney University</i> Can the perception of pain be turned on and off?</p> <p>11.36 Ben Gorman <i>University of Sydney</i> Investigating neural structural connectivity in social anxiety disorder using advanced diffusion imaging techniques</p> <p>11.40 Madison Kho <i>Macquarie University</i> Cue utilisation as an indicator of suicide risk assessment skills: feasibility and initial convergent validity</p> <p>INTERNET MEMES AS ART</p> <p>12.00 Danielle Divola <i>Australian Catholic University</i> Pinkposting, post-medium: memes and the artistic curation of queer identity</p>	<p>ENGINEERING THE FUTURE</p> <p>Chair: Jason Woods <i>University of Newcastle</i></p> <p>10.40 Evan Jobling and Kaelan Parsons <i>University of Newcastle</i> Low cost distributed traffic monitoring system</p> <p>11.00 William Voss and Vaibhav Sekhar <i>University of Adelaide</i> Fingerprinting radio transmitters using artificial intelligence</p> <p>11.20 Joel Hochstetter <i>University of Sydney</i> Emergent critical dynamics in neuromorphic nanowire networks</p> <p>11.40 Alison Campbell <i>University of Sydney</i> The future is bright: investigating the properties of novel nanomaterials through single molecule spectroscopy</p> <p>12.00 Bryce Mullens <i>University of Sydney</i> Disorder by design: energy, pyrochlores and the art of 'stuffing'</p>	<p>MORPHING PERCEPTION</p> <p>Chair: Dr Melissa Tadros <i>University of Newcastle</i> and Gavin Height <i>LaTrobe University</i></p> <p>10.40 Eleanor Armstrong <i>Australian National University</i> Getting under the skin: how has the symbolic significance of snakes throughout history led to their contemporary perception and treatment?</p> <p>11.00 Madelaine Sacco <i>University of Newcastle</i> The treatment of monsters as "other" In science fiction</p> <p>11.20 Jesse Mathew <i>Macquarie University</i> Size is in the eye of the beholder: how extreme bodies bias our perception</p> <p>11.40 Jessica Ledger <i>Southern Cross University</i> Misperception of "normal" body sizes through media consumption</p> <p>12.00 Nathan Jones <i>University of Adelaide</i> Pop psych: the impact of music and lyrics on emotion</p>	<p>CANCER</p> <p>Chairs: Dr Dan Johnstone <i>University of Sydney</i> and Aysha Ferdoushi <i>University of Newcastle</i></p> <p>10.40 Althea Bastian <i>University of Technology Sydney</i> Targeting telomerase activation with mTOR inhibitors in thyroid cancer</p> <p>11.00 Yue Ma <i>University of Technology Sydney</i> The tumour suppressor p53 interacts with E3 ubiquitin ligase machinery to influence the chromatin landscape and facilitate transcription</p> <p>11.20 Edward Eden <i>University of Newcastle</i> Tumour stress promotes nerve infiltration in pancreatic cancer</p> <p>11.40 Maggie Tong <i>University of Sydney</i> Using DNA to design a fluorescent sensor to quantify a platinum anticancer drug</p> <p>12.00 Jayden Sterling <i>University of Sydney</i> The role of histone demethylases in glioblastoma persister cells</p>	<p>PHYSICAL FITNESS</p> <p>Chairs: Kristy Martin and Elvis Freeman-Acquah <i>University of Sydney</i></p> <p>10.40 Sami El Arja <i>Western Sydney University</i> Flexible and non-invasive morphic sensors for measuring electrocardiogram (ECG) signals</p> <p>11.00 Felix Parker <i>Central Queensland University</i> Flex Brain game demographics: informing automatic evaluation of exercise through gamification</p> <p>11.20 Kim Abell <i>Central Queensland University</i> Physical activity behaviour: a dual process approach predicting health behaviour change</p> <p>11.40 Kristie-Lee Alfrey <i>Central Queensland University</i> The role of mental health in exercise rehabilitation for cardiac and pulmonary patients</p> <p>12.00 Rachael Smallwood <i>Central Queensland University</i> Exploring exercise perceptions and experiences of cardiac and pulmonary rehabilitation patients</p>	<p>SOCIOPOLITICS - AUS AND OS</p> <p>Chairs: Sabrina Syed <i>University of Newcastle</i></p> <p>10.40 Peter Fair <i>Australian National University</i> Bridging the gap? Investigating the impacts of Chinese-driven infrastructure development on Kenyan foreign policy objectives</p> <p>11.00 Alex Pan <i>Australian National University</i> Transnational perspectives, social histories: Australian perspectives and insights into China in the 1920s and 1930s</p> <p>11.20 Aoife Wilkinson <i>University of Queensland</i> Investigating Japanese nationality in Australia</p> <p>11.40 Fergal McDonald <i>Australian Catholic University</i> Memory troubles: newspaper representations of the Ballymurphy massacre</p> <p>12.00 Ivy Scurr <i>University of Newcastle</i> Interaction between activism and community building practices in the Australian anti capitalist environment movement</p>

STUDENT PARALLEL TALKS - WEDNESDAY OCT 2 AFTERNOON					
<p>DRUGS</p> <p>Chair: Dr Melissa Tadros <i>University of Newcastle</i> and Alicia Kirk <i>University of Queensland</i></p> <p>1.40 Paige Webb <i>Macquarie University</i> Effect of social isolation on addiction-vulnerable phenotypes: a self-administration model of methamphetamine addiction</p> <p>2.00 Sasha Hermosa <i>Monash University</i> The role of alcohol consumption in a cohort of people who inject drugs following hepatitis C treatment: a mixed methods approach</p> <p>2.20 Bridgette Mackley <i>University of Newcastle</i> Oxycodone and mortality in older Australians in a community setting</p> <p>2.40 Erin Humphries <i>University of Sydney</i> Detection of performance-enhancing drugs in human scalp hair</p> <p>3.00 Thomas Adams <i>University of Newcastle</i> Microfluidic synthesis of polymeric nanoparticles for targeted drug delivery</p>	<p>HARDCORE SCIENCE</p> <p>Chairs: Jason Woods and Evan Jobling <i>University of Newcastle</i></p> <p>1.40 Liam Bond <i>University of Queensland</i> Quantum thermalization and entanglement entropy in the Ising model</p> <p>2.00 Yinuo Han <i>University of Sydney</i> Highly anisotropic stellar winds in recently-identified Wolf-Rayet binary</p> <p>2.20 Hazel Browne <i>University of Sydney</i> An exploration of the generalised McKay correspondence for finite subgroups of Sp(2k)</p> <p>2.40 Joshua Maggiora <i>University of Sydney</i> Anisotropic charge transport properties of hybrid-perovskite bulk crystals</p> <p>3.00 Sharnae Witherspoon <i>University of Newcastle</i> Influence of coal grind characteristics on interface properties and breakage behaviour of metallurgical coke samples</p>	<p>LANGUAGE, LITERACY AND EDUCATION</p> <p>Chairs: Sabrina Syed <i>University of Newcastle</i> Dr Rita Dionisio <i>University of Canterbury NZ</i> and Felix Parker <i>Central Queensland University</i></p> <p>1.40 Neenah Gray <i>Macquarie University</i> Land, language, lore: a comparative study of Hebrew and Aboriginal languages</p> <p>2.00 Aninda Saha <i>University of Queensland</i> Indigenous language robot framework for improving robot-based teaching modalities of endangered Indigenous languages</p> <p>2.20 Lauren Maher <i>Western Sydney University</i> Children's fiction in nineteenth-century Australian newspapers</p> <p>2.40 Lesley Gough <i>Western Sydney University</i> STEM education in Australian primary schools</p> <p>3.00 Lucinda Spence <i>Murdoch University</i> Innovative spaces for self-regulated learning</p>	<p>BLASTS FROM THE PAST</p> <p>Chair: Kurtis Budden <i>University of Newcastle</i></p> <p>1.40 Bethany Harris <i>Macquarie University</i> Reevaluating in notions of Minoan dominance over the bronze age Aegean</p> <p>2.00 Mathew Giakoumatos <i>University of Newcastle</i> No separation of church and state in the 430s BCE</p> <p>2.20 Mitchell Currell <i>Macquarie University</i> The Philistine's use of the divine name in Genesis 26.</p> <p>2.40 Hugh Cullimore <i>Australian National University</i> An ostrich in the Vatican: interpreting Egyptian influences in Renaissance iconography</p> <p>3.00 Jessica Cockerill <i>University of Queensland</i> What's in a disclaimer? Subverted epistemologies in the Florentine Codex</p>	<p>HEALTHCARE ACROSS THE LIFESPAN</p> <p>Chairs: Kristy Martin and Elvis Freeman-Acquah <i>University of Sydney</i></p> <p>1.40 Praween Senanayake <i>Western Sydney University</i> Prevalence, trends and drivers of home birthing during democratic governance in Nigeria from 1999 to 2013</p> <p>2.00 Emma Pallett <i>University of Queensland</i> Neuro-protective developmental care: a pre-post study</p> <p>2.20 Vivian Chau <i>Macquarie University</i> Mentalizing abilities, causal attributions and autonomic responses to infant crying in young adults</p> <p>2.40 David George <i>Western Sydney University</i> Perception of nursing staff towards oral healthcare in Indian hospitals</p> <p>3.00 Chanon Kachornvuthidej <i>University of Queensland</i> Developing technology design framework through co-design with people living with dementia</p>	<p>A HEAD BY A NECK</p> <p>Chair: Ritambhara Aryal <i>University of Newcastle</i> and Rachael Smallwood <i>Central Queensland University</i></p> <p>1.40 Arya Rao <i>University of Adelaide</i> The multi-disciplinary management of dentofacial deformities; long face syndrome</p> <p>2.00 Ray Ho <i>University of Queensland</i> The effect of head position on the length and geometry of the vertebral arteries: an anatomical study</p> <p>2.20 Hetal Parsotam <i>University of Newcastle</i> Speech and language pathologists knowledge and practice of radiation protection during videofluoroscopic swallowing studies</p>

STUDENT PARALLEL TALKS - THURSDAY OCT 3 MORNING					
<p>(SELF) HURTING BEHAVIOUR</p> <p>Chairs: Dr Amanda Rebar Kristie-Lee Alfrey and Felix Parker <i>Central Queensland University</i></p> <p>11.00 Brittany Smith Macquarie University Would you say that to a friend? A randomised controlled trial of a self-compassionate writing intervention for body image disturbance in individuals with a visible skin condition</p> <p>11.18 Marvin-Adib Najem Macquarie University Understanding decisions to avoid driving through floodwater: application of protection motivation theory</p> <p>11.36 Emma Jackson Macquarie University Gender typicality and cyberbullying</p> <p>11.54 Morgan Laird Macquarie University Examining the relationship between cumulative risk and protective factors for aggression following violent video game play</p> <p>12.12 Adam Horvath Macquarie University Predicting suicidal behaviour using machine learning in regards to borderline personality disorder</p>	<p>NEUROSCIENCE</p> <p>Chairs: Dr Dan Johnstone and Elvis Freeman-Acquah <i>University of Sydney</i></p> <p>11.00 Zoe Stawyskyj University of Sydney Wormholes through neural time and space: the role of heavy-tailed transitive dynamics in memory retrieval</p> <p>11.18 Tessa Onraet University of Queensland Investigating the inflammatory profile of Alzheimer's disease in Down syndrome</p> <p>11.36 Matthew Baines University of Newcastle Magnetic resonance spectroscopy findings in chronic alcohol use in the human brain: a systematic review</p> <p>11.54 Jade Thornton Macquarie University The role of early life stress in sex-dependent depressive outcomes in adult rats and the potential preventative benefits of oxytocin treatment</p>	<p>INFECTION AND IMMUNITY</p> <p>Chairs: Jason Woods <i>University of Newcastle</i> and Kristy Martin <i>University of Sydney</i></p> <p>11.00 Kunal Mishra Nanyang Technological University, Singapore The identification of novel inhibitors against the deadliest malaria parasite, <i>Plasmodium falciparum</i></p> <p>11.18 Olivia Jessop University of Queensland Bioinformatic analysis of uropathogenic <i>E. coli</i> fimbrial adhesins</p> <p>11.36 Jennifer Pryor University of Newcastle Investigating mechanisms driving food sensitivity and allergy through immune dysregulation</p> <p>11.54 Soo Lin Tang University of Sydney A map of infiltrating immune cell profiles and structure of islet xenografts in a tolerant xenotransplantation model by imaging mass cytometry</p> <p>12.12 Joanne Wai Sinn Soh University of Newcastle The role of oxidases signaling in colitis</p>	<p>BIOCHEMISTRY</p> <p>Chairs: Sonia Tammana <i>University of Newcastle</i> and Aysha Ferdoushi <i>University of Newcastle</i></p> <p>11.00 Eve Gowen University of Tasmania Catalysts: the chemical key to worldwide issues - past, present and future</p> <p>11.18 Alicia Kirk University of Queensland Unpacking nature's arsenal: investigating the mechanisms of P450 enzymes</p> <p>11.36 Nathan Burke University of Newcastle Acrylamide derived DNA damage in sperm and the ramifications on fertilisation and embryo development</p> <p>11.54 Isabella Moore University of Newcastle The indispensable role of β-catenin for the proliferative effect of oestrogen on the uterine epithelium</p> <p>12.12 Tarneet Kaur University of Sydney Novel dietary intervention for muscle phenotype in neurofibromatosis type 1</p>	<p>GENDER AND SEXUALITY</p> <p>ChairsC: Bernadette Smyth BeLLCORP Accountants and Bridgette Mackley <i>University of Newcastle</i></p> <p>11.00 Erica Wright University of Newcastle Female troubles: ancient ideas persisting through time</p> <p>11.18 Claire Holden University of Newcastle The representation of sexuality in Diana Gabaldon's <i>Outlander</i></p> <p>11.36 Scarlett Harbin-Owens Australian National University Australian women's knowledge of contraception: a systematic review</p> <p>11.54 Adrian Cuerva Macquarie University Dominance and attractiveness of muscularity</p> <p>12.12 Gavin Height La Trobe University Political homophobia in the 2019 Indonesian elections</p>	<p>THE WORLD OF PLANTS</p> <p>Chair: Ritambhara Aryal <i>University of Newcastle</i></p> <p>11.00 Damian Hall Western Sydney University Development of a validated wide spectrum HPLC method for the chemical evaluation of cannabis samples</p> <p>11.18 James Santiago University of Queensland Real time qPCR detection of <i>Calonectria ilicicola</i> in avocado roots</p> <p>11.36 Vaibhav Dagg Western Sydney University Silicon alters the defensive role of leaf macrohairs in resistance to insect herbivory</p> <p>11.54 Molly Turnbull University of Queensland Ancient plant silica as a tool for investigating our agricultural origins</p> <p>12.12 Benjamin Foster Western Sydney University Quantifying physiological drivers of forest flammability</p>

Poster Presentations

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1. **Criniti, Victoria** *Macquarie University*
Body dissatisfaction and body misperception
 2. **Davis, Kenneth** *University of Alabama at Birmingham USA*
Electronegative clusters play an important role in the stability of proteins
 3. **Kasparian, Ainsley** *University of Technology Sydney*
The role of catestatin in hypertension induced cardiac fibrosis
 4. **Kim, James** *University of Adelaide*
Post-operative instructions following minor oral surgery
- the quality and the level of evidence
 5. **Matthew, J'Aala Amy** *University of Newcastle*
Consumer acceptance of alternative edible coatings for apples
 6. **Oliva, Bianca** *Macquarie University*
Snacking with friends: does watching familiar content make you eat more?
 7. **Elnour, Reem** *University of Sydney*
How do diet and microbiota interactions influence the intestinal barrier and the development of colorectal cancer?
 8. **Tang, Kerri** *University of Alabama at Birmingham USA*
Virtual-reality training enhances children's working memory, processing speed, and visual-spatial memory
 9. **Ting, Jonathan** *University of Queensland*
Development of an effective method to represent sigma hole effects in classical force fields
 10. **Wang, Alison** *University of Queensland*
The role of pro-inflammatory cytokine responses in antibody-mediated control of blood-stage *Plasmodium* infection *in vivo*
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Physical Activity Behaviour: A Dual Process Approach Predicting Health Behaviour Change

Kim Abell

School of Health, Medical and Applied Science, Central Queensland
University

Physical activity is important for health and wellbeing; however, many people are inactive. Dual process models suggest physical activity is motivated by deliberate reflective processes and non-conscious automatic processes. Behavioural regulation, a reflective process, involves behaviour change techniques such as goal setting, self-monitoring, and planning to initiate and sustain physical activity motivation. In contrast, the automatic process of automatic evaluations, refers to people's mental evaluations of 'good' or 'bad' concepts, which unintentionally influences decisions and behaviours in their approach or avoidance of physical activity. In separate lines of research, evidence shows behavioural regulation and automatic evaluations are associated with physical activity. Despite theory-driven hypotheses that these processes interact to influence behaviour, however, these dual processes have not been considered in the same study. To address this gap, we tested whether behavioural regulation moderated the association between automatic evaluations and physical activity. Given dual process theories propose reflective processes may override automatic processes, it was hypothesised that people with more behavioural regulation would have weaker associations between automatic evaluations and physical activity behaviour. Participants completed a self-report of behavioural regulation then, each morning for 6 consecutive days, completed brief Implicit Association Tests comparing their automatic evaluations of physical activity to sedentary behaviour. Throughout that week, participants wore accelerometers measuring daily physical activity. Linear regression results showed a person's average daily automatic evaluation score, but not self-reported behavioural regulation, significantly predicted physical activity behaviour across the week. There was no significant moderation effect found, suggesting behavioural regulation does not moderate associations between physical activity and automatic evaluation. These findings suggest behavioural regulation may not interfere with the influence of automatic evaluations on physical activity, but rather that behaviour is driven by non-conscious processes. Further research is needed to investigate dual systems together to inform how dual processes could optimise physical activity behaviour.

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Tauopathy In Canine Dementia: A New Translational Model Of Alzheimer's Disease?

Ajantha Abey

Anatomy and Histology, University of Sydney

Alzheimer's disease (AD) is a progressive neurodegenerative disorder that is the main cause of dementia. Its pathological hallmarks include protein aggregations such as amyloid- β plaques and tau tangles. These pathologies mediate dysfunction in the brain and have a highly stereotypic distribution and progression in the AD brain. However, no disease modifying therapy yet exists, partially due to overreliance on transgenic rodent preclinical models, which do not sufficiently recapitulate this complex AD pathology.

There is thus a pressing need for preclinical models with more translational validity.

Some aged canines naturally present with a human dementia-like syndrome, termed canine cognitive dysfunction (CCD). As domesticated animals that live in a human environment, canines with CCD may be ideal models for AD therapeutic development.

However, while A β plaque pathology has been demonstrated in CCD dogs, open questions remain regarding tau neuropathology. The present study therefore set out to characterise tauopathy using enhanced immunohistochemical methods across a broad array of brain regions to attempt staging of the pathology and to evidence the hypothesis that CCD reflects an early stage of human AD neuropathology.

Presented is the first evidence that phosphorylated (S396) tau, an early marker of tau pathology, is significantly increased in CCD dogs in a regionally specific manner that roughly conforms to Braak staging of human AD pathology. Structures of the Papez Circuit, essential to memory and emotions, which are affected in human AD, were particularly implicated in tau pathology. S396+ and AT8+ NFT-like aggregations were also observed and confirmed to be within axons and neuronal cell bodies by double immunofluorescence.

These results provide evidence that CCD naturally recapitulates a neuropathology similar to an early stage of human AD. These data take important steps to confirming the diverse nature of CCD neuropathology, and further validating it as a preclinical model of human AD.

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Microfluidic Synthesis Of Polymeric Nanoparticles For Targeted Drug Delivery

Thomas Adams

School of Biomedical Sciences and Pharmacy, University of Newcastle

Background: Nanoparticles (NPs) have wide applications in almost all aspects of medicine, for example, the use of poly(lactic-co-glycolic) acid (PLGA) NPs for targeted drug delivery. Traditional methods of NP production have suffered from some significant drawbacks including complex and expensive production, inter and intra batch variability. Microfluidics is an emerging production method which may overcome these production obstacles. Microfluidics involves combining an organic stream and an aqueous stream in micro volumes to form NPs via nanoprecipitation or self-assembly. The NPs can be formed with high-precision control and in a low-cost manner. As such, microfluidics is a promising platform for translating nanomedicines into clinical applications. In our study, we aimed to investigate the effect of a range of microfluidic formulation parameters on the properties of PLGA NPs.

Results: We adopted a systematic approach of design of experiments (DoE) to investigate the effect of microfluidic formulation parameters on particle size, polydispersity index (PDI), and drug entrapment efficiency (EE%) of PLGA NPs. Experimental results revealed the significance of the microfluidic chip design, flow rate ratio (FRR), total flow rate (TFR), and the concentration of polymer ([PLGA]) and stabiliser D- α -tocopherol polyethylene glycol 1000 succinate ([TPGS]). It was shown that an increased FRR resulted in large and unstable NPs, and a decreased FRR was favoured for smaller NPs with a more favourable PDI. Furthermore, greater [PLGA] resulted in larger particles, while [TPGS] played little role in particle characteristics. Using caffeine citrate as a model drug, we showed that a small D/P ratio and greater [PLGA] favoured encapsulation of small hydrophilic drugs.

Conclusion: Microfluidics is a promising platform for NP production. Our study findings helped define formulation parameters to facilitate the optimisation and clinical translation of PLGA NPs for drug delivery.

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The Role Of Mental Health In Exercise Rehabilitation For Cardiac And Pulmonary Patients

Kristie-Lee Alfrey

School of Health, Medical and Applied Science, Central Queensland
University

Following acute cardiac or pulmonary events, the body and mind often need healing and strengthening. Physical activity is known to benefit physical and mental health in patients with cardiac or pulmonary disease, in turn, reducing the potential for significant medical intervention and re-hospitalisation. Clinical exercise rehabilitation is recommended for patients to obtain these benefits, although such programs are typically short in duration (<12 weeks). Some patients may experience decreases in mental health which may result in reductions in physical activity. Given the value of physical activity in cardiac and pulmonary recovery, and the common digressions in mental health during this time, it is important to understand the role of mental health in physical activity across exercise rehabilitation programs and appropriately tailor relevant interventions. The current study examines the impact of mental health on physical activity engagement and motivation for cardiac and pulmonary patients, both during and after a clinical exercise rehabilitation program. Individuals, medically referred to an eight-week exercise rehabilitation program following a significant cardiac/pulmonary event, were invited to participate in a 6-month study comprising of monthly surveys, three interviews and three weeks of physical activity monitoring. We conducted multilevel modelling to test whether depression, anxiety, or stress symptoms impacted how physical activity or physical activity motivation changed before, during, and following rehabilitation. Physical activity and intrinsic motivation declined following the rehabilitation program and results showed no effect of depression, anxiety, or stress on the change in physical activity. However, more stress symptoms during the program resulted in less intrinsic motivation for physical activity. While future research is needed to rule out the potential contribution of low power, this study tentatively suggests that exercise rehabilitation may be appropriate without specifically tailoring for mental health, although motivational support throughout the rehabilitation program, and following completion, may enhance motivation for physical activity.

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Getting Under The Skin: How Has The Symbolic Significance Of Snakes Throughout History Led To Their Contemporary Perception And Treatment?

Eleanor Armstrong

School of Sociology, Australian National University

How does a snakeskin make its way onto a rural Australian pub wall in the present day? Its trophy-like display is no coincidence, being shaped by contemporary cultural attitudes and Australians' reductive treatment of snakes. These originate in Western history and theology, but the symbolic mythologising of multiple snake species shifts over time. The ambiguous nature of the snake bothers humans, as it represents an 'other' and transgresses boundaries perceived as natural, by lurking beyond colonial reach. Snakes slither unwelcomed into physical and metaphorical sacred spaces by entering homes and rearing their ugly heads within folklore. Due to lacking understanding, snakes are popularly anthropomorphised as villainous 'others' to be feared by everyday citizens. Snakes have become conductive agents for humanity's wonderment at 'evil' and sites for enacting masculine domination. Despite this, snakes have also become objects of fascination, being commoditised for trade or national pride. Snakes continue to writhe uncomfortably throughout modern social conundrums, creating immense theoretical possibilities. Its ability to act as a proxy for cultural attitudes towards other phenomena makes it a worthy object of sociological analysis. It is imperative to 'get under the skin' of this enemy-like subject-being using a thematic analysis within an interdisciplinary human-animal studies framework. This paper undertakes a Foucauldian genealogy of snake perceptions by tracing this serpentine object over time, being barometric of wider societal forces. This paper will trace how and why snakes are significantly yet contradictorily constructed as liminal boundary entities, that symbolise both terror and respect throughout history.

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Magnetic Resonance Spectroscopy Findings In Chronic Alcohol Use In The Human Brain: A Systematic Review

Mathew Baines

The University of Newcastle

The past decade has seen an increasing array of studies conducted on magnetic resonance spectroscopy findings on the effects of chronic alcohol use in the human brain, with a concise overview of the current literature lacking. Thus, this systematic review aims to cohesively synthesize the MRS findings and assess the evidential strength of conclusions drawn in these studies. Proton magnetic resonance spectroscopy (1H-MRS, or MRS) provides a powerful device in assessing brain neurochemistry, by isolating and quantifying neurometabolic and physiologic change relative to alcohol's effects. Chronic alcohol use is known to be associated with metabolite concentration variation and reduction in particular metabolite ratios, suggestive of neuronal loss and membrane lipid change. An extensive systematic review was conducted on cross-sectional and longitudinal studies released after 1985 in the English language. Databases were searched on 8th February 2019 and included: Cinahl, Cochrane Library, Embase, Medline, PsycInfo and Scopus. The key terms of the search included: magnetic resonance spectroscopy (MRS), carbon-13 MRS, electron spin MRS, nuclear resonance spectroscopy (NMR), biomolecular or proton MRS, neurospectroscopy, alcohol, alcoholism, alcoholic beverages, ethanol, alcohol abuse, blood alcohol content and brain. Chronic alcohol use, inclusive of alcohol-dependent, alcohol-abusive and alcohol use disorder (AUD) subjects, was formally validated using the DSM-IV alcohol dependence criteria. Multiple stages of screening resolved to 14 eligible articles, consisting of 393 chronic alcoholics and 285 control subjects. All identified publications underwent a methodological quality assessment by multiple reviewers, eliminating bias, and control subjects were free from neuropsychopathology.

Targeting Telomerase Activation With mTOR Inhibitors In Thyroid Cancer

Althea Bastian

School of Medical and Biomedical Science, University of Technology Sydney

Thyroid cancer is the most common endocrine malignancy. Although most thyroid cancers are effectively treated, advanced forms of the disease have a dismal prognosis. Current systemic therapies such as the multi-kinase inhibitor Lenvatinib modestly improve progression-free survival; however their use is often limited by toxicity-related side-effects. As such, there is a clear need for alternative therapeutic options. The TERT gene encodes the reverse transcriptase subunit of Telomerase, a telomere-sustaining enzyme, which under normal circumstances is restricted to developmental and adult stem-cell niches. However, aberrant Telomerase activity is also present in most cancers, and can arise as a consequence of TERT promoter (TERTp) mutations, which generate binding-motifs for transcription factors mediating stimulatory signals of oncogenic kinases (e.g. BRAF, RAS, RET). Clinically, thyroid cancers harboring TERTp mutations are significantly more likely to exhibit adverse clinicopathological characteristics. Thus, targeting TERTp activation presents a promising therapeutic approach for advanced thyroid cancer. This motivated my laboratory to screen a kinase inhibitor library, in which we discovered that mTOR inhibitors effectively suppress the mutated TERTp in thyroid cancer cells. The purpose of my project was to validate and further characterise these findings. Using several TERTp-mutated thyroid cancer cell-lines, we examined the dose and time-dependent effects of mTOR inhibitors upon TERTp activity and TERT transcription by luciferase assays and qRT-PCR respectively. Semi-quantitative western blotting was performed to determine kinase activity and expression of transcription factors (e.g. ETV5) known to activate the promoter. Our preliminary data shows that following 24 hours treatment with 1 μ M mTOR inhibitor, TERT promoter activity and TERT mRNA expression were downregulated 8% to 41% in a thyroid cell-line specific manner. However expressions of TERT-regulating transcription factors were unaffected at this time-point, leading us to now investigate whether mTOR regulates TERTp activity by other mechanisms e.g. altered DNA-binding affinity via post-translational modification.

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Quantum Thermalization And Entanglement Entropy In The Ising Model

Liam Bond

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If a hot cup of coffee is left on a table, the coffee will cool down until it reaches thermal equilibrium with its surroundings. In this process, as the coffee and surrounding air interact, the combined system evolves from a relatively ordered state (low entropy), to a disordered state (high entropy). This one-directional evolution maximizes the system's entropy, at which point the system has "thermalized" and undergoes no further change as time evolves.

This coffee cup scenario is accurately described by statistical mechanics, a classical theory of physics, which prescribes that the maximization of entropy is the driving factor and necessary condition of thermalization. Importantly, statistical mechanics successfully describes macroscopic objects, but not smaller objects (such as individual electrons) which instead require quantum mechanics. In quantum mechanics, pure, isolated systems are in fact time-reversible, which prohibits the emergence of entropy. However, recent work has shown that some quantum systems thermalize as predicted by statistical mechanics. The question is therefore how a pure, isolated system with no entropy can be predicted by statistical mechanics, a theory based on the emergence of entropy.

In this work we investigate the thermalization of quantum systems by considering the time-evolution of a well-known quantum model, the Transverse Field Ising Chain. In this model, electrons are chained together through nearest-neighbour interactions, and interact with a transverse magnetic field. We develop a computer model to numerically simulate a finite chain ($N=12$) and confirm previous work to show that after a sudden change in the magnetic field strength, although the chain does not thermalize, it does equilibrate to a near-thermal value. We also consider the effects of entanglement on thermalization to show that the inter-electron interaction strength can mediate the emergence of entanglement entropy, and the thermalization of the entire chain.

Australasian Conference of Undergraduate Research 2019

An Exploration Of The Generalised McKay Correspondence For Finite Subgroups Of $\text{Sp}(2k)$

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A collection of graphs, known as the affine ADE graphs, miraculously appear in classification problems across seemingly unrelated areas of mathematics. One such problem is the classification of finite subgroups of $\text{SL}_2(\mathbb{C})$ (2×2 complex matrices with determinant 1). This leads to the McKay correspondence: a natural one-to-one correspondence between these subgroups and the affine ADE graphs.

But what happens if we start with larger matrices? What will the resulting graphs look like? Will we get a nice one-to-one correspondence between the subgroups and graphs as in the two-dimensional case?

Unfortunately not. However, there are still many interesting observations to be made about the graphs. For example, we have investigated the symmetries of these graphs, as well as the various ways to build a larger graph from smaller constituent graphs. Armed with a method to make larger graphs from smaller graphs, it becomes sensible to also consider non-connected graphs, since several of these can be combined to create a connected graph (which is what we are really interested in).

Acrylamide Derived DNA Damage In Sperm And The Ramifications On Fertilisation And Embryo Development

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Paternal factor infertility, among other reproductive pathologies, is intimately linked to spermatozoa DNA damage. Acrylamide, a chronically ingested compound, is metabolised by CYP2E1 to a known reproductive toxicant and DNA alkylating agent, glycidamide. Glycidamide has been implicated in inducing DNA damage in sperm and acute acrylamide exposure in vivo has induced embryonic dominant lethality and chromosomal translocations. To investigate the ramifications of DNA damage on preimplantation embryogenesis, sperm were exposed to glycidamide in conditioned in vitro fertilisation (IVF) media generated by culturing immortalised epididymal cells rich in CYP2E1 with acrylamide (10mM). The maintenance of sperm function was paramount in this novel treatment, and no aberrations were detected in motility (~80%) or capacitation ($p < 0.05$). Single cell gel electrophoresis of exposed sperm revealed significant levels of DNA damage compared to control sperm ($p < 0.001$), representing a 50-fold increase in the minimum DNA damage reported in all treated cells. Subsequently, the in vitro fertilisation rate of glycidamide treated sperm (~92%) was unchanged compared to control cells (~93%). Furthermore, over 90% of embryos from all treatments underwent cleavage, forming 2-cell embryos, by 24 hours. Preimplantation embryogenesis progressed unimpeded in embryos fathered by sperm carrying DNA damage; culminating in over 80% of embryos from all treatments forming blastocysts at 96 hours. A subset of embryos derived from glycidamide treated sperm (~30%) exhibited delayed development at 48 and 96 hours and may reflect the impediment of embryonic genome activation in 4-cell embryos. Investigations of paternally derived DNA damage in embryos fathered by glycidamide treated sperm revealed no aberrations in paternal pronuclei (TUNEL staining and γ -H2A.x ICC) and blastocyst stage embryos (γ -H2A.x ICC). Despite extensive DNA damage, treated sperm were able to fertilise and produce developmentally competent embryos, forming the impetus for further understanding the ramifications of DNA damage on pregnancy outcomes and offspring health.

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The Future Is Bright: Investigating The Properties Of Novel Nanomaterials Through Single Molecule Spectroscopy

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Nano-sized semiconducting crystals, commonly known as quantum dots (QDs), have revolutionized the field of display technology. The success of QD-based televisions is testimony to the commercial potential of these nanomaterials. The optical properties of QDs such as their fluorescence intensity and emission spectra can be controlled by changing the size and shape of the QD, which is critical to their application in such devices [1]. However, modifying the size and shape of the QD can introduce defects and energy traps on the surface of quantum dots, which can drastically affect their emissive properties. Understanding the relationship between the size and shape of a QD and its emissive properties is necessary for achieving control over their emission and for the realization of efficient next-generation devices. In my project, I use single molecule spectroscopy to study individual QDs, one at a time. Specifically, I investigate the appearance and disappearance of fluorescence, termed blinking, in cadmium selenide QDs using widefield optical microscopy. The results suggest that coating the QD with a protective outer layer improves its emissive properties. It is anticipated that these results will be relevant for informing the fabrication of new nanomaterials for applications in next-generation devices.

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Mentalizing Abilities, Causal Attributions And Autonomic Responses To Infant Crying In Young Adults

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Background: Inconsolable infant crying may elicit insensitive reactions from the caregiver such as neglect, hostility and/or physical abuse (Compier-de Block et al., 2015). This is often due to the difficulty caregivers experience in identifying the cause of the infant's distress (i.e. causal attributions) (Leerkes & Siepak, 2006). Understanding the factors that influence these causal attributions would therefore be crucial in enhancing caregiver sensitivity and responsiveness (Petzoldt, Wittchen, Einsle, & Martini, 2016). However, previous research on causal attributions has focused on emotional and personality factors (Cohen-Bendahan, van Doornen & de Weerth, 2014). Cognitive predictors such as mentalization may be more relevant in understanding the influences on causal attributions. Furthermore, infant crying also elicits physiological arousal in caregivers, which can have impeding effects on sensitive responsiveness when over-reactive (Del Vecchio, Walter & O'Leary, 2009).

Objectives: This study aims to explore the relationship between individual differences in mentalizing abilities (psychological mindedness, mind-mindedness, and perspective-taking) and the types of causal attributions made to infant crying (child-blaming or child-oriented). Secondly, it aims to investigate whether mentalizing abilities influence autonomic self-regulation (heart-rate) in response to infant crying.

Method: To control for caregiving experience, all participants were child-less young female adults. Self-report questionnaires and open-ended interview questions were used and coded to assess mentalizing abilities and causal attributions made. To control for crying characteristics, a life-like programmable infant doll was designed to cry intensely and inconsolably for 3-minutes. Heart-rate was measured before and after infant exposure using an Apple Smart watch.

Results: Findings from the current study suggest that higher other-oriented mentalizing abilities (mind-mindedness and perspective-taking) are associated with less child-blaming attributions, whereas higher self-oriented mentalizing abilities (psychological mindedness) are associated with higher capacities to self-regulate in response to infant distress, as demonstrated by smaller differences in heart-rate before and after the infant exposure.

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What's In A Disclaimer? Subverted Epistemologies In The Florentine Codex

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Following the arrival of the Spanish in Mexico and the colonisation of its inhabitants, the indigenous Nahua people, Spanish missionaries and soldiers recorded their perspectives of events and of life in what was then known as New Spain. The Florentine Codex, originally published General history of the things of New Spain, is one of the most detailed records of pre-Hispanic Nahua culture and indigenous accounts of the invasion. Completed in 1579, it was written over approximately 30 years as a part of a joint collaboration between Nahua scholars and the Franciscan friar Bernardino de Sahagún. The literature shows that there are opposing views on how this document is to be interpreted, either as a Eurocentric ethnographic study or as an attempt of preserving indigenous culture and knowledge. Drawing from Boaventura de Sousa Santos' proposal, Epistemologies of the South, this study will attempt to determine Sahagún's motivations for undertaking this work through a Critical Discourse Analysis (CDA) approach. This analysis will focus on the use of disclaimers in Sahagún's contributions to the Florentine Codex and how they are used to justify or condemn the preservation of indigenous customs and knowledge. The findings of this investigation will inform future studies on this manuscript and give insight as to how to approach subverted epistemologies in similar documents.

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Can The Perception Of Pain Be Turned On And Off?

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Pain is a notoriously difficult phenomenon to investigate, as there is no single mechanism for pain perception, and individuals experience pain in unique and contrasting ways. What has been uncovered is that attentional circuitry in the brain can be 'distracted' with cognitive tasks, such as the Stroop colour work task, reducing pain perception. This investigation aimed to determine whether different cognitive tasks affect pain awareness in contrasting ways by comparing pain response during the regular Stroop and an emotional Stroop task (using pain related words such as burning and cramping instead of neutral words red, green and blue). These tests were completed during an injection of saline solution to stimulate a 'muscle ache' pain around the 4-5/10 mark (rated by subjects on a sliding scale). For the first time, the technique microneurography, used to measure neural activity in the peripheral nerves, was employed as a mechanism to test pain perception. This enabled muscle sympathetic nerve activity (MSNA) in the common peroneal nerve to be measured. This sympathetic activity has been demonstrated to increase during painful sensations, acting as a secondary measure of pain perception. The hypothesis was that the inclusion of pain related words in the Stroop task would draw the subject's attention back to the pain, therefore increasing sympathetic activity and perception of the sensation. However, preliminary observations suggest that the regular and emotional Stroop equally reduce pain perception, suggesting that the distraction of the task, more so than the nature of the task itself, affects pain awareness. This will continue to be confirmed with further subjects and analysis of the obtained data. Enhancing our understanding of pain perception, and how this can be manipulated, will allow researchers to potentially develop new pain treatment options for patients, as a substitute or supplement to traditional pharmaceutical therapy.

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Body Dissatisfaction And Body Misperception

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Background: Body dissatisfaction (BD) is a significant risk factor for eating disorders and other mental health issues. Discrepancy between one's actual and ideal body size (actual discrepancy) is associated with dissatisfaction. However, an increasing number of people over- or underestimate their body size, suggesting that discrepancy between perceived and ideal body size (perceived discrepancy) may be more important in predicting BD. Recently, visual adaptation to lower (higher) fat bodies has shown to cause participants to over (under-)estimate body size.

Aims: Study 1 aims to establish whether perceived discrepancy predicts BD more effectively than actual discrepancy. Study 2 aims to establish if modifying perceived body size via visual adaptation will result in BD change.

Method: Study 1. Participants will have their body imaged in a 3D scanner. They will complete a BD and an appearance self-worth (ASW) questionnaire before being asked to manipulate the apparent fat content of the 3D body image using the mouse - once to make their ideal body, and once to make their body as they perceive. Actual body fatness will be measured from the scan. Actual discrepancy and perceived discrepancy will be calculated. These discrepancy scores will be used to predict BD (with ASW as a moderator). Study 2. Participants will be asked to look at their 3D body that has been manipulated to appear either higher or lower fat than reality, for 2 minutes, to induce a body size adaptation effect. Participants will then make their 3D body look as perceived and ideal, and then complete the BD questionnaire again.

Conclusions: It is expected that the perceived discrepancy (moderated by ASW) will predict BD more successfully than the actual discrepancy. It is expected that the body size adaptation effect will cause participants' perceived body size to change, impacting their BD.

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An Ostrich In The Vatican: Interpreting Egyptian Influences In Renaissance Iconography

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The Hieroglyphics of Horapollo (2nd century, republished in 1505) was likely one of the books that sat in the Vatican library, and which the celebrated high-renaissance artist Raphael no doubt used as a source for ancient Egyptian imagery. That book was among the most important studies of hieroglyphics prior to Champollion's work on the Rosetta Stone some three centuries later. The Hieroglyphics of Horapollo described 189 different hieroglyphics and their meanings in ancient Greek. That esoteric lexicon of hieroglyphics informed many artists including Albrecht Dürer (1471-1528) who illustrated the first illustrated edition presented to Emperor Maximilien I (1459-1519) in 1514. Indeed, Dürer drew upon this imagery many times in his later work. This paper presents the network of artists and humanist scholars involved in the rediscovery and republication of the Hieroglyphics of Horapollo to argue that this book provides a key to decoding some of the most esoteric renaissance iconography. Moreover, this paper seeks cast light on a little-known early episode in the story of modern Egyptology.

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The Philistine's Use Of The Divine Name In Genesis 26

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Research Area and Background

The divine name, represented by four Hebrew letters normally translated LORD or Yahweh, is portrayed as having been uniquely revealed to the Israelites. It is then unsurprising that the name is seldom observed upon the lips of non-Israelites within the Pentateuch. My paper examines the Philistine's employment of the name in Genesis 26 in order to identify how and why the name is used within the narrative and its life-setting. This analysis may aid in understanding why foreigners refer to Yahweh on other occasions.

Research Methods and Conclusions

This study is divided into three sections and its research involves the careful examination of the biblical text, theories regarding its literary formation, and relevant archaeological data. The paper's first section identifies the purpose of the Philistine's use of the divine name within the Genesis 26 narrative through a nuanced reading of the text. It is argued that the Philistine's recognition and respect for Yahweh facilitates the cessation of conflict and the establishment of peaceful relations with Isaac. The second section identifies the life-setting of the text by considering literary, biblical and archaeological evidence. This section argues the core narrative of Genesis 26 developed as an oral tradition during the Iron IB. This tradition was then influenced by the events of the Early Iron IIA before being given written form in the Late Iron IIA. The paper's final section explores the significance of the narrative's portrayal of the Philistine's use of Yahweh within this life-setting. It concludes that the Philistine's references to Yahweh were primarily understood as justifying peace between Israel and the Philistines during the period of the narrative's formation. This raises the possibility that other foreigners are depicted as using the divine name within the Pentateuch to likewise justify peaceful relations between Israel and the nations.

Silicon Alters The Defensive Role Of Leaf Macrohairs In Resistance To Insect Herbivory

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Many grass species have the unique ability to hyper-accumulate silicon (Si). Silicon has a negative effect on insect herbivory through the accumulation of solid silica particles in the plant. Recent work has shown that the model grass species, *Brachypodium distachyon*, concentrates silicon deposition in the leaf macrohairs (trichomes). Silicon is also deposited internally, predominately in the apoplast where it acts to stabilise cell walls against damage, reducing digestive efficiency through reduced cell rupture during insect digestion. Using Si supplemented (Si+) and control (Si-) *B. distachyon*, we tested a) the effect of Si on leaf traits (specific leaf area, relative electrolyte leakage, macrohair density) and b) mechanical defence against herbivory through experimental removal of macrohairs and subsequent effects on insect performance using *Helicoverpa armigera* (cotton bollworm) and *Acheta domesticus* (house cricket). Si had no effect on measured leaf traits; however, insect growth rate was significantly reduced on Si+ plants. Macrohair removal significantly increased *H. armigera* growth rate, but not *A. domesticus*. *H. armigera* growth rate was negatively correlated with macrohair density but only in Si+ plants. Our results indicate that silicon, despite having no effect on leaf traits, is a highly effective defence against insect herbivory, in part due to the enhanced defensive role of leaf macrohairs. Anatomical differences between *H. armigera* and *A. domesticus* digestion may explain the contrasting results between the two-insect species.

Australasian Conference of Undergraduate Research 2019

Electronegative Clusters Play An Important Role In The Stability Of Proteins

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There are currently 47 million people worldwide who are living with dementia (WHO,2017). Dementia, such as Alzheimer's Disease, is associated with the instability of RNA-binding proteins (RBPs). RBPs have enriched intrinsically disordered regions, but the functions of the disordered regions are unknown. In previous studies, we found that electronegative clusters (ENC) are more enriched in RBPs. We hypothesized that the formation of ENCs in RBPs are not made by chance and that they have a role in the enhancement of RBPs stability. First, a python program was created to scan all the RBPs and non-RBPs from UniProt, a Protein Database, and the probability for these ENCs in RBPs were calculated to be lower than non-RBPs. In addition, fluorescence and stopped-flow fluorimeter spectroscopy were used on the model protein, Nop15, to measure its stability and ΔG . Nop15 was chosen because it had a natural occurring ENC and RNA-binding domain (RRM). In the stopped-flow fluorimetry, the folding rate constant for the two variants were similar, while the unfolding rate constant for the protein mutant without ENCs (No E) was two-fold higher compared to the wildtype. The graph of fluorescence data showed that the wildtype is more resistant to urea denaturation compared to the No E variant. The results show that the occurrence of ENCs in RBPs are not random and serve as a key element in protein stability. In Alzheimer's Disease, TDP-43, an RBP, and other proteins tend to coagulate together and become dysfunctional. For this to happen, both the RRM and disordered regions are needed. In the next step, we will attach an ENC onto TDP-43 and determine whether its stability will be improved by the engineered ENC. We believe that this may stabilize the RRM, which may be useful in preventing the coagulating problem and mitigating the effects of Alzheimer's.

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Pinkposting, Post-medium: Memes And The Artistic Curation Of Queer Identity

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This paper argues that internet memes can be artworks and aligns their style and structure with conceptual and postmodern art movements. It also addresses how memes contribute to the development of online identity curation in the post-internet world, in particular their representation of queerness. Cultural theorist Limor Shifman's method of studying memes as cultural instigators and her classification of memes into form, content and stance will also be discussed. These categories will be applied to exemplary memes that have been recorded during my honours candidature on Facebook and Twitter between March and July of 2019.

The paper will investigate these memes as a primary resource and examine their aesthetic and linguistic functions to address the following research questions: How does the creative content of memes in a post internet culture of referentialism inform and contribute to the constructions of personal and shared identity? Do contemporary art and memes share a similar aim in deconstructing our notion of culture? If memes are a malleable medium does this encourage new visual languages to emerge online and make this art form more accessible and inclusive of marginalised voices?

The current phenomenon of constructing identity through online platforms will also be analysed through a range of meme artworks including Priority Innfield, as it was presented at the Venice Biennale in 2013 by Lizzie Fitch and Ryan Trecartin; and memes from the Facebook page, 'Beautiful, Talented and Deadly'. I will also discuss my creative-led research and production of a "users" manual for understanding how memes are generated, appropriated, and circulated. This user's manual and the memes I have created speculate on how queer identity can be curated, and fine art can be reimagined and exhibited in virtual spaces, to informally engage larger and more diverse communities

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Tumour Stress Promotes Nerve Infiltration In Pancreatic Cancer

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Pancreatic cancer is one of the most lethal of all cancer types - every year almost as many people die from the disease as are diagnosed. In pancreatic tumours, the growth of nerves into tumours and tumour endoplasmic reticulum (ER) stress are both individually recognised as regulators of cancer growth, however their combined role has never before been reported in any cancer type. Here we report that pancreatic cancer cells release pro-brain-derived neurotrophic factor (proBDNF) upon induction of ER stress to enhance nerve infiltration in pancreatic cancer.

Nerve outgrowth is increased when neuronal cells are cultured with growth medium from ER stressed pancreatic cancer cells. This indicates that pancreatic cancer cells secrete molecules that induce nerve infiltration upon induction of ER stress. The conditioned growth medium was analysed (using ELISA and mass spectrometry techniques) to profile all of the secreted factors from pancreatic cancer cells upon induction of ER stress. Among the secreted factors altered in the ER stressed conditioned medium compared to the control, the level of proBDNF was significantly up-regulated. Functional studies showed that introduction of recombinant human proBDNF recapitulated the enhanced neurite outgrowth mediated by ER stress-conditioned medium, whereas, inhibition of proBDNF by neutralizing antibody blocked nerve outgrowth.

Collectively, these results identify that proBDNF released by ER stressed-pancreatic cancer cells promotes nerve infiltration. This opens the door for targeting proBDNF in pancreatic cancer to prevent tumour nerve infiltration and the associated cancer growth.

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Flexible And Non-Invasive Morpnic Sensors For Measuring Electrocardiogram (ECG) Signals

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Field of investigation

Electro-resistive band (ERB) are a form of distributed strain-gauge. They can be employed as a force sensor as well as low-power health monitoring systems as they stretch seamlessly with the body. However, they are not properly characterized and their modes/characteristics could influence the sensed phenomena.

Research Background

ERB has been used as non-invasive wearable sensors with a view to monitor a range of respiratory and cardiovascular metrics. As an example of application, providing patients with sleep disorder with better treatment methods at a home setting and prevent costly misdiagnosis.

Research methods

In this paper, the stretchable conductive fabric is used over the human chest to capture the movements and volume shifts of electrocardiogram (ECG) signals and blood flow. To make our band reliable, we aimed to isolate the band to prevent potential current leakage to the the human skin, therefore, the ERBs were coated by 4 different types of materials, such as, Pinkysil silicone, Transil silicone, Silicone Tape, Sealon adhesive film and we used a non-coated fabric band for comparison and final evaluation. In this work, we tested our electro-resistive band (ERB) on the human body, and we recorded small pulses and respiration as low as 0.2 Hz, a high torque linear actuator was also used to simulate the bodily volume shifts. In every experiment, we investigated the band linearity and internal noise to elicit material internal properties and behaviours. The material performances have been evaluated by assessing the baseline change total harmonic distortion (THD), signal to noise ratio (SNR), correlation coefficient and phase difference.

Summary of conclusions

Final results show that materials with low impedance are more accurate and reliable in monitor respiration, results also show that silicone tape has very low noise, THD and high linearity equivalent to $y=0$, therefore, it is one of the safest and most reliable material comparing it with other coating materials.

Australasian Conference of Undergraduate Research 2019

How Do Diet And Microbiota Interactions Influence The Intestinal Barrier And The Development Of Colorectal Cancer?

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Colorectal cancer (CRC) is the third most common malignancy worldwide. CRC incidence and mortality are correlated with the adoption of a western-style diet (WD), with the gut microbiota also implicated. Synergistic effects of fiber deprivation and excess saturated fats result in microbial starvation and dysbiosis. Toxic microbial metabolites produced in response to WDs, including hydrogen sulfide, are implicated in intestinal epithelium dysfunctions such as inflammation, increased permeability, proliferation and altered mucin production, thereby compromising barrier integrity and increasing risk of CRC. However, we do not fully understand the mechanisms that underpin these interactions. This study aims to analyse the link between diet-induced microbiota changes and CRC development. Through the use of a mouse model, we assigned 3 diets (high fiber, WD, and ketogenic) to 4 mice strains. Through immunohistochemistry, we assessed markers of increased epithelial permeability and proliferation, while molecular approaches, specifically next-generation sequencing and qPCR, were used to profile the gut microbiota. Preliminary data assessing the impact of varying macronutrient ratios on the gut microbiota showed high-fat, low-fiber diets increased the relative abundance of sulfate-reducing bacteria, which contribute to hydrogen sulfide production, however, responses varied between genetically distinct mice. We will further define mechanisms that link the effects of diet on the gut microbiota and intestinal barrier. Understanding the interplay between diet, gut microbiota and the intestinal barrier will provide an insight as to how we can most effectively design diets that promote gut health and reduce CRC risk.

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Bridging The Gap? Investigating The Impacts Of Chinese-Driven Infrastructure Development On Kenyan Foreign Policy Objectives

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Of all the nations that have maintained involvement in rapidly-growing Africa, China's interactions are the focal point of the vast majority of governmental and media scrutiny surrounding FDI distribution, with much of this attention placed onto its investment into Kenyan infrastructure as part of its 'Belt and Road Initiative'. Despite this intense interest, however, very little research has been done on actually defining the character of China's relationship with Kenya beyond political sloganeering, especially in understanding the implications such investment into infrastructure has for Kenyan foreign policy interests. This work firstly seeks to utilise a wide range of existing literature and datasets to form a clearer picture of the context that underpins Kenyan-Chinese interactions, which begins from a clarification of the origins and characteristics of Kenya's regional leadership position and its economic positioning and characteristics, including its infrastructure deficit. From this foundation, Kenya's economic and foreign policy context is translated to an explanation of Kenya's rapport and economic partnership with China, who despite leaning towards the West during the Cold War, maintained strong relations as a result of Kenya's adoption of African Socialism, China's non-interventionist policy and the strong image China had amongst developing nations, and Chinese economic competitiveness in infrastructure development projects. Secondly, this piece seeks to apply prior literature and quantitative measures to build an understanding of the likely foreign policy impacts of the projects China has funded. It is found that the multiple projects engaged in by China had mixed welfare outcomes, with changes in Kenyan involvement in multilateral institutions suggesting they may increasingly need to consider Chinese economic welfare in their foreign policy, but changes in their geopolitical relationships with neighbours and the country's economic structure itself suggest they may strengthen their position in the East African region as a political, economic and cultural leader as a result.

Australasian Conference of Undergraduate Research 2019

Dominance And Attractiveness Of Muscularity

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Evolutionary theory states that sexually reproducing species such as humans may possess psychological mechanisms for detecting mates of high genetic quality. Research in evolutionary psychology has shown that female mate choice mechanisms may detect cues of health, genetic quality and paternal investment. Other scholars argue that certain sex-specific traits such as muscularity may have been selected via male-male competition, where more physically dominant males were able to monopolise mating opportunities through force or threat of force throughout evolutionary history. While sex differences in muscularity suggest that male muscularity likely evolved through sexual selection, it is not clear whether its attractiveness to women or its conferred advantage in physical competition may have driven its evolution. The current study seeks to understand whether perceptions of attractiveness and dominance provide the selection pressure for male muscularity.

Photographs and body composition data of N=92 male university students were obtained. Photographs were rated on both attractiveness and dominance by N=60 university students. Participants also manipulated computer generated 3D male avatars along a muscularity transform to appear normal, attractive and dominant in three separate conditions. It is hypothesised that (1) the relationship between dominance and muscularity will be stronger than the relationship between attractiveness and muscularity, (2) the amount of muscularity rated as dominant will be greater than the amount of muscularity that is rated as attractive, and (3) body shapes indicative of higher levels of muscularity will be rated as more attractive and dominant.

Australasian Conference of Undergraduate Research 2019

Quantifying Physiological Drivers Of Forest Flammability

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Knowing the dryness of fuel present in an area when a fire will pass through is vital to predicting the intensity of the bushfires. Fuels in an ecosystem are the live and dead biomass with a low enough water content to combust (debris i.e. leaves and twigs). These are considered dead fuels while live fuels are still attached to the living organism. Though they have high water content live fuel still make up a major percentage of fuel in an area. The current model for determining live fuel moisture content (LFMC) does not account for the physiological adaptations individual species have evolved to deal with their unique environmental stress. This research aims to identify the difference in LFMC for four species common to the NSW Cumberland Plain Woodland Region. This will show the importance of having species specific LFMC incorporated into fire predicting models.

Over an eight-month period located at the Cumberland Plain Woodland Region the water potential and leaf traits, such as the turgor loss point and leaf mass per area were also measured to understand causes of variation in LFMC among the species *Eucalyptus fibrosa*, *Eucalyptus moluccana*, *Melaleuca decora*, and *Bursaria spinosa* were taken.

The data over a three-month period showed that *M. decora* generally had higher LFMC (171-199%). Compared to other species: *E. moluccana* (91 - 122%), *E. fibrosa* (102 - 78%) and *B. spinosa* (99 - 93%). Overall turgor loss point was insignificantly different from the other species indicating that *M. decora* has other adaptations such as leaf level characteristics to assist in LFMC. This data shows that there is further research required to understand how fire passes through an area. The study of LFMC and its relation to individual species shows elements which would improve fire predicting models.

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Perception Of Nursing Staff Towards Oral Healthcare In Indian Hospital: A Qualitative Study

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Introduction: Oral health is an important part of medical care that is often overlooked. However, oral care remains a low priority amongst nurses especially in countries like India where the prevalence of patients with oral problems continues to increase with nearly half of hospitalized patients having at least one manifestation of oral disease. To date, no study set in India has explored the perspectives of nursing staff towards oral care provision.

Aim: This study aimed to explore the unique perspective and barriers that nurses face in providing oral care for inpatient and assess the feasibility of an oral care training program.

Methods: This study followed an exploratory qualitative design, where nurses working in various inpatient and intensive care units at a major hospital in India were purposively recruited to participate in focus groups. Three separate focus groups were conducted for junior, senior and administrative staff respectively, ranging between 45 minutes to 1 hour. Audio recordings from focus groups were professionally transcribed and thematically analysed using NVivo.

Results: Key themes from focus groups surrounded knowledge, current practice and barriers regarding the provision of oral care. The majority of the nurses demonstrated knowledge regarding the benefit of good dental care and how it relates with general wellbeing of patients. However, a lack of formal training was highlighted by staff, and a clear variation of oral health practice was evident across all wards. In addition, although all the nurses identified oral care as their duty of care, they faced significant barriers that hindered the provision of effective oral care including a lack of evidence-based protocols, time constraints, low prioritisation by staff and lack of training.

Conclusion: This study highlights the need for oral care programs in Indian hospitals that provide formal training, evidence-based protocols and capacity building for nursing staff.

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No Separation Of Church And State In The 430s BCE

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Religion and politics have often been connected, with leaders and regimes using religion to support and legitimise themselves. Egyptian Pharaohs promoted themselves as the sons of Ra and various Greek monarchies claimed descent from their greatest hero, Heracles, and his father Zeus. In the 5th century BCE, the Athenian general and politician Pericles connected himself to the worship of the goddess Athena. Invoking her in speeches, mimicking the goddess' dress by publicly wearing his general's helmet, and lavishing money on a monumental building programme, the ruins of which we can see to this day, were some of the ways Pericles implied a connection between himself and his home city's patron goddess. Ironically, the unprecedented freedom of speech allowed by the Golden Age of democratic Athens meant that the dramatic poets, from the comedians Aristophanes and Cratinus to the great tragedian Sophocles, were able to twist the image Pericles cultivated and criticise him with their own, far less flattering, comparisons to the gods of the Olympic pantheon.

This Honours thesis will look at the extant sources on Pericles to demonstrate how he cultivated Athena's image for his own benefit. These sources include Plutarch's *Life of Pericles*, Herodotus' *Histories*, Thucydides' *The History of the Peloponnesian War*, sculptures of Pericles, and the Periclean building programme, chiefly the Parthenon temple on the Athenian Acropolis. It will investigate the Athenian response to Pericles' policy and self-mythologising by considering Athenian tragic and comedic plays. Use of the written sources; the *Life of Pericles*, the *Histories*, the *History of the Peloponnesian War*, and the dramatic plays will rely on techniques of textual analysis and the consultation of modern commentaries. Examining sculpture and the building programme of Pericles will consider theories of architecture and classical Greek art, and an explanation of the mythological scenes depicted by each piece.

Investigating Neural Structural Connectivity In Social Anxiety Disorder Using Advanced Diffusion Imaging Techniques

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Social anxiety disorder (SAD) is one of the most common mental health illnesses in youths, with detrimental effects on socio-economic wellbeing and increased risk of developing comorbid disorders like depression and substance abuse. Previous fMRI studies have identified the prefrontal cortex (PFC) and amygdala as key to pathogenesis. A number of studies have utilized tensor-based diffusion weighted imaging (DWI) to investigate the neural structural connectivity underlying this disorder. While the previous studies have been significantly inconsistent, they appear to have identified the uncinate fasciculus as a fibre pathway of key interest, displaying reduced connectivity. These tensor-based methods are limited in their inferential capability however, so here we have utilised a new DWI analysis method to investigate the structural connectivity in SAD at a fibre specific level. This technique, known as fixel based analysis, has allowed us to conduct the most specific and sophisticated structural connectivity analysis to date, examining the differences between a clinical and control group, along with the correlations of structural connectivity with symptomatic presentation and response to treatment. We have not found evidence of structural connectivity differences between this SAD and control group, nor as a correlate with symptomatic severity or response to treatment, suggesting that changes in the functional connectivity between the amygdala and PFC are not mediated by structural connections. Our effect sizes indicated the potential for increased structural connectivity to be associated with SAD, so further studies are needed, with larger sample sizes, in order to investigate this potentially inverted model of the disorder.

Australasian Conference of Undergraduate Research 2019

STEM Education In Australian Primary Schools

Lesley Gough

Education, Western Sydney University

There is an enhanced attention to Science, Technology, Engineering and Mathematics (STEM) education in recent times nationally and internationally, given the rapid technological changes in the economic sector. In Australia, and globally, the STEM focus in education has shifted towards the primary years. These early years have been identified as the crucial time for developing skills and generating students' long-term interest in STEM-based subjects. Each Australian state and territory provide a statement on STEM education, often supported by examples of successful school-based projects.

The study discussed in this paper identified eighteen different pedagogical frameworks applied to STEM education in Australian Primary schools. Projects or units of work which applied principles of authenticity or real-world learning appeared to have promising results; however, the lack of qualifications compounded by lack of competence of teachers in STEM disciplines was identified as a limiting factor. Some studies reported on pre-service teacher education programs as a positive step in further developing teacher skills and knowledge of STEM. However, follow-up research outlining the success of these programs once a pre-service teacher became a beginning teacher has not been identified. Furthermore, the focus of the literature tended to be on the application of a specific model or unit of work in a specific school context with limited follow up on how teachers embedded the research once the project had finished.

This paper will present a review of the research literature published from the previous 10 years; with a focus on how curriculum tools have been utilised to promote STEM education in Australian primary classrooms. Successful strategies; gaps in the research; and, possible areas for future research will be highlighted and discussed to assist with developing a way forward for STEM education in Australian Primary schools.

Australasian Conference of Undergraduate Research 2019

Catalysts: The Chemical Key To Worldwide Issues- Past, Present And Future

Eve Gowen

School of Natural Sciences, Discipline of Chemistry, University of Tasmania

What are catalysts and why are they so important? Catalysts are powerful substances that accelerate chemical reactions, facilitating the synthesis of medications, materials, fertilisers and fuels that we rely on daily. Enzyme catalysts are also essential to the function of the human body and countless natural processes. What is more, catalytic reactions offer the only means for developing sustainable and environmentally benign chemical processes for the future.

Our research focuses on the development of a class of new nickel-based catalysts with the potential to be activated by light. Our catalysts may be able to enhance the synthesis of valuable organic molecules, providing an economical and environmentally sustainable alternative to current methods. Research methods consist of standard synthetic techniques to prepare the catalyst, and screening experiments to assess their reactivity. This presentation will discuss our work in this area while highlighting how catalysts have positively changed modern-day life and are essential to our future.

Australasian Conference of Undergraduate Research 2019

Land, Language, Lore: A Comparative Study Of Hebrew And Aboriginal Languages

Neenah R Gray

Arts, Macquarie University

Discuss the ways in which language conveys cultural constructs, identity and the its importance with the revitalization of culture:

Language is a lens into the cosmology of a cultural group, keeping intact significant traditions, maintaining memory and inheriting knowledge. Language is a reflection of values and central pillars that stand within some of the world's oldest living traditions. Aboriginality in Australia and Judaism are prominent examples of the interconnected relationship between language, cultural tradition and identity. These ancient cultures, through the revitalization of language have managed to have a level of rejuvenation of cultural tradition in order to have an ongoing presence in the modern world. For early pioneers and activists, language has been used as a tool to uplift tradition and to inevitably preserve the remnants of identity. This essay will discuss two examples of language, conveying connection to land through the lens of Aboriginality and Judaism. This essay will analyse the meaning of Pesach or the Jewish Passover to understand the undeniable connection between identity, land, and tradition. Combined with this, the analysis of naming ceremonies and the significance of traditional names in Aboriginal cultures will be discussed to emphasize this intertwined connection. The second half of this essay will delve into the impact language has had in rejuvenating and revitalizing cultural integrity and practice. Language lies at the heart of uplifting tradition to have a presence in the contemporary world, and to create a sense of identity that thrives under the cultural oppression that was intended.

Australasian Conference of Undergraduate Research 2019

Development Of A Validated Wide Spectrum HPLC Method For The Chemical Evaluation Of Cannabis Samples

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Background:

Due to its multifarious medicinal properties, the clinical use of the cannabis genus is growing. Typically only the amounts of major cannabinoids (i.e. THC and CBD) are quantified in the medicinal extracts, whilst the minor cannabinoids are frequently overlooked. However, a widening base of evidence demonstrates that the minor constituents modulate the pharmacological effects of the major cannabinoids. This necessitates the development of a wide spectrum method for the chemical analysis of the major and minor cannabinoids in cannabis. Using the same equipment that is typically utilised for the quality assurance of the 2 major cannabinoids, a method of quantifying 10 cannabinoids has been developed.

Methods:

A High Performance Liquid Chromatography (HPLC) method, utilising a photodiode array (PDA) detector, was developed for the chemical evaluation of 10 cannabinoids in cannabis crude plant material. This included 6 minor cannabinoids, which have limits of detection that are less than one part per million. Moreover, the developed method was validated against the protocols outlined by the International Council for Harmonisation (ICH). This included the validation of a single point calibration, which minimises the use of standard compounds and thus also reduces the cost. Moreover, relative to the statistical uncertainty, the composition of the sample extract solution was found to be stable for 96 hours.

Conclusions:

A HPLC-PDA method for the evaluation of 10 cannabinoids in cannabis crude plant material has been validated. This method is relatively simple and is sufficiently robust to yield consistent results. Thus, for quality assurance purposes, this method is ideally suited to the routine analysis of medicinal cannabis plant samples. Moreover, this method could provide important insights into the composition of medicinal cannabis extracts that are used in clinical studies.

Australasian Conference of Undergraduate Research 2019

Highly Anisotropic Stellar Winds In Recently-Identified Wolf-Rayet Binary

Yinuo Han

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Wolf-Rayet stars represent a class of rare, massive stars nearing the end of their lifetime, and are known to be some of the most energetic stars in the universe with extremely high mass-loss rates. When coexisting with a nearby companion, the collision of its powerful stellar wind may produce a pinwheel-shaped dust plume extending hundreds of times the binary separation, revealing the internal dynamics of the colliding-wind binary.

In 2018, our group reported the discovery of a new Wolf-Rayet binary known as Apep. Mid-infrared imaging data of Apep revealed a spectacular spiral plume, one of the most remarkable of its kind, with near-infrared data further resolving a binary with a companion star north of a highly luminous central component. Given the large separation, however, it was suggested that the Wolf-Rayet binary producing the spiral plume is, instead, the central component itself, with a binary separation close to the diffraction limit of even the largest ground-based optical telescopes.

With a recent new epoch of aperture masking data, we provide the first direct evidence of a binary at the centre of Apep, measuring a best-fit binary separation and orientation in agreement with radio data on the colliding wind zone. Our recently updated proper motion studies on the expansion of the dust plume over three epochs continue to show a consistently low wind speed in comparison to the many-times larger spectroscopic wind speed, making Apep's stellar wind the most anisotropic of its kind yet discovered while challenging current models of colliding-wind binaries. As rapid stellar rotations are known to be associated with anisotropic winds, Apep may potentially be identified as a gamma-ray burst progenitor, serving as a convenient laboratory to examine the physics of such extreme explosion events.

Australasian Conference of Undergraduate Research 2019

Gesture And Children's Theory Of Mind

Elyssa Hannan

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Gesture plays a significant role in human communication by supporting and extending the content of speech. Research has demonstrated that observing different types of gesture increases task performance in many areas including narrative comprehension. However, little attention has been given to the influence of gesture on theory of mind, a key aspect of communication by which we understand the feelings and beliefs of others.

The current study examines the influence of observing different kinds of gestures on theory of mind task performance among children who are developing this skill. Children aged 4-7 were presented with video narratives in which the narrator produced either iconic gestures, beat gestures or no gestures, depending on condition. Children were then asked standard theory of mind questions. Head turns were used as a measure of attention, to determine whether children pay more attention to certain types of gestures, and whether this influences the degree to which observing gesture facilitates theory of mind. Results will be discussed in light of the mechanisms surrounding gesture's effects on task performance.

Australasian Conference of Undergraduate Research 2019

Australian Women's Knowledge Of Contraception: A Systematic Review

Scarlett Harbin-Owens

Australian National Centre for the Public Awareness of Science,
Australian National University

In this paper, I will present the results of a systematic review examining women's contraceptive knowledge in Australia. I examined primary research articles published between 1999 and 2019 on this topic, auditing the studies for women's knowledge of contraception and their attitudes towards finding information about it. Many of the studies focused on the use (or lack of use) of the emergency contraceptive pill and long-acting reversible contraceptives, such as implants and IUDs. In concert with reviews from the USA and the UK, my review showed there are widespread misconceptions about contraception in Australia; many women lack comprehensive knowledge of the topic and possess somewhat disjointed knowledge; women sometimes lack confidence in their own knowledge and in their ability to find better quality knowledge; and cultural sensitivities are common surrounding contraceptive access. This suboptimal situation can be attributed in part to discomfort and stigma re communicating about contraception in many contexts and in some cases to a lack of appropriate education. The review also revealed the role played by structural barriers, such as women feeling dissatisfied with the level of information provided by GPs, and feeling uncomfortable with the policing and interventionist role of pharmacists. There is a challenge of availability versus the discomfort with openly discussing the issue of sex and relationships which prevents, wider societal discourse about this topic. At present this narrative is a genderised debate but should be focused on choice, agency, and responsible sexual health which is important to both men and women equally.

Australasian Conference of Undergraduate Research 2019

Reevaluating In Notions Of Minoan Dominance Over The Bronze Age Aegean

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My study is a historiographical consideration of the scholarship concerning the concept of a Minoan hegemony over nearby Cycladic island sites such as Akrotiri, Phylakopi, and Ayia Irini, during the Aegean Bronze Age. Throughout much of the early scholarship, I identify several key flaws and biases in the underlying principles that led to the assumption that the Minoans had colonized and controlled these island sites, and which, consequently, had blurred the lines between fact and fiction in the history of the Aegean. With minimal literary evidence on offer, the primary sources I use in my investigation of the notions of Minoan dominance throughout the region in this period are archaeological, consisting of pottery, art and indications of trade, with a key focus on reciprocity and essentially ‘myth busting’ by examining the wider context of the artefacts to reconsider the broader implications. The results are astoundingly clear, with the Bronze Age Aegean being a region that shared cultural assimilation through a highly globalised and cosmopolitan trade network, with very minimal evidence or even the suggestion of a Minoan hegemony.

Australasian Conference of Undergraduate Research 2019

Political Homophobia In The 2019 Indonesian Elections

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Beginning in early 2016, Indonesian political elites began publicly calling for crackdowns on LGBT Indonesians, with the Defence Minister going so far as to claim the LGBT community was a greater threat to the nation than nuclear war. The homophobic discourse has commonly been attributed to Indonesia's apparent shift to religious conservatism, but other factors have further exacerbated Indonesia's 'moral panic', including the ease of communication through social media, and heightened global attention to sexual and gender minorities following the US's legalisation of marriage equality.

This paper examines to what extent homophobia has featured in the context of electoral politics in Indonesia. In the 2019 presidential and parliamentary elections, discourse regarding gender and sexual minorities was largely absent from the official national campaigns. However, at the local level, some legislative candidates did engage in vilifying and securitisation discourse as a tactic in their personal campaigns, along with unofficial 'black campaigns' against specific candidates on social media. When viewed through the framework of political homophobia, in which sexual and gender minorities are framed as threats to the nation and as an 'other', the Indonesian case is but one recent example of a modular toolkit used by actors for political gain.

The Role Of Alcohol Consumption In A Cohort Of People Who Inject Drugs Following Hepatitis C Treatment: A Mixed Methods Approach

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Background:

Hepatitis C virus (HCV) infection and alcohol are recognised as the most significant contributors to liver disease. Following the advent of highly efficacious direct-acting antiviral medications Australia is on track to HCV elimination by ensuring universal access to treatment, particularly among people who inject drugs (PWID), the most at-risk population. However alcohol is an equally significant risk factor of liver disease that has been given scant attention in clinical practice, despite the magnified risks among recently treated PWID. Using secondary data from the community-based trial, Treatment and Prevention (TAP) study, in-depth interviews were conducted among a sample of treated PWID to contextualise their alcohol consumption patterns.

Methods:

Using an embedded, concurrent mixed methods study, patterns of alcohol consumption before and following treatment were compared based on their Alcohol Use Disorders Identification Test-Consumption results. Additionally, predictors of hazardous alcohol consumption were identified. Then, in-depth interviews were conducted, transcribed verbatim and thematically analysed to explore their lived experience with alcohol consumption following treatment.

Results & conclusion:

Patterns of alcohol consumption may be higher after treatment due to the following predictors: unstable accommodation, male sex, low educational status, previous incarceration and low socioeconomic position. Lived experience may be diverse within this sample and cover both internal and external factors.

Findings from this mixed-methods study may inform the development of future alcohol-based interventions in clinical practice.

Australasian Conference of Undergraduate Research 2019

The Effect Of Head Position On The Length And Geometry Of The Vertebral Arteries: An Anatomical Study

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OBJECTIVE: To determine the effect of different head positions on the excursion and geometry of the vertebral arteries towards better understanding of the effects of trauma.

BACKGROUND: The vertebral arteries have a close anatomical association with the cervical vertebrae and are vulnerable to encroachment by bony spurs, disc material or by unguarded movements of the head. Damage to the arteries has been described in direct head trauma but also in rare cases by neck manipulation and other minor neck strain, but the mechanisms are unclear. Better understanding of the specific effects of head movement on the artery may assist in guiding preventative strategies.

METHODS: The vertebral arteries of 3 adult embalmed cadavers were exposed by blunt dissection. Three markers were placed on the artery wall; A) as it exited the superior border of C2, B) as it entered C1 transverse foramen and, C) mid-way along the superior border of C1 between foraminal exit and entry into the atlanto-occipital foramen (C0). Arterial length (mm) was measured between A and B (C1 -2) and B and C (C0 - 1). The angle of the artery was measured as it exited C2 and as it entered and exited C1. Measurements were taken in head neutral, ipsilateral and contralateral rotation (30°, 45°, 55°) and extension (35°).

RESULTS: C1 - 2 45° contralateral rotation produced the greatest change in angulation from neutral when compared to other measurements. No relationship between arterial length and head rotation could be identified.

CONCLUSION: The greatest effects on the vertebral artery appear to be associated more with increases in C1-2 angulation than increases in arterial length. Greater changes occurred at 45° contralateral rotation suggesting strategies to restrict end range head movement may not be protective for the artery. Effects of head trauma may be more related to acute angulation early in range than stretch.

Australasian Conference of Undergraduate Research 2019

Emergent Critical Dynamics In Neuromorphic Nanowire Networks

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Brain-inspired nanowire networks exhibit emergent properties such as memory and display potential for information processing. Inorganic nanowires are found to self-assemble into densely-connected, unorganised networks with a neural network-like topology. Upon application of an electrical bias, voltage-dependent non-linear switching behaviour is observed at the nanowire-nanowire junctions, with orders of magnitude changes in electrical conductance. Current pathways adapt continuously to the switching dynamics across the network. Network activation dynamics displays characteristics of criticality, a state in which the physical system lies between order and chaos, such as a scale-invariant power spectrum. It has been suggested that Self-Organised Criticality (SOC), a process by which a system tunes itself towards a critical state, is important in dynamics of the brain, however for nanowire networks, this concept is unexplored. Understanding nanowire networks as critical systems is important in developing applications such as neuromorphic computing.

This project aims to understand the mechanism by which critical dynamics emerge in neuromorphic nanowire networks and determine whether SOC occurs. Additionally, the project seeks to improve an existing physical model by incorporating the effect of electron tunnelling at switch junctions. Using an in-house MATLAB code, simulations were performed for a range of different electrical stimuli, network topologies and model parameters. Maximum likelihood analysis was used to constrain the model's free parameters from experimental measurements. Time-series analysis of network conductance, voltage distribution and switch parameters were used to analyse relationships between individual components and system-level network behaviour. Preliminary results suggest that electron tunnelling causes additional current pathways to become involved in network activation and improves memory retention of the network conductance state. The simulated network exhibits avalanche-like dynamics, a hallmark of self-organised criticality, with changes at the individual junction level causing a cascading effect through evolution of other junctions, leading to a whole-of-system state change.

Australasian Conference of Undergraduate Research 2019

The Representation Of Sexuality In Diana Gabaldon's Outlander

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Diana Gabaldon's novel, *Outlander*, enchants readers with her female-centred narrative that depicts sex, violence, and love through the feminine gaze of her protagonist Claire Beauchamp. This depiction of sexuality warrants an investigation into the significance of femininity and masculinity in repressive patriarchal structures. By analysing the dualistic narrative of the Jacobite Rising and Post-World War II, this thesis aims to deconstruct the depiction of sexuality of both temporal epochs in Scotland's history. After the airing of STARZ adaptation of *Outlander* in late 2014, scholarship has transcended into a second-wave that analyses the impact of this pop-cultural phenomenon on contemporary audiences. In my honour's thesis, however, I aim to critique the novel as it's representation of sexuality has not been corrupted by modern discourses of feminism. Through the interjection of Foucauldian and Post-foucauldian social concepts, I will be able to identify discursive and physical forms of sexual power that effect the depiction of sexuality in the novel. From this amalgamation of social and literary analysis, it is unavoidable to see the similarities of Claire's experiences as a woman in both the eighteenth and twentieth century. Despite the two-hundred-year gap, Claire is a personification for the ideological imprisonment women experience as their sexual identities are embedded in the discourse of domestication. Thus, Claire's time-travel highlights the struggles women face when attempting to subvert patriarchal control, regardless of their temporal reality.

Predicting Suicidal Behaviour Using Machine Learning In Regards To Borderline Personality Disorder

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Borderline personality disorder (BPD) is associated with increased suicidality compared to the general population. Accordingly, identifying BPD individuals with high-suicide risk opens up the possibility for targeted suicide prevention programs. Currently, however, identifying BPD individuals at risk of suicide show typically poor prediction because models use only a small number of known risk factors.

This paper investigated whether different machine learning algorithms could accurately identify suicidality retrospectively in a prison population ($n = 353$), even after excluding questions about previous suicide attempts and suicidal ideation.

Results revealed that modern machine learning algorithms, especially tree boosting, can accurately identify individuals with suicidal behaviour (AUC = .877, F1 = .846, precision = .917, recall = .786) and these results are substantially significantly better than current algorithms, such as logistic regression.

Furthermore, meeting five or more diagnostic criteria for BPD, as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM), is associated with an increased but even risk for suicide, supporting the same cutoff score used by the DSM.

These findings highlight the importance of using modern classification algorithms for modelling suicide and self-harm behaviour, and possible suicide interventions are discussed.

Australasian Conference of Undergraduate Research 2019

Detection Of Performance-Enhancing Drugs In Human Scalp Hair

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Preliminary anti-doping investigations have been conducted over the last decade for the detection of performance enhancing drugs in equine, greyhound and human hair as a complementary testing procedure. Hair testing is particularly advantageous due to the ability for retrospective analysis of an individual's drug use, or not, over time through segmentation. The aim of this study was to develop and validate an initial testing procedure for the detection of small molecule performance-enhancing drugs in human scalp hair using liquid chromatography high resolution mass spectrometry (LC-HRMS).

A comparison of eight extraction protocols, sourced from the literature, was conducted to evaluate the recovery of a range of analytes from a spiked hair sample. The best protocols were combined and further optimized by testing a range of solid phase extraction cartridges and conditions. To maximize method sensitivity, two derivatization agents were compared for their efficiency to produce higher signal intensities of anabolic-androgenic steroids (AAS) and their esters using heated electrospray ionization. Methoxyamine hydrochloride was found to produce at least twice the signal intensities than hydroxylamine hydrochloride for all analytes. The retention of these derivatized analytes resulted in two chromatographic peaks per analyte, corresponding to the syn- and anti-oxime geometries. We have since developed a liquid chromatography method for the separation of methoxyamine derivatized AAS and their esters without resolving the geometric isomers. This method also allows for the separation of AAS esters with the same exact mass, for example, testosterone undecanoate and nandrolone laurate.

When validated, this initial testing procedure will allow for sensitivity and reliable analysis of hair samples that greatly extends the window of detection for performance enhancing drugs. It will help maintain the integrity of sport and ensure clean competition for athletes.

Australasian Conference of Undergraduate Research 2019

Gender Typicality And Cyberbullying

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The aim of the present study was to examine how self-perceived similarity to same-gender and other-gender groups was associated with cyber victimisation and perpetration using a survey design. Adolescents who are gender atypical experience higher traditional victimisation than conforming peers, along with increased perpetration of traditional bullying. However, the relationship of gender atypicality with cyber victimisation and perpetration has yet to be examined. The present study draws on Egan and Perry's construct of gender typicality, which describes individual's self-perceived similarity to same-gender and other-gender categories, to examine the relationship of gender atypicality and cyberbullying. A cross-sectional survey collected self-report data from 298 high school students from grades 8 and 10 (165 girls). The sample was largely of upper middle-class socioeconomic status and the majority were from an Anglo-Celtic background (73.5%). Results showed other-gender typicality was positively associated with cyber victimisation when controlling for gender. Further, when controlling for gender, same-gender typicality was negatively associated with cyber perpetration and other-gender typicality positively associated with cyber perpetration. In both models gender differences in cyber victimisation and perpetration were significant, as boys reported higher cyber victimisation and perpetration than did girls. These results aid in understanding how gender cognitions are related to cyberbullying. The more typical individuals feel of their gender and the less typical of the other gender, the less likely they are to experience cyber victimisation or aggress against others. This study provides information about how gender self-perceptions relate to cyber victimisation and perpetration. Implications for interventions to reduce bullying and victimisation for gender non-conforming adolescents are discussed.

Australasian Conference of Undergraduate Research 2019

Bioinformatic Analysis Of Uropathogenic *E. coli* Fimbrial Adhesins

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Extra-intestinal pathogenic *Escherichia coli* (ExPEC) are a major cause of urinary tract infections (UTIs), sepsis and neonatal meningitis. ExPEC possess a range of different virulence factors that enable them to colonise their human hosts and cause disease. One important group of ExPEC virulence factors are fimbriae, which are cell surface organelles that promote adhesion to glycan receptors on the surface of epithelial cells in the human urinary tract. The best characterised fimbriae belong to the chaperone-usher (CU) group that possess a highly conserved system for assembly. This comprises a unique usher protein that resides in the outer membrane and acts as an assembly platform for biosynthesis, and a chaperone protein that guides major and minor fimbrial subunit proteins to this site. Genome sequence analysis has revealed most ExPEC possess the capacity to produce multiple CU fimbriae, and this can be assessed bioinformatically using the unique defining usher sequence for each fimbriae type.

This project aims to assess the prevalence of 41 fimbrial gene clusters in *E. coli* through genome sequence analysis of putative CU fimbrial operons. Uropathogenic *E. coli*, asymptomatic bacteriuria *E. coli*, neonatal meningitis *E. coli*, and avian pathogenic *E. coli* were explored here for virulence factors. A database of fimbrial clades was collated and classified by evolutionary phylogeny of usher amino acid sequence and genetic locus position.

tBLASTn was used to characterise a collection of pathogenic *E. coli* genomes and plasmids, ST131, in terms of fimbrial prevalence. Sequences homologous to the parameters fimbrial clades were considered to contain that fimbria.

The number of strains containing each clade is pending results within 2 weeks. The distribution of CU fimbrial types will provide insight into the prevalence of pathogenicity in *E. coli* strains. Future research is expected to determine the biological nature of each of the subclasses, to develop effective treatments.

Australasian Conference of Undergraduate Research 2019

Low Cost Distributed Traffic Monitoring System

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This project describes the implementation of a smart city IoT (Internet of Things) road traffic monitoring system.

A smart city traffic management system can improve city planning. This includes traffic flow, congestion, public transport, pedestrian safety and parking.

Improved traffic flow also reduces fuel consumption and associated emissions. Traditional traffic management systems have both significant upfront and ongoing costs. This project aims to offer a distributed alternative.

The system developed is a low cost wireless, solar powered and traffic monitoring system using sonar.

The distributed architecture starts with solar powered traffic monitoring nodes delivering data to a server wirelessly. The server then processes the data to generate visualisations and statistics in real time.

These battery powered nodes are designed for installation on roadsides or poles.

This project has developed prototypes which were deployed on the University of Newcastle, Callaghan campus.

Initial trials showed that these low cost traffic monitoring sonar boxes can measure traffic flow with reasonable accuracy.

Future plans include further collaboration with the City of Newcastle, Integrating with their smart city infrastructure. The data could then be compared with other deployed traffic measurement solutions.

Additional work includes enhanced processing algorithms, visualisation software and further cost optimisation.

Australasian Conference of Undergraduate Research 2019

Pop Psych: The Impact Of Music And Lyrics On Emotion

Nathan Jones

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With personal devices and streaming platforms experiencing monumental growth, we are consuming music – and its often-overlooked counterpart, lyrics – like never before. While the effects of music on emotion have been heavily researched, the added influence of lyrics is notoriously difficult to measure. Generally, negative music has been linked with decreased wellbeing and increased aggressive behaviour, but the specific contribution of lyrics remains largely unexplored. To further understand this interaction, original pop songs were written and produced to test the effect of lyrics while controlling for the effect of music. Using a 3 x 2 within-subject design, participants (N = 61) listened to songs in three categories – vitality, unease and sublimity – building on research by Zentner et al. (2008). Each category had two versions with either positive or negative lyrics. 172 words (86 positive, 86 negative) were selected from Warriner et al.'s (2013) database and incorporated into the three song pairs. The track order was counterbalanced between participants. After each song, perceived emotions were reported using the three-dimensional model (Schimmack & Grob, 2000). Participants also responded with felt levels of prosocial (or antisocial) sentiment induced by the stimuli. Intended music emotions were accurately perceived by participants. Importantly, songs with negative lyrics led to lower feelings of prosociality than songs with positive lyrics. This is the first empirical demonstration that lyrics have an effect on felt emotion above and beyond music category. By using such stimuli in future research, along with the use of more subconscious measures, the effects of music and lyrics could be harnessed to facilitate emotions associated with wellbeing and prosocial behaviour. These findings could be of particular interest in the areas of public policy, entertainment, marketing and music therapy. In this new era of music mass-consumption, it appears that lyrics matter more than ever.

Australasian Conference of Undergraduate Research 2019

Developing Technology Design Framework Through Co-Design With People Living With Dementia

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of Queensland

Background: User feedback on technologies designed for people living with dementia indicates these technologies are hard to use and can be inappropriate for the intended tasks. In addition to limited knowledge and stereotypes held amongst designers and members of the public towards people living with dementia, the real needs of end users are being overlooked. As a result, these technologies are a mere representation of how designers believe the product should function, not what end users want it to be.

Objective: The current study aims to develop a framework of design processes and considerations to improve technology usability through co-design with people living with dementia.

Methods: In a 10-week design sprint, research students worked with an interdisciplinary team of health professionals, lived experience experts (people living with dementia and their care partners), as well as developers and designers to develop a technology. A series of consultations, design activities, and prototype improvements made up the iterative Requirements-Build-Evaluate stages undertaken to better understand the end users and their needs.

Results: Privacy and ethical considerations, meeting individual physical and psychological needs, and applying principles of simplicity and usability were found essential. To meet the identified need for social connection with family, Memories Diary, an accessible and safe social network for sharing photos and strengthening regular communication was developed. The device overcame problems with existing social media platforms that users found unsafe and overwhelming, with unnecessary functions. Tracing the design from initial ideas through to the final working prototype illustrates growth in knowledge about dementia and technology use.

Conclusion: The adopted design considerations and processes helped maintain a focus on the user, their goals, and environment. These addressed common design dilemmas and made the developed technology more useful for people living with dementia.

Australasian Conference of Undergraduate Research 2019

The Role Of Catestatin In Hypertension Induced Cardiac Fibrosis

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Introduction: Adverse cardiac remodelling such as fibrosis is a major contributor to heart failure. Catestatin, a cleaved product of chromogranin A, is a potent inhibitor of catecholamine release, which is cardioprotective following ischaemia and has antihypertensive properties. However, whether catestatin has antifibrotic actions on the heart is unknown.

Purpose: Our aim was to examine the extent to which exogenous catestatin can prevent cardiac fibrosis in a mouse model of hypertension and to determine whether catestatin acts directly on cardiac fibroblasts to reduce the fibrotic response.

Methods: 8-week-old C57BL/6 (WT) mice treated with either saline or angiotensin II (angII, 1500 ng/kg/min) received a daily subcutaneous injection of either saline or catestatin (0.5 mg/kg/day) for 14 days. Picrosirius red, which stains fibrillar collagen, was utilised to quantify cardiac fibrosis in left ventricle sections. To assess direct effects of catestatin on fibroblasts, cardiac fibroblasts were isolated from WT mice and treated with ang II (100nm and 300nm). These Ang II treated fibroblasts were also treated with catestatin (10, 30, 100, 300 nM) for 24 hours. Hydroxyproline was assayed to quantify collagen production by these cardiac fibroblasts. Immunoblotting was used to quantify the expression of pro fibrotic proteins by cardiac fibroblasts.

Results: No significant changes were identified in right ventricle and lung weights, however left ventricular weights were significantly increased with angII indicating cardiac hypertrophy, which was not affected by catestatin. There was a significant increase in collagen in ang II treated mice indicative of fibrosis. Collagen production was significantly increased by cardiac fibroblasts treated with ang II 300nM; this was prevented by catestatin (100nM).

Conclusions: These results indicate that catestatin has antifibrotic actions in the heart, and that this at least in part involves direct actions on cardiac fibroblasts to reduce collagen production.

Novel Dietary Intervention For Muscle Phenotype In Neurofibromatosis Type 1

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Background & Aims:

Neurofibromatosis type 1 (NF1) is a congenital genetic disorder commonly associated with a high tumour burden, however muscle weakness is increasingly being acknowledged as impacting on quality of life. Our team has modelled NF1 deficiency in muscle using a limb-specific knockout mouse model (Nf1Prx1^{-/-}) that features intramyocellular lipid (IMCL) accumulation and weakness. We hypothesized that this model could be rescued by dietary modification similar to the clinical treatment for the lipid storage myopathies that also feature IMCL. In subsequent studies we have aimed to mechanistically and longitudinally assess this therapy as a prelude to clinical trials.

Methods:

Nf1Prx1^{-/-} mice were fed normal chow or a modified diet (that included enrichment for medium chain fatty acids and the nutritional supplement L-carnitine). The primary outcome measure was IMCL measured in histological sections by Oil Red O and BODIPY staining. Secondary outcome measures included muscle wet weight and grip strength, analysis of the profile of lipid species using lipid MS, and in situ muscle physiology to test muscle force and fatigability. Initial studies focused on 8 weeks of intervention, however we are currently analysing different time points.

Results:

Our data supports the concept that dietary modification can improve the NF1 muscle phenotype. The modified diet reduced IMCL by 71% and this was associated with a 45% increase in grip strength. Examination of the individual dietary components indicated that L-carnitine was critical and sufficient for IMCL reduction. Muscle specimens have been harvested from the longitudinal study for both lipid MS and histological assessment, which will be completed by September.

Discussion/Conclusion:

These data support the concept that NF1 shares similar features to the lipid storage myopathies and is responsive to dietary intervention. Data from these studies have been used to guide a clinical trial currently underway giving L-carnitine supplementation for NF1 (ACTRN12618002021257).

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Cue Utilisation As An Indicator Of Suicide Risk Assessment Skills: Feasibility And Initial Convergent Validity

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Background: Suicide, is Australia's 13th leading cause of death for people aged 15 to 44 years old. It is responsible for the greatest years of potential life lost, greatly impacts bereaved individuals, and cause significant distress for health professionals working with the victim. Due to its greatly adverse consequences, suicide prevention is a vital initiative and can be improved through conducting quality suicide risk assessments. Currently, measures of suicide risk assessment skills are limited to behavioural or self-report assessments, however it is possible to triangulate the assessment process through an additional method of skill measurement. Cue utilisation is the ability to retrieve learnt relationships between a feature and an event and apply the association in the processing of a novel situation. Cue utilisation has been used to discriminate skills in a variety of fields that require situation assessment including aviation, paediatric care, and driving. As a result, this thesis tests the feasibility of cue utilisation measure for suicide risk assessment, known as EXPERTise in Suicide Risk Assessment.

Aim: To investigate the feasibility and initial convergent validity of a measure of cue utilisation in suicide risk assessment.

Hypothesis: (1) The new measure will demonstrate initial feasibility though (a) people with a variety of skills and experience in suicide risk assessment will successfully complete the tasks on the online measure, and (b) responses to the task will contain sufficient variance that can discern a wide variety of skills in suicide risk assessment. (2) Responses to the tasks and overall scores will exhibit (a) convergent validity with previous experience and training, self-report confidence and capability, and existing self-report measures of suicide intervention skills, and (b) divergent validity through no significant relationships with unrelated variables. (3) The measure will demonstrate test re-test and alternative forms reliability.

Method: A cue utilisation suicide risk assessment skills measure was created using the platform EXPERTise, a shell software that allows users to create cue utilisation tasks for unique fields. This creates five unique tasks that measure different components of cue utilisation. A university sample (n=254) and a community sample (n=91) participated in the study, divided randomly to complete alternate forms. Participants were re-invited to complete another alternate form, two weeks after the first measure.

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Results: (1) The sub-tasks and items of the cue utilisation measure produced sufficient variation but differed in their ability to capture this. Recommendations were made for future iterations to select more optimal items at discriminating skill. (2) The measure provided evidence of convergent validity with the new founded measure's score significantly correlating with established suicide intervention skill measures in the expected directions. Previous training and experience also differentiated individuals who scored more successfully on the skills measure. Divergent validity was also established as the measure provided no relation to variables such as age or gender. (3) Unfortunately, the retention of participants in the second testing period was too limited to establish test re-test reliability.

Discussion: There is encouraging evidence to suggest that a cue utilisation measure for suicide risk assessment skills is feasible. Further suggestions for improvement to further refine items, gather greater convergent validity, confirm reliability, and apply the assessment are provided.

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Post-Operative Instructions Following Minor Oral Surgery - The Quality And The Level Of Evidence

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Objective. The aim of this study was to assess the availability and quality of Internet information targeting the lay public focussed on post-operative instructions after minor oral surgery (MOS), and to determine the level of evidence of any peer-reviewed articles cited in the identified instructions.

Design. Cross-sectional, observational study.

Methods. Web searches were performed to identify professional dental organisations and specialist dental society websites in ten English speaking countries from whom patient focussed post-operative instructions might be sought by the lay public. Each identified website was searched for post-operative instructions and downloaded, or when not readily locatable on websites, each respective organisation/specialist society was emailed, requesting this information, where available. Reliability and quality of post-operative instructions were assessed by a single assessor (JK) using the DISCERN instrument, with intra-examiner reliability assessed via Cohen's kappa. The Joanna Briggs Institute Level of Evidence for Effectiveness was used for assessing articles

Results. Thirty-three patient post-operative instructions from 52 professional bodies/specialist societies in ten countries were identified. Cohen's kappa scores were almost perfect. The overall quality of information was low, represented by median scores of 45%, 42.9% and 41.3% for reliability, quality of information and total DISCERN score respectively. None scored as high-quality. Nearly 10% of the instructions cited a total of six peer-reviewed articles to support their content, with their level of evidence being mostly high.

Conclusions. The quality and the level of evidence of post-operative instructions targeting the lay public and available on the Internet regarding MOS were mostly low. Societies that cite articles to support their instructions are often ranked as high levels evidence. This study could potentially inform the guideline decision-making bodies within professional organisations and specialist societies to review the current information and to make appropriate changes to offer quality, accurate, up-to-date and reliable information.

Unpacking Nature's Arsenal: Investigating The Mechanisms Of P450 Enzymes

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Cytochromes P450 (CYPs or P450s) are involved in the metabolism of drugs, the biosynthesis of steroids, and many other vital biosynthetic and biodegradative pathways. With over 300 000 sequences collected across all areas of life—from bacteria and fungi to plants and animals—P450s are a superfamily of heme-thiolate enzymes.

Despite more than sixty years of study, questions remain about the mechanisms of these enzymes, in particular the mechanism of P450 catalysed dehydrogenation. Dehydrogenation is responsible for the toxicity of drugs like valproic acid (anti-epilepsy) and is important for the biosynthesis of sterols in fungi and protozoa. Mechanistic understanding of P450 catalysed dehydrogenation can help predict drug toxicity, help develop inhibitors for the fungal P450s (antifungal drugs), and can help advance the use of P450s for industrial and fine chemical synthesis. It often occurs alongside hydroxylation, but the factors determining which of the two reactions dominates remain speculative.

To investigate the mechanism, an enzyme—CYP199A4—which is known to dehydrogenate or hydroxylate one of its substrates in a 3:2 ratio was selected and computationally modelled using a combination of quantum mechanics (QM) and molecular mechanics (MM) methods. Density functional theory calculations (a QM method) of a truncated version of the active site could not model the selectivity between the two reactions that was observed experimentally. In order to retain the detail of QM methods at the site of chemical reactivity while practicably modelling the surrounding protein environment, combined QM/MM methods were employed. Preliminary results suggest restriction of substrate movement within the active site of the enzyme may prevent the substrate from moving to the correct position for hydroxylation, slowing this reaction down, and allowing dehydrogenation to occur instead.

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Examining The Relationship Between Cumulative Risk And Protective Factors For Aggression Following Violent Video Game Play

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Although a substantial literature finds links between violent video game play and subsequent short-term aggression in laboratory studies, there is very little research that examines which factors may increase or decrease the risk of such behaviour. Existing findings are typically based on limited measures and/or retrospective self-reported game use and aggression, and to our knowledge no studies have examined a wide range of potential risk and protective factors together. The current study examines why some people are more susceptible to such aggression, and aims to determine which factors accentuate or ameliorate this vulnerability. To this end, a wide range of proximal (person; situation) and distal (environment) factors thought to contribute to susceptibility to aggression were measured online in a sample of 80 undergraduate students (M age = 20.88, SD = 6.62; 87.5% female). Then a behavioural measure of aggression (the CRT task) was administered immediately following violent game play in a laboratory setting. Participants also completed pre- and post-game checklists for feelings, hostile thoughts and levels of arousal. Preliminary analyses show significant bivariate relationships between behavioural aggression following violent video game play and a number of proximal and distal risk and protective factors including hypersensitivity narcissism, guilt and shame proneness, agreeableness, self-control, and parental attachment. A model of best predicting risk and protective factors will be presented.

Misperception Of “Normal” Body Sizes Through Media Consumption

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Extended exposure to standardised images of thin (or large) bodies, where image features such as pose and lighting are standardised, results in an aftereffect where the participant’s perception of the normal body shape shifts in favour of thinner (or larger) bodies. However, this aftereffect has not been investigated using ecologically valid stimuli, such as images similar to those viewed in the media. In particular, the potential for images conveyed through mass media to impact body size perceptions is of importance, as many people, particularly young adults, consume media images on a daily basis. Consequently, this research sought to determine if images, typical to those seen in the media, impact perceptions of body size, and if this impact is equivalent to that caused by adaptation to standardised images. Sixty participants manipulated the size of computer generated lifelike bodies, to what they perceived to be “normal” size, before and after exposure to a bank of images with people of i) standardised high body fat; ii) standardised low body fat; iii) media typical high body fat; or, iv) media typical low body fat. After adaptation to high body fat standardised and media typical images, participants significantly increased the size of their “normal” body. However, adaptation to both low body fat conditions did not significantly change perceptions of the normal body shape. There was no significant difference in the pattern of results for standardised and media typical images. These findings suggest that viewing images of high body fat models similar to those used in the media, may result in misperceptions of normal body sizes. Additionally, this finding provides support for body adaptation being a high-level adaptation effect, and is therefore likely to happen in other ecologically valid contexts, such as face to face exposure.

The Tumour Suppressor p53 Interacts With E3 Ubiquitin Ligase Machinery To Influence The Chromatin Landscape And Facilitate Transcription

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Ovarian cancer is the most deadly gynaecological cancer with a current 5-year survival rate of only 45.7% in Australian women, categorising it as a low survival cancer. Treatment is usually surgery followed by combinations of platinum and taxol-based chemotherapy. While most women respond initially to chemotherapy, the majority relapse with chemoresistant tumours and succumb to their disease. The TP53 gene encodes for the tumour suppressor protein p53 that is known as the "guardian of the genome", effectively acting as a brake on proliferation of damaged cells. Nearly all of the most common form of ovarian cancer, high-grade serous ovarian carcinoma (HGSOC), have a mutation in TP53. Detection of mutant p53 in pre-neoplastic ovarian cancer lesions suggests that this is a very early event in the initiation of ovarian cancer, likely functioning as a key driver mutation. Mutant p53 loses its tumour suppressive functions and in many cases, gain cancer-promoting (oncogenic) effects. Gain-of-function (GOF) mutations cause mutant p53 to accumulate at high levels in the cell, promoting tumorigenesis and drug resistance. Identification of proteins that interact with p53 and mutant p53 may offer new therapeutic targets for the treatment of malignancy. We have used two techniques, co-immunoprecipitation (co-ip) and the Proximity Ligation Assay (PLA), to show that both mutant and wild-type p53 interact with the E3 RING finger ubiquitin ligase proteins RNF20 and RNF40 that work to modify the chromatin landscape. RNF20 and RNF40 function as a complex to add a single ubiquitin (monoubiquitination) to the histone H2B substrate at lysine 120 (H2Bub1) that leads to a more open chromatin configuration and increased gene transcription. Our discovery suggests an important role for RNF20 and RNF40 in the transcription of mutant p53-related cancer genes. Furthermore, it identifies these RING finger proteins as potential therapeutic targets for ovarian cancer.

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Oxycodone Use And Mortality In Older Australian's In A Community Setting

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Worldwide there is concern about the consequences of inappropriate opioid use. Analysis of Pharmaceutical Benefits Scheme (PBS) data on oxycodone supply to older Australians (55- 86 years of age) from the Hunter Community Study (HCS) has shown that approximately 25% of 1160 participants with available PBS data had one or more oxycodone prescriptions filled from 2002-2017. Linkage to mortality data showed increased rate of death in oxycodone users (~21%) compared to the remainder of the cohort (~14%). A literature review identified various potential causes of oxycodone-related death including respiratory and cardiac events as well as drug interactions, poor post-operative outcomes and abnormal drug response due to genetic variation. The present investigation aims to analyse data from PBS records, hospital admissions and death records to identify comorbidities and co-prescribed drugs that may contribute to the increased death rate of oxycodone users compared to non-users in the Hunter Community Study. Preliminary analyses showed no statistical difference in the age of the participants at death or rates of death from malignant causes ($p>0.05$), suggesting that the increased death rate may not solely reflect use of oxycodone in palliative care of terminal cancer patients. Ongoing investigation of the data will investigate the use of time variant covariate models analysing use of opioid use over time, comorbidities, and consequences of hospital admissions to estimate effects on survival time. This research aims to improve patient safety and provide important information for health professionals to consider when prescribing in older people using opioids.

Anisotropic Charge Transport Properties Of Hybrid-Perovskite Bulk Crystals

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Over the past decade hybrid halide perovskites have been discovered as a promising intrinsic semi-conductor for applications in the optoelectronics areas of photovoltaics, photodetectors, lasers and transistors. A Hybrid-Perovskite is a type of perovskite crystal structure conforming to a unit cell of ABX_3 , where X is a halogen anion, B is an inorganic cation and A is made up of an organic and inorganic cation. An advantage of hybrid-perovskites is the economic superiority, they have over existing conventional optoelectronic devices, where they are both agile and low-cost in production. $MAPbBr_3$ and $MAPbI_3$ bulk single crystal hybrid perovskites are of interest, because of the innate physical properties they possess regarding a direct band gap in the visible spectrum, substantial absorption coefficient, long-carrier dynamics, a large and balanced carrier mobility between electrons and holes from exciton production.

Using the Inverse Temperature Crystallisation method, we have synthesised $MAPbBr_3$ bulk single crystals ranging from millimetres to centimetres in scale. For these crystals, preliminary results have displayed a trap density of $3.83 \times 10^9 \text{cm}^{-3}$ and from our Photoluminescence data, we have attained a photoluminescent peak at 528nm and a wavelength absorption onset of about 576nm, which are in line with reported values. For the trap density, we made use of the Space Charge-Limited Method to apply the Mott-Gurney Power Law, finding the Trap-Filled Voltage. Next, we intend to fabricate a Field Effect Transistor based on the perovskite crystals, such that it is possible to check the plane charge transport properties within the crystal surface and to unveil the anisotropic nature of these properties in detail.

Summating, the antecedent literature reports, regarding the Hybrid-Perovskites are promising, displaying the potentially revolutionary properties that can be utilised for optoelectronic technology, however more research needs to be completed, to increase the stability of the crystals so they can become commercially viable.

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Children's Fiction In Nineteenth-Century Australian Newspapers

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My research area was fiction for children in nineteenth-century Australian newspapers. The work involved using advanced navigation methods to locate children's literature in newspapers and the compilation of annotated bibliographies. The bibliographies provided summaries of the works as well as contextual information including genre, settings, authors and, in particular, the pedagogical outlook.

The research method used involved navigating the Trove database to search through Australian newspapers, in particular the Australian Town and Country Journal and the South Australian Chronicle from 1892-1900. Fictional works for children found in these publications were then critically analysed in order to provide detailed information for the annotated bibliographies.

My research for the project began as part of Western Sydney University's Summer Scholarship Research Program and was continued during an internship unit within my degree. The research contributed to Dr Anne Jamison's wider project which seeks to identify key women authors who contributed to the formation of national identity in nineteenth-century Australia. The project seeks to fill a gap in the largely neglected area of children's literature in Australian newspapers. The bibliographies will also inform Dr Jamison's digitisation project which will make literature published in Australian periodicals available to teachers and academic researchers for inclusion in their curriculums.

Having studied the unit Children's Literature: Image and Text while completing my research, I was able to draw comparisons between the motives of nineteenth-century and contemporary children's literature. I found that children's literature today is far less didactic and more inclusive than in the nineteenth-century when it often served a moral function. The project was successful in that it provided confirmation that children's literature published in Australian newspapers often sought to impart economic morals in the shaping of national identity. It also identified women writers for Dr Jamison's investigation as well as insight into nineteenth-century gender divisions.

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Consumer Acceptance Of Alternative Edible Coatings For Apples

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As consumers demand ‘natural’ looking products, major food retailers announced the removal of edible coatings from apples. Edible coatings reduce water loss and slow deteriorative changes, resulting in an increased shelf life of fresh produce. If not treated with an edible coating, over a third of apple production spoils and ends up as food waste prior to getting to the retailer, resulting in lost income for farmers and retailers and an increase in avoidable food waste throughout the food chain. The aims of this project are to find out; how much consumers know about why edible coatings (wax) are applied to apples and if educating consumers on the benefits of edible coatings can influence their attitude toward buying waxed apples.

In an online experiment (n=120) participants will be randomised into one of three conditions, each condition receiving a different education statement about the purpose of edible coatings. Participants in the control condition will only be informed that apples are waxed, the second condition they will be informed that indigestible wax coating can prevent food waste and in the third condition they will read a statement that a natural digestible coating can prevent food waste. Using Analysis of Variance and post hoc t-tests, it will subsequently be analysed, if the participants had read the information (manipulation check) and if the acceptance of coated apples differs between the three experimental conditions. It will further be assessed, if food technology neophobia is related to acceptance of coatings.

Results are expected to show, that providing educational information about the purpose of apple coating influences consumers’ acceptance of different coatings. This knowledge will help to craft education/marketing campaigns that educate consumers on how coatings increase shelf life and reduce food waste, whilst at the same time maintain the desire for ‘naturalness’.

Size Is In The Eye Of The Beholder: How Extreme Bodies Bias Our Perception

Jesse Mathew

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Body shape and size misperception occurs when individuals consistently misperceive the dimensions of their own body. Such misperceptions are commonly observed in eating disorder patients. For example, sufferers of anorexia nervosa regularly perceive their underweight bodies as being significantly larger than they really are, and adjust their behaviour to reflect this. Recent studies have suggested that visual exposure to extreme body sizes alters the subsequent perception of other bodies, including one's own, via the process of adaptation. It is well known that prolonged viewing of a red "adaptor" stimulus can lead to an "aftereffect" where people see an illusory green colour, and vice versa. Similarly, exposure to thin (large) adaptor bodies can make subsequently seen normal "test" bodies appear much larger (thinner) than they really are. We use this adaptation paradigm to probe the foundations of body perception.

Two models for the perception of body size and shape have been proposed. These models predict different patterns of aftereffects for various combinations of adaptor and test stimuli. Specifically, the two models conflict in the aftereffects predicted when a test body is more extreme than the adaptor used.

The current study trained participants to accurately rate a range of different sized bodies based on their level of body fat. After 2 minutes of adaptation to thin (large) bodies, their perception of size was again assessed for the range of test bodies. By comparing ratings of body fat before and after adaptation, we can establish which processing model underpins body perception. The conclusions of the current study will be used to advance the understanding of body perception and inform the development of treatments for conditions in which body size and shape misperception is evident.

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Memory Troubles: Newspaper Representations Of The Ballymurphy Massacre

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My Honours thesis concerns the Ballymurphy Massacre, an event that occurred during the Troubles conflict in Northern Ireland. Local residents remember it as the killing of eleven unarmed Catholic civilians over a 36-hour period in the Ballymurphy area of Belfast in 1971. The Ballymurphy Massacre entered public memory after relatives of the dead gathered for the first time as a group in 1998, twenty-seven years after the event. The families have consistently claimed that British Army troops were responsible for the killings. Since that gathering, Ballymurphy has infiltrated the public consciousness of the Nationalist community in Northern Ireland as a significant moment in the history of the Troubles. The aim of my thesis is to investigate why a memory of the massacre did not enter the collective memory of the Nationalist-Catholic community in its immediate aftermath.

This paper presents an analysis of a selection of the mainstream Northern Irish newspapers from 10-12 August 1971. The aim of this review is to see if anything resembling the Ballymurphy Massacre — as remembered by eyewitnesses — was represented in the mainstream press at the time. My research shows that the news media focused most of its attention on the internment of civilians, and the subsequent allegations of torture and mistreatment of internees. I suggest that the details of the massacre were obscured by, and partially absorbed into, coverage of the roll out of internment. I conclude that the existence of a collective memory of the state's previous uses of internment against the Nationalist community determined how the newspapers reported the events of 9-11 August 1971. Ultimately this process acted to occlude details of the Ballymurphy Massacre, and thus excluding it from the broader memory of the Troubles.

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The Identification Of Novel Inhibitors Against The Deadliest Malaria Parasite, Plasmodium Falciparum

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Malaria remains one of the most prevalent mosquito-borne diseases on the planet, with 219 million cases reported in 2017 with *Plasmodium falciparum* accounting for more than half of these. While there are many antimalarials in use, there have been many instances of resistance reported, creating a need to develop novel therapies against the parasite. With the rising costs and low success rates of novel drug development, drug repurposing serves as an alternate strategy to develop novel therapies by speeding up the drug discovery pipeline. This study explores the concept of drug repurposing for use against malaria, with the eventual goal of identifying compounds which can be accelerated through the drug discovery pipeline for clinical testing. The Selleck Chemicals Anti-cancer library was explored for antimalarial activity via medium-throughput screening (MTS) assays. Highly synchronised cultures of the drug sensitive 3D7 strain were grown in the presence of each of the compound (10 μ M in DMSO) for one complete life cycle, and growth inhibition was measured using a fluorescence-based assay. A total of 131 compounds showed complete growth inhibition against *P. falciparum*, with varying targets and mode of actions in cancer cells. Through an extensive literature study on the mode of action, pharmacokinetic data, current clinical trial progress, as well as prior studies in malaria, 50 compounds were determined to be suitable for further studies and validation.

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The Indispensable Role Of B-Catenin For The Proliferative Effect Of Oestrogen On The Uterine Epithelium

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The endometrium, the inner lining of the uterus, has incredible transformative ability as it continually degenerates, regenerates and differentiates during pregnancy and the menstrual cycle. This is controlled by oestrogen and progesterone; however, dysregulation of these hormones is often involved in the pathogenesis of gynaecological diseases, including cancer. In endometrial cancer, oestrogen dominance increases endometrial proliferation causing the development of oestrogen-dependent tumours. To understand how oestrogen promotes cancer cell proliferation, we must first understand which molecular signalling pathway oestrogen works through to produce its effects on the endometrium. Clinical reports have shown that Wnt/ β -catenin signalling is amplified in 30-85% of endometrial cancer cases, so this pathway likely has a role in the pathogenesis of endometrial cancer (Saegusa & Okayasu, 2001; Scholten, Creutzberg, van den Broek, Noordijk, & Smit, 2003). However, there is no evidence of oestrogen utilising the same Wnt/ β -catenin signalling physiologically to exert its proliferative effect on the endometrium. In this study, we have provided for the first time direct evidence that oestrogen cannot produce any effect on the endometrium in the absence of β -catenin. To demonstrate this we used a novel in vitro model system known as endometrial organoids. We first developed and characterised mouse endometrial organoids to show that they are not only morphologically similar to the endometrium in the body but also functionally responsive to oestrogen and progesterone. Next, to investigate the effect of oestrogen on the endometrium in the absence of Wnt/ β -catenin signalling, we developed endometrial organoids from a mouse model with specific β -catenin gene deletion and consequent Wnt signalling inactivation in the endometrial epithelium. These mutant organoids had an abnormal cellular structure with disrupted apicobasal polarity and an irregular, flattened appearance. Notably, these organoids had no response to oestrogen treatment, as immunostaining showed no morphological changes between the oestrogen treated and untreated organoids. This indicates that intact Wnt/ β -catenin signalling is required for oestrogen to induce endometrial proliferation.

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Disorder By Design: Energy, Pyrochlores And The Art Of 'Stuffing'

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Low-emission energy-generation systems, utilising both nuclear and renewable energy, are being developed around the world in order to combat climate change. Two current technologies being developed in Australia, which are related to renewable and nuclear energy respectively, are next-generation oxygen ion conductors and materials suitable for long-term storage and disposal of radioactive nuclear wastes.

Pyrochlores of the structure $A_2B_2O_7$ have found immense applications in each of the above areas. However, one application requires flexibility and movement in its anionic sublattice, whereas the latter needs a robust lattice where ions cannot escape. This is a seemingly contradiction in requirements. It is believed that oxygen vacancies present in the pyrochlore structure allow for short-range disorder, whilst keeping the long-range order intact.

We are investigating the oxygen-vacancy disorder, and 'tailoring' it to improve the applications of pyrochlores. We have done this by looking at 'stuffed' pyrochlores of the form $A_2(A_{0.67-x} B_{1.33+x}) O_{6.67+x/2}$. We wish to determine whether controlling the disorder in the cation sublattice will allow us to tailor-make stuffed pyrochlores targeting specific applications.

Two series of stuffed pyrochlores have been synthesised using conventional solid state methods and their long-range average structures characterised by Rietveld refinement against X-ray powder diffraction data. The local short-range order has been characterised by Raman and infra-red spectroscopy.

Over the coming months, further characterisation will be undertaken using the Soft X-ray Spectroscopy and Powder Diffraction beamlines at the Australian Synchrotron. It is also planned to determine the displacement of oxygen ions using the ECHIDNA Diffractometer at ANSTO. Other measurements have also been performed regarding their photocatalytic, associated band gaps and magnetic properties, showing promising results.

These results will be presented, along with a judgement as to whether inducing certain types of disorder within the pyrochlore structure can lead to them being purposely-engineered for specific applications.

**Understanding Decisions To Avoid Driving Through Floodwater:
Application Of Protection Motivation Theory**

Marvin-Adib Najem

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BACKGROUND RESEARCH & AIM

A prominent behavioural risk factor related to flood fatalities is driving through floodwater. Considerable progress has been made in understanding the factors underlying this risky behaviour. However, the decision to avoid driving through floodwater has received limited attention by existing research. As such, the present study employed Protection Motivation Theory (PMT) to enhance understanding of the Psychological processes that motivate individuals to avoid driving through floodwater in low-risk and high-risk flooding situations. According to this theory, intention is the proximal determinant of behaviour. The current study aimed to determine whether threat and coping appraisal variables, as stipulated by PMT, could predict the intention to avoid driving through floodwater over and above the effect of other factors such as vehicle size and driving experience.

METHOD

The present study employed a cross-sectional design and focused on young Australian drivers, given their propensity for risky driving behaviours. Participants were 205 Australian drivers aged between 17 and 30 who completed an online questionnaire containing hypothetical driving scenarios.

RESULTS & DISCUSSION

Consistent with hypotheses, the results revealed that the intention to avoid driving through floodwater was associated with drivers' threat and coping appraisals in the theorised directions. In addition, a subset of these appraisal variables emerged as significant independent predictors of driver's intentions to engage in this protective behaviour. These variables were perceived vulnerability, perceived severity, self-efficacy, and perceived rewards for non-protective behaviour. These findings suggest that a driver's perception of risk associated with a flooded roadway, the perceived benefits of driving through (e.g. saving time), and a driver's confidence in their ability to execute an alternate course of action (e.g. find an alternate route) are important sources of influence underlying the decision to avoid driving through floodwater.

Snacking With Friends: Does Watching Familiar Content Make You Eat More?

Bianca Oliva

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Background

Eating while watching television (TV) has been shown to increase food intake, leading to claims that it is a risk factor for obesity. However, some studies have found no effect. This variability may reflect how engaging the content presented is, which Mathur and Stevenson (2015) investigated by manipulating content familiarity. Participants consumed more food while viewing familiar content compared to novel content, suggesting that more engaging content draws attention away from eating and actually reduces intake. However, their study was conducted in a female-only sample. Many differences have been found in how much males and females engage with content, and their patterns of eating also differ. Few studies within the TV and eating literature have examined male-only samples, so it is important to examine the food consumption of males to help develop appropriate health interventions for obesity.

Research question

The present study seeks to investigate whether the effect obtained in Mathur and Stevenson's (2015) experiment also applies in a male-only sample.

Research methods

Male undergraduate psychology students ($n = 45$) undertook two experimental sessions. In the less engaging "Same" session, participants viewed one episode of the show "Friends" twice. In the more engaging "Different" session, participants viewed two different episodes, which were also different to whichever episode they viewed twice in the "Same" session. The participants were provided with snack foods to consume during the second episode viewing of each session, and the amount of food remaining unconsumed was weighed.

Preliminary conclusions

We predict that males will consume more food in the "Same" condition than the "Different condition. However, if the predicted effect is not obtained, we will look at whether food-intake is influenced by how engaging males find "Friends" to be.

Australasian Conference of Undergraduate Research 2019

Investigating The Inflammatory Profile Of Alzheimer's Disease In Down Syndrome

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Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterised by the presence of amyloid- β (A β) plaques and neurofibrillary tangles (NFTs). Chronic inflammation is another hallmark of AD and includes increased activation of the brain's immune cells (microglia and astrocytes), in addition to increased expression of several pro-inflammatory mediators. Individuals with Down syndrome (DS) represent the largest genetically at-risk population for AD and are destined to develop the most common form of early-onset AD due to the triplication of chromosome 21. Therefore, determining the inflammatory changes in individuals with DS provides a unique opportunity to identify potential cellular and biochemical components involved in AD pathogenesis. I utilized immunohistochemistry and western blot approaches to investigate the neuropathology of DS in the absence and presence of AD (DSAD). I found that amyloid precursor protein (APP) levels, A β deposition, and phosphorylated tau (pTau) levels are increased in DSAD hippocampal samples relative to DS. DSAD cases also exhibit increased microglial activation and decreased activation of the immune-related transcriptional factor nuclear factor- κ B (NF- κ B). Collectively, this study indicates that increased APP expression leads to increased A β deposition and microglia activation in DSAD, with the inflammatory response potentially occurring independently of NF- κ B activation. Additional studies are still required to understand the inflammatory response associated with AD in individuals with DS.

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Neuroprotective Developmental Care: A Pre-Post Study

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The challenges faced by mothers during the early months of caring for their newborn have been addressed to form an innovative model of infant and mother care. Neuroprotective Developmental Care (NDC) provides a uniquely holistic approach which acknowledges the interrelatedness of breastfeeding, sleep, cry-fuss behaviours, and maternal mood during this vulnerable period. NDC supports parental responsiveness to promote healthy psychological attachment and neurohormonal synchrony between parent and infant.

Objective: To collect data on the mothers and infants accessing NDC intervention, both to understand their experiences and characteristics at point of access and to explore the effectiveness of NDC by following up participants when their infant is 6 and 12 months of age.

Methods: This study invited all mothers accessing NDC to participate in a baseline survey when they began accessing NDC and followed up participants when their infant was 6 and 12-months of age. Participants were compared against their own baseline surveys. An additional analysis compared the baseline surveys of a pseudo-control group whose infants were 12-months old, to follow-up surveys of those who had received NDC intervention when their infants were 12-months old.

Results: Results show statistically significant improvement in crying time, the mother's perception of their infant's sleep problems, the mothers own sleep satisfaction, the mother's Acceptance and Action Questionnaire score and the mother's Edenborough Post-Natal Depression Scale score from baseline to 12-month follow-up as well as in 12-month old babies who had received NDC intervention compared to those who had not.

Conclusion: The results of this study are consistent with the NDC being efficacious for infant's crying, the mother's perception of their infant's sleep problems, the mothers own sleep satisfaction, the mother's experiential avoidance and the mother's risk of postnatal depression. These preliminary findings suggest that NDC is effective and relevant for further clinical and health professional education with the aim of making this intervention more publicly accessible.

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Transnational Perspectives, Social Histories: Australian Perspectives And Insights Into China In The 1920s And 1930s

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This paper explores China and Australia's social history during the 1920s and 1930s by examining the personal accounts of white Australians who lived in China. Examining these personal accounts gives great insight into both contemporary Chinese society and how Australians viewed Chinese at the time. Historians of modern China traditionally relied on Chinese-language sources to study Chinese society. However, more recently, historians have been exploring how sources from foreigners living in China can provide fascinating alternative perspectives. However, the focus remains on British and American perspectives to the neglect of Australian sources. Of course, Australian sources also give great insight into domestic Australian views towards China and the Chinese.

This paper only examines accounts from two Australians who lived and travelled in China during the 1920s and 1930s. However, as a form of microhistory, this paper treats these limited personal accounts as a microcosm of insights that reflect and illuminate wider contemporary trends and perspectives. I examine businessman Rex Phillips' writings, documenting life in Shanghai in the 1920s and 1930s. Phillips' writings can reflect, to a degree, the views and experiences of many Australians dealing with China on a primarily commercial level, especially after the Great Depression saw relatively more Australians seek overseas opportunities. I also examine the travel diary of Harry Glathe, who travelled extensively in inland China. Glathe's perspective can reflect how Australians viewed China in and of itself, rather than through a commercial lens.

These writings give great insight into Australian perspectives on China, as well as Chinese society itself. Phillips' writings highlight how Australians could disdainfully view China as a dangerous, backwards, war-torn nation, while Glathe's writings show how Australians may have viewed China from an Orientalist viewpoint – a quaint, exotic, but developing country. Phillips' writings also give greater insight into life as an Australian in Shanghai, while Glathe's extensive travels and experiences in inland China gives great insight into Chinese society during the 1930s, both reinforcing and challenging existing historiographical views.

Flex Brain Game Demographics: Informing Automatic Evaluation Of Exercise Through Gamification

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University

Despite public health efforts to promote exercise in Australia, adult engagement in regular exercise remains low. Most person-level exercise interventions attempt to change behaviours by influencing a person's intentions to be active, but only part of exercise behaviour can be predicted by intention or goal-oriented strategies.

Dual-process frameworks describe behaviour as both reflective (i.e., goal-directed, intentional) and non-conscious (i.e., unintentional, automatic) influences. There is considerable evidence regarding reflective processes that influence exercise; far less is understood about the non-conscious processes that influence exercise, e.g. automatic evaluations. Automatic evaluations are non-conscious mental associations of the concept of exercise as "good" or "bad". Some evidence shows positive correlations between automatic evaluations of exercise and exercise behaviour, but there is little research investigating these processes in an experimental design.

An ongoing research project is investigating a gamified application (Flex), testing whether automatic evaluations of exercise can be delivered without participant awareness. Flex was offered as a free mobile application, and incorporated four different "brain games", with users randomly allocated to either a control or exercise-content version of the games. As user engagement is essential to successfully translating behaviour change techniques into real-world interventions, preliminary evidence was needed to determine player demographics, which of the four games people were most drawn to, and how often/long people engaged with the application.

A preliminary study of user engagement found that most users were under 25 years old (51%) and female (60%). Most users (75%) played the games 18 times or more, with card-flipping memory game Flashback being most played ($M= 8.96$, $SD= 11.75$). On average, the three other games were played about half as many times. These findings essentially inform the experimental study, which will consider the effects of the intervention using Implicit Attitude Tests, potentially leading to behavioural change strategies beyond traditional intention-based strategies.

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Speech And Language Pathologists Knowledge And Practice Of Radiation Protection During Videofluoroscopic Swallowing Studies

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Research Questions

How knowledgeable are Speech and Language Pathologists (SLPs) about radiation protection, and the workplace practices that they utilise during Videofluoroscopic Swallowing Studies (VFSS)?

Methods

The research utilises an online questionnaire distributed through Survey Monkey. The questionnaire was distributed to SLPs from six different countries, including Australia, Canada, Great Britain, Ireland, New Zealand and the United States of America. The questionnaire asked a total of 96 questions and was a combination of both closed response and open-ended questions. The questionnaire was divided into five sections, with the focus of this research on the final section which investigated radiation protection knowledge and practice. Data analysis of closed questions was through summary statistics such as frequencies and counts. Statistical differences between countries were analysed using Chi-Square with significance assessed at 5% ($p=0.05$). Data analysis of open-ended questions was through the development of codes to identify themes, patterns and relationships.

Background

Whilst SLPs are performing VFSS procedures, they may often be required to stand in close proximity to the patient, exposing them to the primary and scatter radiation beam. Previous studies conducted on this issue have reported that SLPs lack sufficient knowledge of basic radiation protection practices, and recommended increasing the amount of education provided to SLPs on safe radiation practice.

Preliminary Conclusions

While a large portion of SLPs does appear to have theoretical knowledge about the fundamental methods of radiation protection, this knowledge is not necessarily being applied in clinical practice. Respondents stated that changes which could be made to overcome this include an increased education in regards to radiation protection and training.

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Investigating Mechanisms Driving Food Sensitivity And Allergy Through Immune Dysregulation

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Food allergy (FA) affects up to 10% of infants and 2% of adults in Australia and manifests in a range of serious symptoms. FA is an abnormal T-helper type 2 mediated immune response to specific food antigens. The exact immune mechanisms which cause this response are unclear, however there is evidence that the use of antibiotics during infancy is associated with a significantly increased risk of developing FA.

Antibiotics induce dysbiosis or dysregulation to the intestinal microbiome. We hypothesise that this dysbiosis will alter the composition of the mucosal immune population, increasing food antigen uptake and sensitisation. We aimed to examine mucosal immune changes following antibiotic treatment and understand how these changes influence immune responses to food antigens. To investigate this, we are developing a physiologically relevant mouse model of oral sensitisation.

Balb/C mice (n=8 per group) received amoxicillin/clavulanate (5mg/kg) or PBS, via oral gavage on days 0-4 to induce dysbiosis. On days 4 and 5, mice were administered peanut protein extract (1mg/mL) or PBS before being sacrificed on day 7. Blood, small intestines, and lymphoid organs were collected for analysis of resultant immune responses

Preliminary PCR data demonstrated upregulated IL-5 transcription in the experimental mice. IL-5 has a known role in eosinophil recruitment, and assessment of histology proved duodenal eosinophilia as well as the increased presence of mast cells. This phenotype is indicative of a type 2 response.

The model has thus far confirmed that introduction of antigenic food following a course of antibiotics results in altered mucosal homeostasis in the small intestine, leading to sensitisation. The resulting phenotype is representative of type-2 immune activation, consistent with a number of gastrointestinal disorders including FA. Further characterisation of the response will contribute to the understanding of food sensitisation and can support the development of improved treatment and prevention options.

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The Multidisciplinary Management Of Dentofacial Deformities; Long Face Syndrome

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The management of dentofacial deformities was historically viewed as a physical intervention and was carried out by a sole practitioner, either a surgeon, or an orthodontist. Management by only one of these clinical disciplines frequently resulted in a compromised occlusion, or facial profile and it was established that joint management was necessary for more severe dentofacial deformities. As the medical profession's understanding of dentofacial deformities developed further, several other issues besides from facial profile and occlusion were observed amongst sufferers including psychological, speech, airway and sleep issues. Whilst the surgical-orthodontic correction of dentofacial deformities has been demonstrated to rectify most of these issues, wholistic management of the entire problem list is arguably beyond the scope of a surgeon and orthodontist. This study will focus on the dentofacial deformity 'long face syndrome', which is primarily characterised by vertical maxillary excess and clockwise rotation of the mandible. It is a severe dentofacial deformity known to compromise the sufferer's aesthetics and function, along with potentially having a large psychological impact. The aim of this study is to review the clinical presentation of long face syndrome, along with its associated consequences and confirm that the multidisciplinary dentofacial deformity management protocol at the Australian Craniofacial Unit appropriately addresses them.

The specific outcomes that will be assessed are skeletal outcomes (using lateral cephalogram radiographs), facial outcomes (using clinical photographs), speech outcomes (using speech pathologists report), otolaryngology outcomes (using ENT report on symptoms), occlusal outcomes (Using PAR index) and most importantly, patient satisfaction (Using an anonymous questionnaire).

We believe the protocol in place achieves on all these fronts and hope to set a gold standard for the management of dentofacial deformity patients around the world and highlight the fact that orthognathic surgery is much more than a physical intervention solely for cosmetic purposes.

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Transforming Patient Safety In Dementia Care

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Aim: To promote clinical practices that promote patient safety in dementia care.

Background: Given ageing populations and the rise of cognitive impairment, health systems are under increasing strain. The safety of elderly people with dementia can be compromised by: the time required to establish rapport with patients and carers; the burden of bureaucratic accountability mechanisms that often quantify care; poor communication among clinicians; staff burnout and, relatedly, limited workforce capacity; and varied interpretations of evidence-based care. Despite these challenges, dementia care that is safe for patients, carers, and staff members does occur – the challenge is to identify, learn from, and share these experiences.

Methods: This 18-month study was conducted in a South Australian inpatient geriatric unit for people with dementia. Patients, carers, and staff members allowed researchers to use the methodology of video reflexive ethnography (VRE) to visibilise the invisible. It involved negotiated processes between researchers and participants to capture commonplace practices via video-recordings, which the researchers and participants analysed, during reflexive sessions that were also video-recorded. The video-recordings were analysed to clarify some of the themes that contributed to the clinical practices that promoted patient safety in dementia care.

Findings: Patient safety was optimised when managers, clinicians, carers, and patients shared an understanding of what constituted safe dementia care. In this study, such care involved: context-specific education before commencing employment; relating to staff members – regardless of seniority – as part of a family; experiential learning; shared goals; and flexible practices driven by patient and carer preferences.

Conclusion: This study reveals some of the ingredients that contribute to safe dementia care for elderly people and their carers. Specifically, it demonstrates how principles of safe care are applied locally. To maximise patient safety, clinicians should be empowered and supported within a cohesive team environment.

Australasian Conference of Undergraduate Research 2019

The Treatment Of Monsters As "Other" In Science Fiction

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My honours thesis aims to investigate the shifting perspective of the “Other” in contemporary discourse. Through a Classical Reception lens and Practice-led research, I hope to explore the changing role of the monstrous in science fiction to reflect the growing sympathies for what is considered “Other.” Classical reception studies explore how myth has been altered and/or adopted to produce new text. By writing creative fiction exploring this topic, I am able to adopt a unique perspective of the classical reception of monsters in a modern context. My inspiration comes from texts such as Guillermo del Toro’s *The Shape of Water*, and Randolph Stowe’s “Green Girl as Elderflower,” both of which are exemplary at evoking feelings of sympathy for their mermaid monsters. For this reason, I will be analysing the mermaid tradition from myth to folktale, while adopting the Amphibian man/Mermaid monster to reinterpret the stories of popular mythical monsters such as Medusa and the Minotaur; who are representatives of the dualistic tradition from which mermaids descend. As my science fiction narrative takes place in a dystopian future, a by-product of this study explores the nature of humanity when given freedom from moral and ethical restrictions/obligations, with a focus on their treatment of, and relation to, the “Other.” In conclusion, my thesis aims to show our changing sympathies to the “Other” as we learn to re-evaluate our understanding of monster and how we relate to it, using the easily accessible nature of the science fiction genre.

Australasian Conference of Undergraduate Research 2019

Indigenous Language Robot Framework For Improving Robot-Based Teaching Modalities Of Endangered Indigenous Languages

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A large number of Indigenous languages in Australia have become increasingly endangered, with only a handful of speakers remaining for some languages. In an effort to support communities working on the revitalisation of their languages, OPIE the robot was co-designed by the Centre of Excellence for the Dynamics of Language (CoEDL) and the Ngukurr Language Centre. The purpose of OPIE is to provide a platform for language-based educational games and activities which can be used to engage young children and provide practice with such endangered languages. The 2018 winter research project contributed to the development of an Indigenous Language Robot framework, which includes the OPIE robot, a language resource creation tool and a data visualisation tool.

Hermes is the language resource creation tool that allows swift addition of new language data by automatically converting them into the OPIE format. The data visualisation tool, VisualOpie, is an R-based Shiny dashboard which displays statistical user data collected by OPIE. The purpose of the framework is to enable OPIE to be deployed into classrooms, where it will log user data. This data will be displayed and analysed on VisualOpie. Consequently, additional language resource can be created using Hermes based on the insight gained from VisualOpie.

Hermes features an advanced dictionary building mechanism, with the ability to add translations, voiceovers and images associated with each word. The benefits of VisualOpie are threefold, in that it provides teachers reports of learners' progress, performance data to guide language resource development and usage data to assist in developing the framework.

This iterative design framework is targetted towards building a sustainable teaching modality for endangered Indigenous languages. It is hoped that following further refinement and testing, both Hermes and VisualOpie will be ready for the first cycle of development and evaluation of OPIE robots within the Ngukurr community.

Australasian Conference of Undergraduate Research 2019

Real Time qPCR Detection Of *Calonectria ilicicola* In Avocado Roots

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Nursery trees of avocado (*Persea americana*) can die a year after transplantation due to black root rot caused by pathogens from the genera *Dactylonectria* and *Calonectria*. The most aggressive known species is *C. ilicicola*. A rapid real-time polymerase chain reaction (qPCR) diagnostic assay was designed for early detection of this fungus. Pathogen-specific qPCR primers and probes were designed based on the β -tubulin and Histone H3 partial gene regions. The specificity of the primers were tested with conventional PCR followed by validation with real-time qPCR, using DNA templates from 20 isolates of target *C. ilicicola*, and non-target representative species of *Dactylonectria*, *Ilyonectria*, *Gliocladiopsis*, *Cylindrocladiella*, *Mariannaea* (2 isolates each), and *Calonectria* sp. (19 isolates). Optimisation of qPCR was done by varying the annealing and extension temperature and addition of reagents such as bovine serum albumin (BSA) and dimethyl sulfoxide (DMSO). Sensitivity tests were conducted by checking for amplification of diluted target samples. One-month old avocado seedlings were then inoculated with *C. ilicicola*. Necrotic roots were obtained from the seedlings and DNA was extracted using a tissue lyser and a lysis buffer.

One hundred percent specificity for *C. ilicicola* was demonstrated with conventional PCR with all 20 *C. ilicicola* isolates detected. The real time qPCR assay was subsequently optimised by including BSA in the master mix and an annealing and extension temperature of 65°C with detection occurring at Ct below 35. The qPCR assay demonstrated sensitivity to 0.45 ng/ μ l. The qPCR assay was not able to detect *C. ilicicola* fungal DNA in planta and further optimisation of DNA extraction techniques with plant tissue is required to fully validate the assay. Nevertheless the qPCR assay demonstrated specificity and sensitivity for detection of *C. ilicicola* with pure fungal DNA as the template.

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Interaction Between Activism And Community Building Practices In The Australian Anti Capitalist Environment Movement

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Research Question: ‘How do the practices of activism and alternative community building interact with each other in the lives of ‘radical’ anti-capitalist and environmental activists?’

Methods: This project draws on Bourdieusian and Assemblage theories to investigate the ways that activist and community practices are shaped through the relationships between the various human and non-human components of activist networks, as well as wider society. Primary data collection involved qualitative one on one semi-structured interviews. Strategic recruitment of interviewees sought participants from a mix of different groups, aiming for a combination of experiences and theoretically rich data. Interview transcripts were coded for emergent themes, utilising standard qualitative thematic analysis.

Background: A wide variety of individuals in Australia and other countries are involved in grassroots activist movements that work to resist and challenge the ongoing effects of globalisation, capitalism, patriarchy, and other dimensions of power and inequality. The building of alternative communities and social support networks is important for maintaining and growing involvement while mitigating burnout. While it would appear that activism and community building practices should work to support each other, given limited capacity and resources there exist potential tensions between these two areas of activity.

Conclusions: Striking a balance between focusing on activism and community building can be difficult for many activists to sustain. The networks of influence that decision makers and other social actors are embedded in strongly influence the types of action and community building that activists utilise. Lack of access to material resources also constrains the scope of actions and alternative community building. This supports the applicability of assemblage thinking for investigating activist practice, which encourages a detailed analysis of the relationships between all of these elements and the ways that these relationships shape the possibilities for action within and between activist groups.

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Prevalence, Trends And Drivers Of Home Birthing During Democratic Governance In Nigeria From 1999 To 2013

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Background: Globally, birthing in a health facility is an important interventional strategy for improving maternal and child health outcomes. In Nigeria, however, home birthing is common, particularly in areas with traditional birth attendants (TBAs) and other unskilled attendants (OUAs). Investigating the trends and enablers or barriers to health facility birthing is essential for policy decision-makers and health practitioners to efficiently allocate resources.

Aim: To investigate the prevalence, trends and drivers of home birthing during democratic governance in Nigeria between from 1999 and 2013.

Methods: This study used the Nigeria Demographic and Health Surveys for the years 1999 (N=3552), 2003 (N=6029), 2008(N=28,647) and 2013(N=31,482). Multivariate logistic regression was used to investigate the association between socioeconomic, demographic, health service and community level factors with TBA/OUA utilisation in Nigeria, after adjusting for confounders and sampling weight.

Results: The study indicated that the proportion of mothers who were assisted by TBA increased from 20.7% (95% CI: 18.0-23.7%) in 1999 to 24.4% (95% CI: 22.6-26.3%) in 2013, but it was not statistically significant. In the same period, OUA delivery decreased from 37.7% (95% CI: 34.6-41.0%) in 1999 to 37.5% (95% CI: 35.4-39.6%) in 2013. Multivariate analyses identified a total of seven factors that were associated with TBA and OUA use. The three most significant factors were low maternal education, poor wealth status and not attending antenatal care.

Conclusion: The study showed that TBAs and OAU use slightly increased in Nigeria from 1999 to 2013. Improving health facility birthing in Nigeria would require increased maternal and child health efforts that target mothers who are less educated, have poor wealth status and do not attend antenatal care.

Keywords: Home delivery, traditional birth attendants, other unskilled attendants, Nigeria.

Australasian Conference of Undergraduate Research 2019

Exploring Exercise Perceptions And Experiences Of Cardiac And Pulmonary Rehabilitation Patients

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Exercise rehabilitation programs are encouraged by health care teams to support patients with pulmonary or cardiac disease to improve fitness, strength and energy, and also to prevent subsequent health issues post-hospitalisation. Whilst the benefits of exercise programs are well-documented, little attention has been given to understanding the long-term continuity of patients' physical activity behaviour and motivation beyond the clinical rehabilitation setting. This study sought to explore patients' perceptions and motivation towards exercise inside and outside of rehabilitation, specifically focusing on long-term exercise engagement following clinical rehabilitation program completion.

Following a pulmonary or cardiac event, patients were medically referred to a local eight week pulmonary and cardiac exercise rehabilitation program. At first consultation, patients were invited to participate in the study to understand their levels of physical activity. Patients who agreed to participate in the research (n= 31) were asked to complete quantitative and qualitative measures over six months, both during and post rehabilitation. The current study utilised the qualitative portion of this study. Using a semi-structured script, patients were interviewed face-to-face at baseline, 3 months and 6 months. Interview questions explored the patients' experiences and perceptions of exercise inside and outside of the rehabilitation setting and what they felt may impact long-term continuation of physical activity after rehabilitation was complete.

Experiential thematic analysis generated five main points of interest including patient understanding of exercise benefits, importance of motivational climate, financial and environmental barriers, accepting exercise as a lifestyle choice and interference of health and pain concerns.

From these five points, recommendations for improving the long-term success of the rehabilitation program include educating patients about the long-term nature of exercise and its benefits, post-rehabilitation partnerships with local health and fitness organisations that encourage social networking for patients and the opportunity to commit to regular sessions at an affordable price.

Would You Say That To A Friend? A Randomised Controlled Trial Of A Self-Compassionate Writing Intervention For Body Image Disturbance In Individuals With A Visible Skin Condition

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Visible skin conditions can manifest negative self-body evaluations that are associated with psychological issues including negative affect, social anxiety, and depression. Limited access to successful psychological intervention within dermatological clinical consultations means that body-image concerns are rarely attended to within this setting. “My Changed Body” (MyCB) is a web-based psychological therapeutic writing intervention, that has led to improvements in body image-related distress in breast cancer survivors. A prior feasibility study of the MyCB intervention with the visible skin condition population indicated likely benefits with increases in self-compassion and decreased negative affect evident immediately following completion of the writing activity. This randomized control trial will extend this work by examining the longer-term effectiveness of the MyCB intervention in addressing body image disturbance (BID) in individuals with a visible skin condition. Undergraduate university students (N=126) with a range of visible skin conditions provided online informed consent then completed baseline measures of the primary outcomes of body image disturbance, negative affect, and self-compassion. They were then randomly allocated either to an active control writing condition (n=62) or to the MyCB writing condition (n=64). Participants were blind to their condition allocation. Participants wrote in their allocated condition for 20 minutes immediately after completing the baseline questionnaire. At 1-week follow-up participants again undertook allocated writing for 10 minutes only, and completed questionnaire assessments at 1-week and 1-month follow-up. Overall retention was 80% (i.e., 20% attrition). The average word count of the MyCB writing intervention M = 639 words, compared with control writing intervention M= 509 words. Hypothesis testing analyses will be undertaken with intent-to-treat linear mixed models with maximum likelihood estimation. Specific results will be presented and implications discussed.

Australasian Conference of Undergraduate Research 2019

The Role Of Oxidases Signaling In Colitis

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Inflammatory Bowel Disease (IBD) is a group of chronic inflammatory diseases of the gastrointestinal (GI) tract that affect 1.3% of individuals, and this number continues to increase worldwide. Ulcerative colitis (UC) and crohn's disease (CD) are the two main types of IBD. Current treatments include anti-inflammatory drugs and monoclonal antibody therapies to reduce inflammation and promote healing, however these are suboptimal and often have severe side effects. The Th17 immune response is common to all IBD types, although the trigger for this inflammation remains unknown. Inflammation induced oxidative stress promotes the Th17 response through dysregulation of reactive oxygen species signaling pathways and damage of the epithelial cells in the gut. Dual oxidase 2 (Duox2) and dual oxidase activator 2 (Duoxa2) are the two main downstream molecules in the ROS signaling pathway and it promotes mucosal inflammation during oxidative stress in the GI tract. However, the role of these molecules in IBD remains unclear.

We examined the role of Duox2 and Duoxa2 in colonic biopsies from IBD patients and experimental models of Dextran Sulphate Sodium (DSS) and anti-CD40 induced colitis in mice.

In this study, we found that Duox2 expression was increased in human colonic biopsies from controls (n=16) and IBD patients (n=4). Duoxa2 was not significantly altered in IBD patients. The mRNA levels of Duox2 and Duoxa2 were increased in the DSS model, while only Duoxa2 mRNA was increased in mouse colons after anti-CD40 injection. Immunohistochemistry was carried out to explore the exact distribution and position of Duoxa2 protein in colon. In conclusion, increases in Duox2 and Duoxa2 are associated with development of IBD-like inflammation, and may be drivers of inflammation in IBD.

Australasian Conference of Undergraduate Research 2019

Innovative Spaces For Self-Regulated Learning

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Environment, the foundation to every great project and achievement; the spaces in which we work reflect our overall success. Teaching, learning and environment must co-exist to provide essential resources for students to learn and grow. When considering the learning style of university to be self-regulated, the need for innovative spaces is essential in student engagement and achievement. My project aims at creating the best outcome for the space already available. Our current library space has a higher focus on aesthetics than practicality. Modern study demands technologically advanced resources, the need for technology in the present day depicts some downfalls in people's health, due to excessive sitting on incorrect furniture, lack of fresh air and poor lighting deteriorating people's eyesight. My project aims to engage students to assess student needs and improve overall quality of learning and life.

Research Methods: Initially my research was qualitative, assessing other people's findings, I observed a lack of research focusing on spatial environments in universities. Similarly, the overall perspective of the research differed to my own with majority of the research conducted by academics, graduates and teachers. I have conversed with a range of people within the field; the Director of Murdoch University Library, the Manager of Learning and Engagement at Murdoch University and the Library Experience Manager at the University of Western Australia. Finally, I've conducted field research, assessing different library spaces and practicalities, photographing a variety of spaces to create a visual/mood board for future reference.

Results & Findings: Future research includes student surveys, the survey queries a range of environmental factors; from furniture, technology usage, time of the day, noise, group size along with overall satisfaction of the resources currently provided. Finally to conduct practical research through focus groups discussing the dynamics of furniture, their overall study needs and assess the practicality of current spaces and resources.

Conclusion/significance: My project outlines a potential gap, considering the limitations of self-regulatory learning spaces in universities. While research exists, it is primary and secondary based. Although university students are adults they have the same basic needs of any student, all educational establishments should follow the same principals striving for student success.

Australasian Conference of Undergraduate Research 2019

Wormholes Through Neural Time And Space: The Role Of Heavy-Tailed Transitive Dynamics In Memory Retrieval

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Propagating neural activity dynamics have potential importance in understanding the mechanisms associated with memory and attention processes in biological organisms. Despite this, extensive studies and characterisations of these dynamics has not, as of yet, been undertaken. Experimental studies of rodent hippocampus activity, when engaged in tasks associated with memory, have shown that neural propagation includes irregular bursting activity consisting, in part, of jumps through time and space. In this study we use a computational recurrent neural network model to simulate activity bump dynamics of the CA3 subfield of the hippocampus. Memories in the hippocampus are known to be encoded through non-topological environmental maps. Our map is a two-dimensional toroidal environment. We explore the impact of short-term synaptic depression on the model dynamics identifying regions of the parameter space showing significant spatial and temporal complexity. Analysis of the dynamics in this region show that they are superdiffusive. To understand the role of these dynamics in memory retrieval synaptic strengths were altered allowing for memories of various geometries to be embedded in the network. Further investigation of this model shows that the superdiffusive dynamics persist upon the introduction of memories to the model. Based on these findings we propose a mathematical model of memory retrieval based on fractional diffusion of neural activity patterns. This study posits that such dynamics may represent a more efficient and accurate mechanism of memory retrieval than standard models.

Australasian Conference of Undergraduate Research 2019

The Role Of Histone Demethylases In Glioblastoma Persister Cells

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Glioblastoma is an aggressive brain cancer, with a high mortality due to the formation of drug-tolerant persister (DTP) cells that survive treatments and cause tumour recurrence. This project aims to target epigenetic proteins responsible for the formation of DTPs in order to improve the efficacy of glioblastoma therapy. In order to identify epigenetic regulators of DTPs, glioblastoma stem cells were subjected to high concentrations of tivantinib, a promising drug candidate in Phase III against solid tumours. Tivantinib-surviving DTP cells were analysed by PCR for the expression of genes coding for twenty lysine-specific demethylases (KDMs). KDMs catalyse the removal of methyl marks from histone lysine residues to epigenetically regulate gene expression and increased KDMs activities have been linked to drug tolerance. A significant upregulation of KDM7 mRNA was found in DTP cells. Upregulation of KDM7 and changes in histone methylation are currently under investigation by immunoblotting. To further validate KDM7 as a target in DTPs, KDM7 inhibitors in combination with tivantinib will be investigated in a panel of orthogonal cell survival assays. These assays will confirm or dispute whether targeting KDM7 can eliminate drug-tolerant persister cells and open new opportunities for glioblastoma therapy.

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Virtual-Reality Training Enhances Children's Working Memory, Processing Speed, And Visual-Spatial Memory

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Pedestrian injury mortalities comprise one-third of all child road traffic deaths worldwide (WHO, 2014). Virtual reality (VR) pedestrian training has successfully taught children safe street-crossing skills, allowing them to practice perceptual and cognitive skills needed for pedestrian safety (Schwebel et. al, 2017). For example, schoolchildren in Changsha, China improved self-efficacy to cross streets after training in pedestrian environments using smartphone based VR (Schwebel et. al, 2017). While VR is effective, little is known about mechanisms that may underlie its efficacy: What aspects of children's cognition improve through pedestrian training in VR? This study investigated three possible factors: working memory, processing speed, and visual-spatial memory. Study participants included 120 schoolchildren ages 7-8 (mean=8.0 years, SD=0.6; 41% male; 52% African-American, 43% Caucasian). Working memory and processing speed were assessed using the WISC-V, a standard measure of intelligence. Visual-spatial memory was assessed using "Mr. Peanut", a computer-based interactive game in which children viewed a figure decorated with colorful stickers for a set amount of time and selected their recall of sticker colors and locations. Assessments were completed before and after children received a series of street-crossing training sessions in smartphone-based VR. On average, children mastered adult-level safety after 10 VR training sessions (SD=±3). After training, statistically-significant improvements were found in children's working memory ($t(119)=2.83$, $p<.01$), processing speed ($t(119)=2.87$, $p<.01$), and visual-spatial memory ($t(119)=2.41$, $p<.01$), and results were consistent when participants were stratified by sex, race, or baseline age group. Training children to cross streets in VR led to clear improvements in working memory, processing speed, and visual-spatial memory. The results suggest that cognitive-skills training could enhance safe child pedestrian behaviors and VR could improve cognitive skills that extend beyond the primary goals of the VR training. With ready access to smartphones, gradual implementation of VR-based training should greatly improve global child pedestrian safety.

A Map Of Infiltrating Immune Cell Profiles And Structure Of Islet Xenografts In A Tolerant Xenotransplantation Model By Imaging Mass Cytometry

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Introduction: Islet transplantation is currently a Type 1 Diabetes forefront therapy. However, strong immune response and donor shortages remain barriers to successful clinical application. Alternative sources exist, such as porcine neonatal-islet-cell-cluster (NICC) transplantation. This has been investigated in our group using a mouse model, where NICC xenograft tolerance can be induced by costimulation-blockade of B7-CD28 and CD40-CD154 pathways using CTLA-4Fc and MR-1. Naïve CD4+FoxP3+Regulatory T cells (Tregs) been shown to non-specifically suppress rejection, thus identification of xenograft specific Treg subgroups is needed for potential clinical application. Tregs from tolerant mouse hosts in allo-transplantation have been shown to be more effective than naïve-Tregs. **Hypothesis:** Phenotype of infiltrating immune cells, especially Tregs, differ between tolerant and rejected NICC xenografts.

Aim: To study xenograft sites using the novel technique of imaging mass cytometry (IMC) to identify profiles of immune cell infiltration and xeno-specific Tregs subsets. **Method:** C57BL/6 mice with Foxp3 GFP-tagged received NICC xenograft transplant under the kidney capsule. Mice received CTLA-4 and MR-1 treatment (500µg). Groups included control (no-transplant), tolerant (transplant/treatment) and rejection (transplant/no treatment). Serum, kidney, lymphoid tissues were collected at day 8, 20 and 100 post-transplantation for porcine c-peptide test, histology, flow cytometry and IMC. **Discussion:** Mice with co-stimulatory blockade exhibit xenograft tolerance up to 100 days post-transplantation, exhibiting positive insulin staining when compared to day 8 and 20 groups without treatment. An IMC panel of 31 antibodies was created for identifying immune cell subsets, cytokines and chemokine receptors. Preliminary IMC data showed successful proof of concept staining within spleen tissues of tolerant groups, with further optimization required. **Conclusion:** Subsequent imaging are needed to further identify immune cell profiles in graft tissue, along with flow cytometry analysis of lymphoid tissues. The classification of xenograft specific Treg subgroups will potentially lead to clinical applications in the future.

The Role Of Early Life Stress In Sex-Dependent Depressive Outcomes In Adult Rats And The Potential Preventative Benefits Of Oxytocin Treatment

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Introduction. Stress exposure during critical developmental periods alters neural processing, leaving individuals vulnerable to negative mental health outcomes, including major depressive disorder (MDD). Recently, Oxytocin (OT) administration has been identified as a potential treatment for MDD, reducing depressive-like symptoms in adult rats with a history of early life stress (ELS). However, the ability of adolescent Oxytocin treatments to prevent the expression of depressive-like symptoms following early stress exposure has yet to be investigated. Further, in spite of human data indicating that women are at an increased risk of poor mental health, preclinical research investigating such matters has continually excluded female rats. The present study attempts to determine whether OT is efficacious in ameliorating the long-term effects of ELS on depressive-like behaviours in a sex-dependent manner.

Methods. Ten time-mated Long Evans dams were used, resulting in a total of 107 experimental rats (56 males and 51 females). Following birth, rat pups were separated from the mother once daily, for either 15 minutes (control) or 6 hours (stress condition) from postnatal day (PND) 1 to PND 21. Over the first 10 PNDs, maternal care was recorded prior to, and following separation. During the adolescent period (PND 28 to PND 42), rats received a daily injection of either OT (treatment; 1mg/kg) or saline (control). During adulthood (PND 57 onwards), anhedonic behaviour was measured using an effortful choice paradigm, where rats could choose to work for a highly palatable reward (sucrose pellet), or consume readily available rat chow. Following this, learned helplessness was measure using the forced swim test.

Results. Preliminary findings suggest no significant difference between groups on maternal behaviour. Results from depression measures will be discussed, and the implications of the limitations of the study will be considered.

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Development Of An Effective Method To Represent Sigma Hole Effects In Classical Force Fields

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Nowadays, to understand the behaviour of chemical molecules in a system, we can simply build them in computers and simulate them. However, most biomolecular force fields, which are the functions used to represent the interactions between atoms in classical simulations, are using an overly simplistic model to represent the electrostatic properties of the molecules. Generally, a number is assigned to each atom of the molecules as charges to reproduce the observed properties of the molecules.

Although the method describes most molecules to a satisfactory extent, it is far from accurate in the modelling of molecules containing Group 17 elements, also known as halogens. This is because the halide molecules exhibit sigma hole effects, where the halogen atoms contain both positive and negative regions on their electrostatic surface, and hence a single number is simply inadequate to represent their physical properties. An obvious solution to this is to add a virtual charged extra point (EP) to represent the positive hole on the overall negative surface. This has been done for some force fields but not for the rather popular Groningen Molecular Simulation (GROMOS) force field yet.

We managed to develop a robust protocol of adding the charged EP by combining the data obtained across different types of halide molecules. The addition of the EP has also been shown to improve the electrostatic description of the molecules.

A Model For Pre-Natal Stress And Functional Gastrointestinal Disorders (FGIDs)

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Introduction: Due to frequently occurring psychiatric comorbidities, FGIDs are now recognised as neurogastrointestinal diseases. FGIDs and mental health disorders are common; Irritable Bowel Syndrome (IBS) affects approximately 10% of the population, while 1 in 3 are affected by anxiety and depression. These disorders impact patient quality of life, particularly where comorbidities exist. Women disproportionally bear this burden, with a 2:1 female to male ratio for IBS and depression. The role of sex hormones in these disorders remains unclear, particularly when stress is a co-factor. We aimed to determine whether pregnancy hormones and stress influence the immune responses implicated in FGIDs. We hypothesised that elevated progesterone and oestrogen during pregnancy, in association with stress, influence GI immune homeostasis and therefore disease pathophysiology.

Methods: Pregnant and non-pregnant guinea pigs were randomised into stress and non-stress groups. Stress was induced by acute or chronic strobe light exposure. Colon tissue was collected and morphological and cellular changes examined by histopathology.

Results: There was an increase in mucosal eosinophils in the ileum ($p=0.01$) and distal colon ($p=0.02$) of acutely stressed pregnant animals compared to non-stressed pregnant animals, as well as non-pregnant controls in the distal colon ($p<0.009$). Mast cells were increased in the distal colon in chronically stressed pregnant animals compared with non-stressed pregnant animals (<0.0001), as well as non-pregnant controls ($p=0.0007$). Observed decreases in stain intensity of tight junction protein ZO-1 in the distal colon of stressed pregnant animals by immunohistochemistry suggests that stress during pregnancy is associated with altered GI epithelial barrier permeability.

Conclusion: These data show that pre-natal stress significantly alters immune cell populations in the ileum and colon. This immune activation is likely to correlate with increased GI permeability and influences homeostasis. This study provides novel insights linking pre-natal stress to previously characterised mechanisms of gut-brain dysfunction implicated in FGID pathophysiology.

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Using DNA To Design A Fluorescent Sensor To Quantify A Platinum Anticancer Drug

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Cisplatin is a platinum complex that is one of the most commonly used drugs for cancer chemotherapy. It binds to DNA, causes DNA bending and ultimately leads to programmed cell death. However, most administered cisplatin cannot reach the DNA of cancer cells and instead interacts with the body in other ways. These interactions can deactivate the drug, or conversely lead to severe side effects including toxicity to the kidneys and peripheral nervous system. It is thus important to be able to accurately and selectively quantify the levels of active cisplatin in biological fluids like blood serum to address the issue of optimal dosage and achieve a balance between treatment efficacy and unwanted toxicity.

Current methods can often only measure the total amount of platinum, without telling us if that platinum has been deactivated or not. But if we use DNA to make a sensor for cisplatin, there is the potential to selectively detect only active cisplatin that can bind to DNA.

My project aims to use DNA and fluorescent molecules to design an accurate way to measure active cisplatin in patients' blood serum. I am combining molecular biology approaches to analysing DNA with the photophysical chemistry of organic fluorescent molecules. These techniques have allowed me to detect the interactions of cisplatin with DNA and work towards designing selective and sensitive sensor for active cisplatin.

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Ancient Plant Silica As A Tool For Investigating Our Agricultural Origins

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Around 10,000 years ago, humans started behaving in ways which were simply; incredibly odd. Humans decided to live in one place for most of the time, and oddly began experimenting with drinking milk from other animals past infancy. Humans also began extensively engineering and modifying various plants, primarily wild grasses, into modern crop species we now know as wheat, barley and oat. This was not only strange behaviour, it was revolutionary, inspiring catastrophic changes. Humans began; trading longer distances, forming elite classes, creating production surpluses, writing, having specialist occupations, and building large cities.

Archaeologists call these odd behaviours the origins of agriculture and agropastoralism, or the Neolithic Revolution. Archaeology tells us this all began in a region in the Near East called the Fertile Crescent, before these strange practices spread into Europe and further east. Archaeobotany is the archaeological sub-discipline concerned with the recovery and analysis of plant remains, in order to understand past human-plant interactions. Archaeobotanists like myself, are interested in exploring the role that plants played in this revolution and examining the modification of wild grasses into the modern crop species that exist today.

This research seeks to identify the differences in wild and domestic varieties of barley (*Hordeum*), to understand the crop domestication narrative better, in relation to the advent of agriculture. Preliminary findings indicate there are potential superficial differences. This study is the first comprehensive morphometric analysis to exclusively focus on *Hordeum*, using phytoliths, or plant silica.

The domestication of plants and the development, then spread of agriculture were transformative events in human and ecological history. Examining our agricultural origins and disposals is of fundamental importance to both archaeology and understanding human behaviour. This research can also be applied to debates surrounding global food security and the sustainability of agriculture in Australia.

Australasian Conference of Undergraduate Research 2019

Fingerprinting Radio Transmitters Using Artificial Intelligence

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Radio frequency (RF) transmitters, such as mobile phones or hand held radios, are now ubiquitous. For the military, radio transmitters are a crucial strategic tool to provide wireless communication between, for example, troops, vehicles, planes and ships.

Variations between radio transmitters introduce unique imperfections in the transmitted signals, an RF fingerprint. If this RF fingerprint can be extracted from received signals, it is possible to identify and track the associated radio transmitter. RF fingerprinting has both military and civilian applications. Traditionally, the RF fingerprint is extracted by algorithms based on statistical signal processing principles.

Convolutional Neural Networks (CNNs) are an artificial intelligence framework that are loosely modelled on animal brains. CNNs are often used for image recognition or speech processing as they excel at pattern recognition. For example, CNNs are used in software that controls self-driving cars. An emerging body of research exists on their use in RF fingerprinting. Potential advantages over traditional techniques include better performance, less computational expense, and less effort developing custom estimation techniques for each new application.

Our research developed CNNs for extracting an RF fingerprint. The networks were trained using the university's Phoenix supercomputer service. Traditional estimation techniques were also implemented to provide a benchmark to the CNN results.

It was found that the CNN prediction outperformed the traditional estimation techniques across various aspects. In particular, the CNN prediction was able to cope with a randomly distorted signal much better. This research could ultimately lead to better detection of hostile transmitters, keeping troops safer in war zones.

Australasian Conference of Undergraduate Research 2019

The Role Of Pro-Inflammatory Cytokine Responses In Antibody-Mediated Control Of Blood-Stage Plasmodium Infection In Vivo

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Plasmodium parasites invade and replicate within red blood cells (RBCs) via a cycle of maturation, asexual replication, rupture and release of merozoites. This results in high levels of parasitised RBC (pRBC), which have shown to correlate with disease severity in humans and experimental animals. Therefore, controlling pRBC numbers is critical in ameliorating malaria. Both parasite-specific antibodies and pro-inflammatory cytokine responses have shown to contribute to the control of parasitemia. However, it is yet unknown what role pro-inflammatory cytokines play in antibody responses to Plasmodium parasites. Here, we employed *P.yoelii* 17XNL (Py17XNL)-infected mouse model to examine the role of pro-inflammatory response in promoting infection-induced, parasite-specific antibody function in vivo. To examine the necessity of pro-inflammatory cytokines for antibody-mediated protection, *rag1*^{-/-} mice received purified parasite-specific Immunoglobulin G (IgG) and parasite maturation and clearance was assessed. We showed that there was a reduced antibody efficacy in *rag1*^{-/-} but in the presence of upregulated TNF α and IFN γ . We speculate the source of TNF α and IFN γ may originate from natural killer (NK) cells activated by antibody binding to Fc γ RIII (CD16) and inducing antibody-dependent cellular cytotoxicity (ADCC) or monocytes, which have been shown to initiate antibody-dependent cell inhibition upon (ADCI) activation during Plasmodium infection.

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Effect Of Social Isolation On Addiction-Vulnerable Phenotypes: A Self-Administration Model Of Methamphetamine Addiction

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Introduction: Adolescence is a critical period for development, during which time stress exposure can result in increased drug-seeking behaviours for illicit drugs such as methamphetamine. Many animal models of drug addiction are limited to modelling one or two behaviours that are associated with substance abuse. This limits understanding of how stress exposure during adolescence impacts the development of drug addiction, and the translatability of this knowledge to human addicts. Additionally, the use of female rodents in addiction research is limited, which is problematic considering they escalate their drug use at a faster rate than males. Therefore, this project will explore whether adolescent stress exposure increases the incidence of addiction vulnerable phenotypes in female rats using a self-administration paradigm that measures key behaviours that define substance use disorders.

Method: Eight Long Evans rat dams gave birth to 32 female pups, which were left undisturbed until weaning. After weaning rats were either caged in groups of four (i.e. group housed) or caged individually (i.e. socially isolated) during the early to mid-adolescent period (postnatal day (PND) 22 – 42). On PND 43, the socially isolated rats were re-socialised in groups of four and left undisturbed until early adulthood. Rats were then instrumented with intravenous jugular vein catheters and trained to self-administer methamphetamine. Various schedules were used to measure motivation to receive methamphetamine, ability to limit drug use when not available and propensity to relapse to drug-related cues, re-exposure to the drug, and exposure to a stressor, after a significant period of withdrawal from drug use.

Results: Although there are as yet no preliminary findings, we are expecting a correlation between the three addiction behaviours and predict that there will be more rats possessing the addiction vulnerable phenotype in the social isolation condition compared to the group housed condition.

Australasian Conference of Undergraduate Research 2019

Investigating Japanese Nationality In Australia

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The rising fame of multiethnic and multicultural celebrities in Japan, such as tennis player Naomi Osaka, has brought into question the roles of Japan's Nationality Act and that of nationality and citizenship in shaping identity. In the face of an ageing population and an increased number of foreign residents in Japan, multiethnic and multiracial identity has become of even more importance to Japanese studies today than it has ever been in the past. Although research has been conducted regarding multiracial and multiethnic youth identity, there is a scarce amount of research into how youths of Japanese descent outside of Japan negotiate their own identities in the face of ambiguities surrounding their citizenship rights.

This research aims to fill the gap in knowledge that addresses how young multiethnic and multiracial people who are born to one Japanese parent and one non-Japanese parent in Australia are navigating their nationality and by extension, their identity. This study will adopt a post structural theoretical framework based on the work of Homi K. Bhabha for the purpose of realizing identities as socially constructed and dynamic. Furthermore, with consideration to recent popular debate on Japan's Nationality Act, the study will seek out to what extent the identities of young multiethnic and multiracial people are affected by Japan's Nationality Act.

Australasian Conference of Undergraduate Research 2019

Influence Of Coal Grind Characteristics On Interface Properties And Breakage Behaviour Of Metallurgical Coke Samples

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Traditionally, metallurgical coke quality is thought to be improved with the fineness of the inertinite rich fraction (IRF) grind. However, uncharacteristic trends have been reported with coke strength decreasing with the fineness of the IRF grind. This project investigates the unusual trends identified in earlier research by employing fractography and rotational tribology to further understand the microstructural features and mechanisms of fracture that contribute to either the strength or failure of cokes made from coals D and E and to determine whether these features vary between IRF grinds. The features identified in cokes D and E are contrasted with coke C, a higher rank coke made from the same coal measure as coals D and E and also with cokes A and B, from additional coal measures.

Coke lumps fractured during fractographic testing were examined on a macro and micro level, with the microstructural features quantified during analysis. Radar graphs summarising significant features contributing to either the failure or strength of a coke were generated. Comparable trends were identified for particular microstructural features of cokes C, D and E with cokes A and B displaying significantly different behaviour for certain features.

The main damage mechanisms and severity of damage within a microtexture or interface boundary were quantified through rotational tribology for comparable IRF grinds of cokes D and E. Minimal transgranular and intergranular cracking of the IMDC regions was observed with a considerable degree of damage identified in the reactive maceral derived component (RMDC) regions, leading to greater cavity formation for both cokes D and E. The boundary between the IMDC and RMDC exhibited regions of delamination with small cavities present at the coarser IRF grind of coke D and medium IRF grind of coke E.

Australasian Conference of Undergraduate Research 2019

Female Troubles: Ancient Ideas Persisting Through Time

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This research examines ancient perceptions of women, particularly in relation to “female troubles”, as a result of either failing, or being unable to, fulfil patriarchal female roles in society. Gender specific ideologies based upon ancient binary thinking have always seemed to persist through time, one particular example being the concept of the “wandering womb”. The wandering womb is the idea that women suffering from uterine problems and/or hysteria have had their wombs displaced and wandering throughout their bodies wreaking havoc. Even in ancient times, after being repeatedly disproven by medical professionals, the idea of the wandering womb persisted, warranting both medical and even magical attempts to “fix” the condition. One such magical approach is the spell PGM VII 260-71 from the Papyri Graecae Magicae (or Greek Magical Papyri), an understudied collection of papyri from approximately the 4th Century AD, thought to be the personal handbook of an ancient magician. The critical analysis of this ancient text became the background for this research, after discovering that this particular spell was a unique form of exorcism in which the demon (or the womb itself in this case) was not exorcised out of the body (as it was needed for reproduction) but banished back to its “proper place”. This unique spell, previously misinterpreted by other scholars, sheds new light on how the womb was viewed in ancient times, and highlights which aspects of these beliefs have persisted through time even, arguably, to the present day. The methodology of this research includes close, critical analysis of this spell through the identification and interpretation of patterns, motifs and symbolism; research into ancient binary thinking patterns; and preliminary research into current perceptions on “female troubles” such as endometriosis. From this research we may begin to speculate on the extent of which these ancient ideas of women and the consequences of neglecting their social roles have carried over into the present. This invites us to examine the representation of women in particular areas of popular culture such as film and gaming, i.e. in horror genres, and even general discourse and stigma surrounding PMS and menstruation.