

# ACUR

*Australasian Conference  
of Undergraduate  
Research 2018*

**Program and  
Presentation Abstracts  
24 and 25 September 2018  
[www.acur.org.au](http://www.acur.org.au)**



**LA TROBE**  
UNIVERSITY

**All kinds of clever**

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# **Wominjeka La Trobe Welcome to La Trobe**

Wominjeka means "hello" and "welcome" in the Woiwurrung language, spoken by the Wurundjeri people of the Kulin nations, the Traditional Custodians of the land and waters where La Trobe's Melbourne campus is located.

It is an honour for La Trobe to host the 2018 Australasian Conference of Undergraduate Research.

The program of presentations is vibrant and diverse. We hope you enjoy the opportunity to learn from each other, in the presentation sessions and more informally, as you share the excitement and challenges of engaging in research.

# ACUR 2018 Program

Monday, 24 September

Time	Mins	
8.00	60	<b>Registration</b> <i>John Scott Meeting House foyer</i>
9.00	60	<b>Welcome and Acknowledgment of Country</b> <i>John Scott Meeting House</i>  <b>Professor Paula Baron, La Trobe University</b> Pro Vice-Chancellor, Learning Quality and Innovation  <b>Keynote Presentation</b>  Emeritus Professor Angela Brew, Macquarie University Chair Australasian Council for Undergraduate Research
		<b>Session 1</b> <i>John Scott Meeting House</i>
10.00	15	The neural mechanisms underpinning body image: Is sex important?  <i>Evelyn Baldry</i> <i>Macquarie University</i>
10.15	15	Examining the influence of Chinese social norms and thinking styles on psychopathy  <i>Samantha De Silva</i> <i>Australian National University</i>
10.30	15	Neural mechanisms underlying rhythmic motor actions and entrainment  <i>Emmelyne Jack</i> <i>University of Queensland</i>
10.45	15	Development of tools to identify the intramitochondrial location of the potential malarial drug target PfNDH2  <i>Jai Meyers</i> <i>Flinders University</i>
11.00	20	<b>Morning Tea</b> <i>John Scott Meeting House foyer</i>
11.20	10	<b>Move to Parallel Sessions</b>

## Monday, 24 September

Time	Mins	Session 2 <i>John Scott Meeting House</i>	Session 3 <i>Library Seminar Room 1.34</i>
11.30	15	Molecular components of the trail mucus in the brown garden snail <i>Cornu aspersum</i>  <i>Kaylene Ballard</i> <i>University of the Sunshine Coast</i>	False memories and cultural mindsets: can we be protected?  <i>Paige Berry</i> <i>Australian National University</i>
11.45	15	Regulatory effects of IL-4 on IL-4R $\alpha$ and its likely implications for vaccination outcomes  <i>Lachlan Deimel</i> <i>Australian National University</i>	Risky driving: is your brain to blame?  <i>Andrea Dimeco</i> <i>Macquarie University</i>
12.00	15	The temporal dynamics of body size and shape aftereffects: implications for body image disturbance  <i>Edwina Keen</i> <i>Macquarie University</i>	Recycling organophosphorus catalysts for greener chemistry  <i>Alicia Kirk</i> <i>University of Queensland</i>
12.15	15	Chronic hearing loss: a comparative analysis of recreational divers and dive instructors.  <i>Dave Moss</i> <i>Central Queensland University</i>	The impact of cognitive resources on memory encoding and retrieval of emotional information  <i>Aswathi Neelakandan</i> <i>Macquarie University</i>
12.30	15	Research pertaining to oxygen analysis in Cambodian CPA3 hospitals  <i>Talia Rose</i> <i>University of Queensland</i>	Gender views of females in sports media  <i>Janita Ruhle</i> <i>Central Queensland University</i>
12.45	15	An investigation into the correlation between heart rate variability and psychiatric disorders  <i>Edward Southall</i> <i>University of Queensland</i>	Responding to scepticism  <i>Jake Stone</i> <i>Australian National University</i>
1.00	20	<b>Lunch</b> <i>John Scott Meeting House foyer</i>	
1.20	10	<b>Move to Parallel Sessions</b>	

## Monday, 24 September

Time	Mins	<b>Session 4</b> <i>John Scott Meeting House</i>	<b>Session 5</b> <i>Library Seminar Room 1.34</i>
1.30	15	Rational computational design of an electrostatic catalyst  <i>Mitchell Blyth</i> <i>Australian National University</i>	Oceanographic predictors of humpback whale entanglement in Queensland shark nets  <i>Jessica Bolin</i> <i>University of the Sunshine Coast</i>
1.45	15	Am I really that gullible?  <i>Sarah Doueih</i> <i>Macquarie University</i>	Identifying the excretory-secretory biomolecules that facilitate aquatic schistosome-host interactions  <i>Conor Fogarty</i> <i>University of the Sunshine Coast</i>
2.00	15	Can Gumby Gumby do wonders?  <i>Eden Little</i> <i>Griffith University</i>	Evaluation of an Aboriginal and Torres Strait Islander resilience scale  <i>Donna Lock</i> <i>Griffith University</i>
2.15	15	Development of a survey to investigate study abroad destination choice  <i>Nam Nguyen</i> <i>Washington State University USA</i>	Who's responsible? A Foucauldian-inspired policy analysis of the New South Wales RSA & RCG competencies  <i>Myf Nizette</i> <i>University of Notre Dame Australia</i>
2.30	15	Building a deadly foundation: improving oracy through Indigenous art  <i>Nicholas Sailor</i> <i>Central Queensland University</i>	A new turbulence-regulated star formation law  <i>Diane Salim</i> <i>Australian National University</i>
2.45	15	Breaking <i>The Sex Pistols</i> barrier: demystifying the diversity of holocaust representations in British punk culture 1975-1990  <i>Tessa Tribe</i> <i>Monash University</i>	Serious games in health professional education: a qualitative study exploring student experiences with a learning intervention  <i>Suzanne Volejnikova-Wenger</i> <i>University of the Sunshine Coast</i>
3.00	20	<b>Afternoon Tea</b> <i>John Scott Meeting House foyer</i>	
3.20	10	<b>Move to Parallel Sessions</b>	

## Monday, 24 September

Time	Mins	Session 6 <i>John Scott Meeting House</i>	Session 7 <i>Library Seminar Room 1.34</i>
3.30	15	Are male or female rats more vulnerable to the effects of early life and adolescent stress?  <i>Gemma Campbell</i> <i>Macquarie University</i>	Oxytocin administered to adolescent rats attenuates early life stress induced neuronal changes and anxiety-like behaviours differentially between genders  <i>Harry Carey</i> <i>Macquarie University</i>
3.45	15	Improving university students' algebra competence: a digital approach  <i>Nicholas Gibson</i> <i>Central Queensland University</i>	Why are you studying in Canberra? A qualitative study of the barriers faced by regional students in coming to university  <i>Elvis Gleeson</i> <i>Australian National University</i>
4.00	15	Can group work in STEM improve girls' academic engagement?  <i>Charlotte Logan</i> <i>Central Queensland University</i>	Punctuation and grammar: can a digital curriculum improve instruction?  <i>Nicholas Lovett</i> <i>Central Queensland University</i>
4.15	15	The New Life Movement in China's 'cosmopolitan' Anglophone press  <i>Alex Pan</i> <i>Australian National University</i>	From 'scrawny' to 'swole': body dissatisfaction and perception of muscularity  <i>Hamish Phillips</i> <i>Macquarie University</i>
4.30	15	Creating stronger university-school partnerships  <i>Birgit Sambell</i> <i>Central Queensland University</i>	Are autistic traits associated with reduced cooperation in a Prisoner's Dilemma? Testing a self-categorisation model of autism spectrum disorder  <i>Crystal Santos</i> <i>University of Queensland</i>
4.45	15	The lowly and hated Formosan: Taiwanese national identity in the trial of Japanese war criminals Sgt Matsushima Tozaburo and others  <i>Tandee Wang</i> <i>Australian National University</i>	Understanding the developmental plasticity of brain connections  <i>Yunan Ye</i> <i>University of Queensland</i>
5.00	60	<b>Free time</b>	
6.00		<b>Conference Dinner and ACUR 2018 Trivia Championship</b> Glenn College Airport Lounge  Dinner concludes approximately 8.30pm	

## Tuesday, 25 September

Time	Mins	
9.00	15	<b>Reflection on Day 1</b> <i>John Scott Meeting House</i>
		<b>Session 8</b> <i>John Scott Meeting House</i>
9.15	15	Window dressing with no real power? Australian female ministers and the saliences of their cabinet portfolios  <i>Intifar Chowdhury</i> <i>Australian National University</i>
9.30	15	Families and school achievement: does divorce hinder university graduation  <i>Benjamin Halpin</i> <i>Central Queensland University</i>
9.45	15	On the economic convergence to the zero-growth equilibrium and evaluation of significant drivers of income growth across countries  <i>Elaine LK Luc</i> <i>University of Queensland</i>
10.00	15	Measuring Hubble's Constant with peculiar velocities and a new standard siren  <i>Tyler Philp</i> <i>University of Queensland</i>
10.15	15	Initial characterisation of immune cell entry to the brain in a mouse model of multiple sclerosis  <i>Abigail Slater</i> <i>Australian National University</i>
10.30	15	Novel flexible materials for wearable antennas  <i>Donald Zhang</i> <i>University of Adelaide</i>
10.45	15	<b>Morning Tea</b> <i>John Scott Meeting House foyer</i>

## Tuesday, 25 September

Time	Mins	<b>Session 9</b> <i>John Scott Meeting House</i>	
11.00	15	Unravelling the role of steroid androgens and aberrant adipocyte function in polycystic ovary syndrome (PCOS)  <i>Madeleine Cox</i> <i>UNSW</i>	
11.15	15	Images of influence: the power of visual media in influencing public opinion of asylum seekers  <i>Gavin Height</i> <i>La Trobe University</i>	
11.30	15	Truthiness under deep and critical thinking: can we be protected?  <i>Deva Ly</i> <i>Australian National University</i>	
11.45	15	What is normal variability on the King-Devick (K-D) test over time?  <i>Joel Pienmunne</i> <i>Macquarie University</i>	
12.00	80	<b>Lunch and free time</b> <i>John Scott Meeting House foyer</i>	
12.00			<b>ACUR Executive attend AGM</b> <i>Donald Whitehead Boardroom</i>
1.20	10	<b>Move to Parallel Sessions</b>	

## Tuesday, 25 September

Time	Mins	<b>Session 10</b> <i>John Scott Meeting House</i>	<b>Session 11</b> <i>Library Seminar Room 1.34</i>
1.30	15	<p>“Permission not a directive” An analysis of family veto in organ donation in Victoria</p> <p><i>Laura Cripps</i> <i>La Trobe University</i></p>	<p>Ending denial of service cyber attacks with negative selection</p> <p><i>Liam Daly Manocchio</i> <i>University of Queensland</i></p>
1.45	15	<p>Bremelanotide: originally developed to treat sexual dysfunction, but how about methamphetamine addiction?</p> <p><i>Timothy Hill</i> <i>Macquarie University</i></p>	<p>Characterising a novel protein in the <i>Toxoplasma gondii</i> cytochrome c oxidase complex</p> <p><i>Nur Fikriyah Ihsan</i> <i>Australian National University</i></p>
2.00	15	<p>Gene expression patterns in the human brain provide evidence that iron interacts with the nerve coating myelin which facilitates electrical signalling</p> <p><i>Seak-Lin Ly</i> <i>University of Newcastle</i></p>	<p>Symbiosis in the photic zone: identifying nanoscale marine relationships</p> <p><i>Carl McCombe</i> <i>Flinders University</i></p>
2.15	15	<p>Litigation funds in improving access to justice and increasing corporate accountability</p> <p><i>Tim Porter</i> <i>University of Adelaide</i></p>	<p>Remote Aboriginal community well-being and South Australia's driving and licensing offences</p> <p><i>Appurva Raaj</i> <i>University of Adelaide</i></p>
2.30	30	<b>Closing remarks and farewells</b>	

# Presenters

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# Abstracts

Monday, 24 September

## Session 1

**Evelyn Baldry**

Macquarie University

### **The neural mechanisms underpinning body image: is sex important?**

Body size misperception is key risk factor for eating disorders, such as Anorexia Nervosa and Bulimia Nervosa. Although socio-cognitive processes have dominated causative explanations, new research suggests that visual adaptation may underlie the perceptual aspects of body size misperception. Adaptation is a well-known phenomenon in visual perception where prolonged viewing of a particular stimulus results in an aftereffect that biases the appearance of subsequently seen stimuli. For example, adaptation to thin bodies generates an aftereffect such that normal sized bodies are perceived as fatter than they actually are. By measuring the size of this 'body size aftereffect' (BSA) under carefully controlled conditions, it is possible to reveal the underlying neural mechanisms encoding body size. The current study aims to determine whether body size is encoded by populations of neurons that are selective for the sex of the stimulus (i.e. independent groups for male/female body size) or by a single population that is insensitive to sex.

Participants adapted to a series of thin (or fat) male or female bodies, before adjusting both male and female 'test' bodies to a size they perceived as 'normal'. It was hypothesised that adapting to thin (fat) bodies would result in normal bodies appearing fatter (thinner) than they actually were. If body size is encoded by independent populations for male & female stimuli, BSAs would be larger when sex of test and adaptation stimuli are congruent. However, if a single, sex-insensitive population is responsible, BSAs should be equal in magnitude regardless of the sex of the adapting and test stimuli. The results of this study may have important implications for the development of clinical treatments for eating disorders and should be considered when assessing the impact of social media platforms, such as Instagram, where viewers are inundated with unrealistic body images of both sexes.

**Samantha De Silva**

The Australian National University

### **Examining the influence of Chinese social norms and thinking styles on psychopathy**

Psychopathy as a personality disorder is present in those who display distinct interpersonal (e.g. egocentricity and manipulative nature), affective (e.g. lack of affect or sympathy) and behavioural (i.e. impulsivity and antisocial behaviour) traits. The framework of psychopathy was developed in the Western context and has been extensively studied in Western countries. However, the applicability of psychopathy to the Eastern world may be limited due to differences in the cultural norms and practices within Eastern countries and thus impacting the overall level of expression in psychopathic traits. Although some diagnostic assessments such as the Triarchic Psychopathy Measure (TriPM) (Patrick, Fowles, & Krueger, 2009) has been used across a broad range of populations and has been translated into several foreign languages (Shou, Sellbom, & Han, 2016), the exploration of external validity and reliability in East Asia is still limited. Therefore, this study sets out to explore how psychopathy personality related to cultural norms in China. In the current study, a total of 218 students from the Southwest University, Chongqing filled out a survey containing the following questionnaires; TriPM, Cultural Orientation Scale, Dialectical Self Scale and Zhong Yong Thinking Style. The results demonstrated that collectivism and the Zhong Yong thinking style negatively correlated with the TriPM and its subscales. While two subsets of the Dialectical thinking style scale demonstrated two positive correlations. These results demonstrate that cultural concepts were associated with the presentation of psychopathy in China. Research should expand on these findings and continue to explore how cultural constructs in the Eastern world influence the presentation of psychopathy. By striving to increase the cross-cultural applicability of psychopathic measures, it will help identify and isolate psychological universals but also facilitate the development of an internationally uniform diagnostic criteria (Cooke, 1996).

**Emmelyne Jack**  
The University of Queensland

### **Neural mechanisms underlying rhythmic motor actions and entrainment**

Rhythm is evident in many aspects of everyday life, from dancing, to walking, to communicating via speech and writing, but the brain processes responsible for rhythm are still a mystery. Research has suggested a broad network involved in the control of rhythmic movements, including the motor and sensory areas of the brain. These sites are thought to communicate by synchronising neural electrical activity in an oscillatory fashion. Electroencephalography measurement of activity in premotor areas of the brain has demonstrated an increasing negative potential prior to voluntary movement that parallels in appearance to slow-wave neural oscillations when participants engage in a rhythmic series of movements. Brain stimulation techniques such as Transcranial Alternating Current Stimulation (tACS) can replicate these oscillations and, if causal to movement, may alter the way people perform rhythmic movements to be more entrained by the rate of the neural oscillations induced by the brain stimulation. The current study employs tACS in conjunction with a motor tapping task, to examine the role of induced neural oscillations in voluntary control of rhythmic movements. The experiment comprised a finger tapping task in which participants initially tapped in time with a beat and then continued to maintain the same tapping pace when the beat stopped. In separate blocks, participants either received tACS brain stimulation at 1Hz or a non-stimulation sham condition. Three different tapping rates were tested that were either consistent with (1000ms), slower (1200ms), or faster (800ms) than the 1000 ms cycle of the tACS brain stimulation. It is hypothesised that the tapping rates in the 800ms and 1200ms conditions would converge towards the 1000 ms rate of the tACS in blocks when stimulation is present. Data collection for this study has yet to be completed, therefore, no conclusion can be drawn at this time.

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**Jai Meyers**, Kathleen Soole, Christopher Waterman and Ian Menz  
Flinders University

### **Development of tools to identify the intramitochondrial location of the potential malarial drug target PfNDH2**

The assessment of the accessibility of potential drug targets is essential to determining their usefulness. The malarial parasite *Plasmodium falciparum* Type 2 NADH dehydrogenase (PfNDH2) has been identified as a potential drug target, however its intramitochondrial localisation and metabolic role remain unknown, hence its accessibility to novel pharmaceuticals is also unknown. Protein import assays utilising *in vitro* eukaryotic translation systems is a common method of mitochondrial protein localisation, often utilising the labelling of proteins with fluorescent tags. This requires *agrobacterium*-mediated transformation. Therefore this study's focus was the preparation of expression vectors that could be used for *in vitro* translation and importation of the PfNDH2 protein into plant mitochondria. Utilising gateway cloning technology, an entry clone construct, *Pfndh2*\_pDEST15- cGFP\_pDONR221, capable of being incorporated into the expression or destination vector pDEST15-cGFP was developed. This construct lacks a stop codon within the *Pfndh2* gene, allowing for the expression of a fusion c- terminus green fluorescent protein upon incorporation into the pDEST15- cGFP vector. This process involved the use of BP cloning reactions whereby complementary flanking regions of DNA upon the gene and pDONR221 entry vector are combined to produce a singular circular entry clone. The methodology by which this entry clone was produced and amplified by *Escherichia coli* (DHB3.1) has been refined throughout this project. Parameters tested included incubational periods, electroporation- transformation, reagent and growth media antibiotic concentrations. It was found that the extension of all incubatory periods to the recommended maximum, the tripling of genetic material utilised in electroporation transformation of host cells, reduction of growth media selective agent concentration and altering bacterial population density allows for the successful production of this entry clone.

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## Session 2

**Kaylene Ballard**

University of the Sunshine Coast

### **Molecular components of the trail mucus in the common garden snail *Cornu aspersum***

Several species of land snail are a significant agricultural pest around the globe. *Cornu aspersum*, also known as the Common Garden Snail, has successfully colonized most continents, and is a pest of citrus orchards, vineyards and many other crops. As such, information regarding communication in land snails would be useful in developing a sustainable and effective pest control strategy. As several species of land snails have been shown to follow the mucus trail of conspecifics, this study investigated the components of snail trail mucus, with the goal of identifying a land snail pheromone. Using methods including LC-MS/MS, HPLC and GC-MS, we have identified the peptide components of the trail mucus of *C. aspersum*, along with volatiles that are emitted from the mucus trail. To date, several novel peptides have been identified, and numerous volatiles elucidated. Additionally, we will document the microbial diversity of trail mucus, including culture-dependent and culture-independent species. In particular, actinomycetes will be explored as a possible source of volatile components, which may also play a role in snail communication. Actinomycete species have been isolated and cultured from the mucus and are currently undergoing antifungal and antibacterial assays, while awaiting the results of microbial diversity profiling. These results will be combined with snail behavioural assays, in order to observe snail response to purified snail mucus-derived substances.

The outcomes of this project will utilize a multidisciplinary approach to provide knowledge into snail behaviour and pheromone communication, and therefore can be used to control pest snail species. Results may also facilitate the protection and conservation of native snail species. In addition, this study may have an impact on human health, by identifying the antimicrobial and antifungal components of snail mucus that may be beneficial in biomedical applications.

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**Lachlan Deimel**, S. Roy, H. Liu, Z. Li and  
C. Ranasinghe  
The Australian National University

### **Regulatory effects of IL-4 on IL-4R $\alpha$ and its likely implications for vaccination outcomes**

IL-4 and IL-13 are important cytokines, mediating the type 1 and 2 immune paradigm, and are associated particularly with mucosal vaccine-specific immunity. These cytokines have been shown to promote effective humoral responses whilst dampening cell-mediated immunity in the context of HIV pox viral vector-based vaccination. Although IL-4 and IL-13 can signal via their cognate receptors, they also share a common receptor complex known as the IL-4R $\alpha$ /IL-13R $\alpha$ 1 Type II complex which signals via the STAT6 pathway. Unfortunately, how these IL-4/IL-13 receptors modulate vaccine-specific immunity at the innate immune level is largely unknown. Previous studies in the laboratory have demonstrated that IL-13 crucially regulates the dendritic cell (DC) recruitment to the vaccination site, within 24 hours post viral-vector-based vaccination. Moreover, we found that transiently inhibiting IL-4/IL-13 signalling at the vaccination site promotes better quality mucosal and systemic cytotoxic T cells. However, the regulatory mechanisms underpinning these adaptive immune responses are largely unknown. Given the critical role of innate immune cells and IL-13 in the early post-vaccination response (ultimately determining the T cell fate), we believe that it is imperative to elucidate the mechanisms associated with IL-4/IL-13 signalling on antigen presenting cells. Therefore, in this study, *in vitro* IL-4 stimulation was used to mimic mucosal vaccination conditions, assessing the regulation of Type I (IL-4R $\alpha$  and  $\gamma$ C) and Type II IL-4 receptor complexes on murine lung DCs using multicolour flow cytometry and immunofluorescence microscopy. Collectively, our observations have revealed differential regulation of IL-13R $\alpha$ 1, IL-13R $\alpha$ 2 and IL-4R $\alpha$  24-72h post stimulation. Unravelling these important regulatory patterns indicates the availability of receptor complexes and, consequently, levels of STAT6 signaling—this has the propensity to drastically affect an immune outcome. Understanding these mechanisms has high potential to design more effective mucosal and/or systemic vaccine strategies in the future, specifically against chronic pathogens such as HIV.

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**Edwina Keen**  
Macquarie University

**The temporal dynamics of body size and shape aftereffects: implications for body image disturbance**

Body image disturbance – a phenomenon in which individuals misperceive characteristics of their body size – is thought to be a significant component of clinical disorders including anorexia nervosa and bulimia nervosa. A growing body of literature suggests visual adaptation may underpin this misperception of body size. Adaptation is a phenomenon by which prolonged exposure to a particular stimulus biases the perception of subsequently viewed stimuli. The resulting biases are known as aftereffects. Through this process, viewing thin (large) bodies for extended periods of time makes subsequently viewed average sized bodies appear larger (smaller) than they actually are. However, the longevity of these effects is currently unknown. If aftereffects are found to endure for relatively long periods of time, then visual adaptation may provide a valuable model for developing our understanding of body image disturbance.

The present investigation sought to investigate temporal dynamics of body size and shape aftereffects. Participants were randomly allocated to one of three adaptation durations (30 seconds, 2 minutes, or 4 minutes) during which they were exposed to either larger or smaller body stimuli. Using a manipulation program, participants designated their “point of subjective normality” (PSN) by making size and shape adjustments to body stimuli presented to them until they appeared normal. These ratings were made once before exposure to manipulated body stimuli and five times after exposure. The difference between baseline and post-adaptation ratings provided a measure of aftereffect magnitude and therefore, of misperceptions of normal body size. We expect that longer adaptation durations will produce aftereffects which are larger in magnitude and longer in duration. The temporal dynamics of body size and shape aftereffects will be discussed with reference to real-world implications and their applicability to body image disturbance in clinical disorders.

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**Dave Moss**  
Central Queensland University

**Chronic hearing loss: a comparative analysis of recreational divers and dive instructors**

This study investigates the influences of hearing loss whilst comparing recreational scuba divers and dive instructors.

The study uses a quantitative methodology with data being collected via an anonymous online survey that will establish the research participants’ demographic profile, their knowledge of ear equalization, and any workplace factors that may have an influence on hearing loss. The survey is distributed using the researcher’s diving industry contacts as well as sharing the survey link on Facebook.

The human body is not designed to stay underwater. Research based on diving instructors’ health is rather limited, with case study reports predominating. This study aims to fill this gap in the literature by investigating the influences that may contribute to hearing loss. The current literature indicates that frequent repetitive dives particularly near the surface can cause damage to the mechanisms of the ear. Other literature suggests that prolonged immersion and waterlogging of the ear can lead to greater instances of ear infection. The work requirements of dive instructors may necessitate frequent repetitive dives, and increased immersion periods beyond that of recreational divers, which suggests that the health of dive instructor’s ears are at greater risk. Hearing loss has been linked to an increase in workplace incidents and injury, and while it is suggested the individual may be at risk, dive instructors are also responsible for the safety of passengers on dive vessels.

The findings of this study will identify if dive instructors are at greater risk for hearing loss than recreational divers, and if there are any cofactors that exacerbate or mitigate these risks. This information could lead to changes in training manuals at all levels, and workplace conditions for instructors.

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**Talia Rose**

The University of Queensland

### **Research pertaining to oxygen analysis in Cambodian CPA3 hospitals**

#### *Background*

There is a significant lack of medical testing and calibration equipment in the developing world. Oxygen analysers are one piece of instrumentation often lacking. In Cambodian hospitals, the cost of buying and importing oxygen analysers is a key barrier to their implementation. There is a distinct need for research into the most appropriate method for design and implementation of oxygen analysers in this setting.

#### *Research Question*

What is the most appropriate method for analysing oxygen in Cambodian CPA3 hospitals?

#### *Methods*

This research was conducted utilising observation, interview and self-report questionnaire techniques to determine the need for oxygen analysers in 15 different Cambodian CPA3 hospitals. An extensive literature review of existing methods of oxygen analysis was then conducted. Methods were critically analysed according to criteria adapted from the World Health Organisation's "Medical device donations: considerations for solicitation and provision".

#### *Preliminary Results*

In 13/15 CPA3 hospitals visited and surveyed, there was no oxygen analyser present in any department of the hospital. Three key oxygen analyser contexts were identified:

1. Testing of oxygen concentrators;
2. Confirming FIO<sub>2</sub> output of anaesthesia machines; and
3. Measuring oxygen output in infant incubators.

In comparison to traditional galvanic oxygen sensors, it was found that a para-magnetic oxygen sensor could be utilised. This sensor was selected with a focus on design ethnography, consideration of the potential for task shifting and local manufacturing prospects. At the time of submission, the oxygen analyser design is being manufactured in Cambodia and comprises:

- Arduino IDE with micro-controller (Atmega328P);
- operational amplifier;
- seven segment displays; and
- 3D printed casing.

Integration of the para-magnetic oxygen sensor through a Wheatstone bridge configuration will see the prototype finalised in coming weeks. User feedback in the clinical setting of 3 Cambodian CPA3 hospitals is expected to be completed by late September, 2018.

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**Edward Southall**

The University of Queensland

### **An investigation into the correlation between heart rate variability and psychiatric disorders**

Major depressive disorders such as post traumatic stress disorder (PTSD) have a notoriously low rate of successful diagnosis by clinicians. This is largely due to the fact that diagnosis techniques of mental illnesses are typically based off qualitative values, and the subjects' responses to qualitative questions. Furthermore, there have been several studies published that have reported physiological manifestations of major depressive disorders. Focussing on heart rate variability (HRV) as the primary physiological measure and using a dataset from a sleep study of patients with obstructive sleep apnoea (OSA) +/- PTSD the physiological manifestation of PTSD was investigated. This was done using traditional time domain measures of HRV, such as mean NNI and STDev, as well as complex frequency domain and Hilbert domain measures. Finally, the algorithm proposed by Von Rosenberg et al in 2017, along with a support vector machine (SVM) was applied to determine if the two data sets could be effectively separated based on measures of HRV from a single night of sleep. While previous studies have reported a correlation between various major depressive disorders and HRV, they are typically limited in three key ways:

1. Short duration of ECG measurement
2. Limited measures of HRV (analysis purely in the time domain, or limited frequency domain measures)
3. Large clinical trial group

By addressing these shortcomings, it is hoped that this research will provide a new insight into the physiological manifestation of PTSD. This research is currently ongoing, and while the analysis techniques have been developed and the ethics approval has been completed, the clinical data has not yet arrived but is due to do so shortly. Preliminary results of the polysomnograms of subjects without PTSD are available.

## Session 3

**Paige Berry**

The Australian National University

### **False memories and cultural mindsets: can we be protected?**

We know from almost four decades of research that human memory does not work like a video recorder – it is much more like a Wikipedia page, constantly changing and being updated by ourselves or others (Loftus, 1979). Because memory is like a Wikipedia page, it is rarely a perfect record of the past and people regularly make mistakes in what they remember from their own experiences (Loftus, 2013). In my honours research, I am studying the underlying cognitive mechanisms that contribute to errors in memory – in particular, how certain mindsets might make people more vulnerable to false memories. It is crucial to understand what makes people more vulnerable to false memories—on average, 75% of false convictions are due to faulty eyewitness memory (“Innocence Project”, 2018).

In my planned experiments, I will prime people to look for connections between items they encounter, or to try and find differences. These primes map on to key cultural differences in the way we process information (Collectivism and Individualism). Participants will unscramble 13 sentences that will prime the cultural mindsets of Individualism or Collectivism (or no prime for control condition). After being primed, each participant will complete a well-established memory paradigm to test their susceptibility to false memories. The expected findings of this research are that a Collectivistic mindset will increase vulnerability to false memories, while an Individualistic mindset will decrease vulnerability. The results of this research will help us to understand cross-cultural vulnerability to false memories as well as whether we can prime people to protect them from making mistakes in memory.

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**Andrea Dimeco**

Macquarie University

### **Risky driving: is your brain to blame?**

The relationship between cognitive functioning and driving behaviours in certain sectors of the population has been well established. For older drivers and drivers with neurodegenerative disorders such as dementia, there has been substantial investigation into whether cognitive

testing can predict if someone is safe or unsafe to drive (Reger et al., 2004). Studies have achieved this end by identifying cut-off scores on specific cognitive tests which enable correct classification of whether an individual is fit to drive (Bennett, Chekaluk & Batchelor, 2016; Molnar et al., 2006). To date, however, no study has attempted to use this relationship between cognitive testing and driving performance to develop cut-off scores for classifying those at risk in a healthy population.

The current study therefore aims to address this gap in the literature by using scores on cognitive tests to help classify individuals as either at risk or not at risk of unsafe driving. Participants will be sampled from a university population and must have at least a Provisional Level 1 licence. Each participant will be assessed on a battery of cognitive tests and complete a drive on a simulator. Risky driving behaviours will be measured via total number of collisions, speeding, lane deviation and on two risky driving questionnaires. Although research is still ongoing, it is hypothesised that all measures of cognitive functioning will relate to all measures of risky driving, enabling the derivation of valid cut-off scores for each cognitive test. Given that healthy drivers make up the majority of the driving population and that road accidents are on the rise, it would be prudent to examine factors which identify those ‘at risk’ in a sample of relatively young, inexperienced drivers.

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**Alicia Kirk**

The University of Queensland

### **Recycling organophosphorus catalysts for greener chemistry**

In organic synthesis, there is a need for more environmentally sustainable technologies. One such technology, which has growing application, is the recycling of organophosphorus catalysts through the chemoselective reduction of phosphine oxides by organosilanes. This method is being used to enable greener versions of reactions such as the Wittig, Staudinger, and Appel reactions. A greater understanding of the mechanism of these reactions is required in order to design more active catalysts and improve reduction rates. Currently, the mechanistic role of catalytic acid additives in the reduction is unknown. Density functional theory calculations were carried out to address this question. The reduction was suggested to occur by a hydride transfer through a four-membered, front side transition state. For the mechanism of acid catalysis, two possibilities were considered:

hydrogen bonding from the COOH to the oxygen in the transition state, and the formation of a silyl ester that acts as an enhanced reductant. Both mechanisms had lower activation barriers than the uncatalyzed reaction; however, the effect of hydrogen bonding in the mechanism did not fully agree with experimental data. The silyl ester model appeared more promising. Several other possible alternate mechanisms were also suggested. The understanding gained from these studies will help design catalysts that are easier to recycle.

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**Aswathi Neelakandan**  
Macquarie University

### **The impact of cognitive resources on memory encoding and retrieval of emotional information**

#### *Background*

Older adults show greater psychological wellbeing and lower rates of psychopathology compared to younger adults. Studies of attention and memory show that older adults display an information processing bias for positive over negative information, referred to as the 'positivity effect', while younger adults tend to display a negativity bias. It has been suggested that the positivity effect is the result of chronically activated emotion regulation strategies in older adults that either preference attention to positive information, or suppress the processing of negative information. Regulating emotion requires cognitive control and resources. Decreasing cognitive resources during memory encoding (i.e., depleting the capacity to employ an emotion regulation strategy when remembering new information) eliminates age-related positivity biases. However, it is unclear whether depleting cognitive resources impacts biased processing information only during memory encoding for emotional information, or whether this also impacts memory retrieval for emotional information.

#### *Aim*

This study aims to examine whether age-related memory biases, specifically the 'positivity effect' is eliminated if cognitive resources are depleted during memory retrieval, or whether this effect is specific to the encoding of emotional information.

#### *Method*

This study will use a 2 (younger adults, older adults) x 3 (divided attention during memory encoding, divided attention during memory retrieval, control condition) between-subjects experimental design. All participants will view 45 images (15 neutral, 15

negative, 15 positive), followed by a five-minute unrelated filler task. Participants will then complete an unexpected memory recall task and recognition memory task. Individuals in the divided attention during encoding condition and divided attention during retrieval condition will engage in a concurrent sound discrimination task while viewing the pictures or completing the recall and recognition memory tasks, respectively.

#### *Results*

Preliminary results and implications for our understanding of age-related information processing biases will be presented.

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**Janita Ruhle**

Central Queensland University

### **Gender views of females in sports media**

The 2012 London Olympic Games was named the "year of the women" as 45% of participating athletes were deemed women (Fink, 2014). Sport participation for women is in an all-time high; however, female athletes are still receiving unequal treatment by media.

Eveleth (2013) conducted an analysis of *Sports Illustrated* magazines in which he discovered women only appeared on the cover 4.9% of the time once the swimsuit issues were removed. In fact, they were only the primary feature of the cover 2.5% of the time. Elueze and Jones (1998) demonstrated that female athletes were described in terms of their physical weakness twice as much as males. Gabby Douglas was the first black woman to take the all-round individual title in the 2012 London Olympic games (Samuels, 2012); however, all social media could talk about was the presentation of her hair (Fink, 2012). Media tends to maximise female issues in sport conversation while minimising their athletic abilities. The goal of this study is to analyse how *Inside Sport Magazine* uses images to misrepresent women.

My research will utilise a case study frame analysis to understand how images in media are used to misrepresent women athletes. In media studies, frame analysis looks at what features are emphasized in news items (ESRC, n.d.). More specifically, this study will be analysing how women are represented in images from the Australian sports magazine, *Inside Sport*. This study will look at a year's worth of *Inside Sport* issues, collecting all the images of women used in the magazine for that year. Once the pictures are collected the

researchers will use image analysis to create themes for groups of photos sharing similar characteristics. It is predicted through conducting a frame analysis of these images that female athletes will be showcased and perceived as less athletic compared to men.

#### References

Economic & Social Research Council (ESRC). (n.d.) Methods for media analysis. Retrieved from <http://www.restore.ac.uk/lboro/research/methods/#content>

Eveleth, R. (2013). Women appear on less than five percent of Sports Illustrated covers.

Smithsonian. Retrieved from <https://www.smithsonianmag.com/smart-news/women-appear-on-less-than-five-percent-of-sports-illustrated-covers-56315860/>

Fink, S. (2012). Time for another bad hair day. Tampa Bay Times, p. C6. Retrieved from <http://go.galegroup.com/ps/i.do?id=GALE%7CA298710591&v=2.1&u=cqu&it=r&p=IT OF&sw 9=w>

Fink, J. (2014). Female athletes, women's sports, and the sport media commercial complex: Have we really "come a long way, baby"? *Sport Management Review*, 18(3), 331-342.

Samuels, A. (2012). Gabby Douglas takes two Olympic golds and hair criticism. *Daily Beast*. Retrieved from <https://www.thedailybeast.com/gabby-douglas-takes-two-olympic-goldsand-hair-criticism>.

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#### Jake Stone

The Australian National University

#### Responding to scepticism

Is the world real? It could be that I am a brain in a vat connected to a simulation of the external world. Most people have entertained such alarming doubts at some point in their life. Sceptics use these doubts as grounds to deny we have knowledge of the external world. This denial is troubling as we generally take the existence of the world to be a paradigmatic example of something we know. My research investigates a possible response to this denial of knowledge. In particular, I reply to the paradox which arises when we ask whether we might be brains in a vat being deceived into believing an external world exists.

This paper argues that the philosophy of language provides a response to sceptical doubts of the external world. Specifically, that once we appreciate that the word 'know' is context-sensitive it becomes apparent that the brain in a vat hypothesis does not undermine our knowledge claims. This response is important as it provides a new and promising reply to the sceptical paradox; a paradox which has been a perennial problem in philosophy. Most excitingly, context sensitivity can accommodate our sceptical intuitions while preserving our claims to know of the existence of an external world. However, context sensitivity is not without objection. Recent criticism has argued that this response fails to address some types of sceptical argument. Building upon the work of Stewart Cohen, Keith DeRose and David Lewis, this paper improves the standard reply and shows how we can maintain knowledge of the external world in spite of these sceptical worries.

## Session 4

**Mitchell Blyth** and Michelle Coote  
The Australian National University

#### Rational computational design of an electrostatic catalyst

The ability to dramatically improve the rate of chemical processes, termed catalysis, has been of immense and global importance both to industrial processes and human health. Traditionally, catalysis has been achieved through the manipulation of temperature or light, for example, or the addition of other chemical species, termed catalysts. Furthermore, recent research has shown that electrostatic fields can also be used to catalyse chemical reactions of significant utility. However, our current ability to use electrostatic fields in a practical and scalable manner is hindered by their strong directionality and attenuation in polar environments such as water. Using quantum mechanical calculations and kinetic modelling, we have designed a series of catalysts which utilise tuneable electrostatic fields to accelerate an important reaction, the Diels-Alder cycloaddition, while simultaneously addressing these limitations of directionality and polarity.

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**Sarah Doueih**  
Macquarie University

### **Am I really that gullible?**

Gullibility refers to the acceptance of a false premise when an untrustworthy cue is present (i.e., believing something is true when it is not) (Yamagishi, Kikuchi & Kosugi, 1999). The Barnum Effect refers to the tendency for people to accept bogus personality feedback as being specific or unique to themselves has been a typical paradigm to measure one's gullibility (Layne, 1979; Meehl, 1956). However, studies that have sought to measure the relationship between gullibility and the Barnum effect are limited as they lack a clear definition of what the term gullibility means and they do not utilise a valid scale to measure gullibility. Instead, these studies operationalise the acceptance of profile feedback as being evidence for gullibility. The current study seeks to clarify this relationship.

Participants were recruited based on their extraversion level. In this study, a modified Barnum procedure was administered requiring participants to complete a series of personality questionnaires along with a reliable and valid gullibility scale (Teunisse et al., under review) and at the end of the experiment the participants were under the assumption that they would receive a personalised personality profile based on their scores. However, instead of providing one generic profile, the participant randomly received one of three profiles: an extrovert profile, an introvert profile or a control "Barnum" profile. The random allocation of these profiles will make three conditions (1) matching condition- participant received a profile which accurately represents their level of extroversion; (2) mismatching condition- participant received a profile which inaccurately represents their level of extroversion (3) control condition- participant received a Barnum profile which contained generalised personality statements. Results and implications will be discussed.

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**Eden Little**  
Griffith University

### **Can Gumby Gumby do wonders?**

The native Australian plant Gumby Gumby (*Pittosporum angustifolium*) has been used as a bush medicine by Aboriginal people for thousands of years. Traditional knowledge suggests that this plant material may be ingested or applied topically

in order to treat a variety of diseases, including cancers, skin disorders and viral infections. A preliminary literature review was conducted on the taxonomy, geological distribution and traditional application of this bush medicine. The chemical composition of Gumby Gumby was then isolated and identified from a 1g sample of plant material using modern laboratory techniques and spectroscopic technology. Including High-Performance Liquid Chromatography (HPLC), Liquid Chromatography-Mass Spectrometry (LC-MS) and Nuclear Magnetic Resonance Spectroscopy (NMR). The initial stages of this study have resulted in the structural identification of a natural product, which have shown promising results for biological activity. Further investigation into the phytochemistry of this traditional bush medicine are required to confirm its potential use in modern medicinal chemistry.

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**Nam Nguyen**  
Washington State University, USA

### **Development of a survey to investigate study abroad destination choice**

Many students nowadays consider study abroad during their undergraduate studies. We wish to learn why certain study abroad destinations are more common and popular for a student than other destinations, and to understand better the different factors that influence destination choice. This study comprises two complementary efforts to produce a high-quality survey instrument to investigate the factors that influence students while selecting their study abroad destination. Participants are undergraduate students at Washington State University who have expressed interest in completing a study abroad experience.

The first phase of this study uses the cognitive interviewing technique. In this method, the interviewer sits down with a survey respondent and asks the respondent to verbalize what they are thinking as they complete survey items on a draft of the survey that we will be using in our larger study abroad destination study. This process provides a window into how respondents perceive, interpret, and form a response to survey items. Additional follow-up questions gauge reaction to the survey and solicit recommendations for improving it. We ask the respondents that we record the interview to capture their comments accurately. The recorded file will be used for transcribing and analyzing purposes only. All recorded audio files will be destroyed at the completion of the project.

Additionally, all information collected during this project will be confidential. No names or other identifying information will be connected with the audio files, transcriptions, or study reports. Eighteen cognitive interviews were conducted, and transcripts are currently being analyzed for themes that can support revisions and interpretations drawn from the survey.

The second phase of the study involves pilot testing a survey revised after the cognitive interview findings. In this phase, representatives of the study population will be invited to complete a paper version of the survey voluntarily during a study abroad informational session. Item responses will be analyzed to guide further revisions. By completing these study phases, the research team will produce a tool for collecting high-quality data that significantly informs our understandings of undergraduate students and guides programming designed to counsel students through their study abroad experience.

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**Nicholas Sailor**

Central Queensland University

### **Building a deadly foundation: improving oracy through Indigenous art**

Australia's educational goals have highlighted that Indigenous children need to improve their literacy skills (Melbourne Declaration, 2008). One of the literacy skills is oracy. Oracy is the ability to listen and communicate in a grammatically correct way (Fellowes, J., & Oakley, G., 2014). Developing children's oracy at a younger age is important, since it assists in developing critical thinking skills. Indigenous children have been observed having cultural barriers limiting their academic oracy (Jens Korff, C., 2018). The gap between Indigenous and non-Indigenous literacy ability is substantial, which can be seen with NAPLAN data (Dept PM&C, 2017).

Indigenous artwork as a form of non-academic oracy tells the stories of the past and present traditions, instilling the cultural beliefs of the Indigenous people (Aboriginal Australian Art & Culture, 2018). Aboriginal dot painting is one form of Indigenous art. Aboriginal dot paintings have many symbolisms determined by the colours, the size of the dots, and grouping of the dots (Aboriginal Australian Art & Culture, 2018). The elements used in the dot paintings allow students to develop oracy by elaborating on the possible meanings of the art (Aboriginal Australian Art & Culture, 2018). The use of Indigenous of Indigenous

artwork as a form of non-academic oracy could overcome the cultural barriers of oracy.

The aim of this study is to improve Indigenous students' academic oracy through the use of Indigenous art. This research uses qualitative methods to collect descriptive data that will determine if oracy can be developed through the use of Indigenous art activities. These qualitative methods would be note taking of teaching scenarios, interviewing teachers/administration staff, self-observation, and reflexive investigation in the context of ethnographic field work and writing. This research is pertinent because young Indigenous children are not achieving to the standard of other Australian groups in literacy. It is predicted that Indigenous art would improve oracy with Indigenous students because of the cultural connection.

### *References*

Aboriginal Australian Art & Culture. (2018).

Retrieved from <http://www.aboriginalart.com.au/>

Australian Government Department of the Prime Minister and the Cabinet. (Dept PM&C, 2017). 2.04 Literacy and numeracy. Retrieved from Aboriginal and Torres Strait Islander Health Performance Framework.:

<https://www.pmc.gov.au/sites/default/files/publications/indigenous/hpf-2017/tier2/204.html>

Fellowes, J., & Oakley, G. (2014). Language, literacy and early childhood education (Second ed.).

Jens Korff, C. (2018). Ways of teaching & engaging Aboriginal students. Retrieved from

<https://www.creativespirits.info/aboriginalculture/education/teaching-aboriginal-students>

Melbourne Declaration on Educational Goals for Young Australians. (Melbourne Declaration 2008).

Retrieved from

[http://www.curriculum.edu.au/verve/resources/National\\_Declaration\\_on\\_the\\_Educational\\_Goals\\_for\\_Young\\_Australians.pdf](http://www.curriculum.edu.au/verve/resources/National_Declaration_on_the_Educational_Goals_for_Young_Australians.pdf)

National Report on Schooling in Australia. (2015).

Retrieved from ACARA:

<http://www.acara.edu.au/reporting/national-report-on-schooling-in-australia-2015>

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**Tessa Tribe**  
Monash University

### **Breaking *The Sex Pistols* barrier: demystifying the diversity of holocaust representations in British punk culture 1975-1990**

The emergence of the anti-authoritarian counter-culture of 'punk' in 1970s Britain coincided with the coming of age of a post-war generation born after the Holocaust. Despite the geographical and temporal distance, this new generation of British youth were culturally immersed in memories of the Holocaust through a rise in representations in popular culture. Coinciding with a period of social, political and economic crisis in Britain, punk music and art became the seemingly unlikely conduit for a wealth of creative products that represented, engaged and subverted British cultural memory of the Holocaust. Despite the wealth of punk literature, music and visual art representing the Holocaust between 1975 to 1990 the few investigations analysing this intersection have been significantly restricted by an exclusive focus of scholarship on one commercially successful band, The Sex Pistols.

Owing to the underground, 'do it yourself' nature of punk, crucial primary source material was obtained from both private and formalised archives in the United Kingdom. These atypical sources provide frames of individual identity, cultural context and motivations behind each case study's Holocaust representations. By applying realist and anti-realist frameworks of debate regarding the limitations of Holocaust representations to a broader variant of punk artists this paper demonstrates an overlooked nuance within punk approaches to representing and understanding the Holocaust. The aim of this paper is not to judge the appropriateness of these representations, but rather to begin a conversation that acknowledges the enormity of breadth and variety beyond the nihilism and shock value of The Sex Pistols in both Holocaust memory studies and punk cultural and historical enquiry.

## **Session 5**

**Jessica Bolin**  
University of the Sunshine Coast

### **Oceanographic predictors of humpback whale entanglement in Queensland shark nets**

East Australian humpback whales undertake predictable annual migrations along the Australian eastern seaboard, from their Antarctic feeding

grounds to their tropical breeding grounds in the Great Barrier Reef. Undertaking such large-scale migrations requires well-developed navigation abilities, influenced by the interplay between spatial memory and responses to real-time environmental cues, such as temperature and ocean currents. The dominant oceanographic process of the Australian east coast is the East Australian Current (EAC). The EAC's inner boundary is characterised by a sharp change in sea surface temperature, which may be used as a navigational tool by migrating humpbacks. However, humpback whales face numerous threats along their migratory route, including ship strike, pollution, and entanglement in shark nets.

The environmental processes influencing the likelihood of humpback whale entanglements in shark nets are poorly understood. This study aims to provide a quantitative spatio-temporal analysis of oceanographic influences on the likelihood of humpback whale entanglements in shark control nets. We will use satellite-derived sea surface temperature and current velocity imagery with humpback whale entanglement data from the Queensland Shark Control Program. Focusing on entanglements in South-East Queensland since 2001, we will investigate how the inshore edge of the EAC influences the probability of humpback entanglements. This study will be the first of its kind to interface remote sensing and statistics to investigate predictors of entanglement in shark nets.

Identifying the effect of these oceanographic processes on humpback whale entanglements is important to further understand the mechanisms underpinning humpback navigation, to improve predictive capacity of future humpback entanglements and monitoring of shark nets, and ultimately, improve conservation outcomes for east Australian humpback whales.

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**Conor Fogarty**  
University of the Sunshine Coast

### **Identifying the excretory-secretory biomolecules that facilitate aquatic schistosome-host interactions**

Schistosomiasis is one of the most socioeconomically impactful neglected tropical diseases in the world and innovations into minimising its spread have been widely investigated. It results from infection from parasites of the *Schistosoma* genus, whose lifecycles involve

the infection of an intermediate molluscan host and definitive mammalian host. Schistosoma species are believed to identify their potential hosts through chemosensory interaction. The aim of this study was to construct a database of the excretory-secretory biomolecules of both human infective schistosomes and their respective molluscan hosts. The focus was the identification of the respective proteomic interactions between the *S. mansoni* and *S. japonicum* schistosome species and the *B. glabrata* and *O. quadrasi* snails. Snail conditioned water was collected from both susceptible and resistant snails and fractionated using HPLC. Behavioural bio-assays were conducted on the schistosomes during their molluscan infective stage following exposure to these fractions. The protein composition of the fractions which produced the greatest change underwent proteomic analysis using LC/MS/MS coupled to an AB-Sciex QTOF X500R and an electrospray ion source. The data collected was cross referenced with the BLASTp database. The infected *B. glabrata* snails displayed an abundance of cathepsin L1, mucins and serine elastase. At this stage it is unclear whether they are coming from *S. mansoni* or *B. glabrata*. However, the resistant *B. glabrata* snails displayed upregulations directly or indirectly resulting from intramolluscan defence mechanisms, such as peroxiredoxin, leukocyte elastase and tyrosine kinase. This indicates that the *S. mansoni* may not be more attracted to certain snails within a species, but rather the snails' resistances may be determined by their internal defence mechanisms. This study will increase knowledge regarding the interactions between schistosomes and hosts and facilitate future developments of non-invasive methods of disrupting the lifecycle of Schistosoma parasites.

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**Donna Lock**  
Griffith University

#### **Evaluation of an Aboriginal and Torres Strait Islander resilience scale**

This research aimed to evaluate the Fleming-Kickett Aboriginal and Torres Strait Islander resilience scale to determine its effectiveness in measuring resilience in Australia's Indigenous people. Published articles on Indigenous resilience research is limited. It has been identified that research on Indigenous resilience must embrace culturally specific measures that include tradition, spirituality and customs from an Aboriginal and Torres Strait Islander perspective.

Indigenous agencies on the Gold Coast were involved in the screening of participants for this research and permission granted by traditional owners. The Fleming-Kickett Aboriginal and Torres Strait Islander resilience scale (Indigenous) was measured with the Connor Davidson Resilience Scale (non-Indigenous). The Fleming-Kickett Aboriginal and Torres Strait Islander resilience scale contained 23 culturally appropriate questions such as "I have strong cultural values and principles" while the Connor Davidson Resilience Scale contained 10 general questions including; "I am not easily discouraged by failure." A survey pack was completed by each of the 26 participants (9 male, 17 female), which included both measures, demographics and feedback form.

The hypothesis tested was found to be true with positive correlations between the Fleming-Kickett Aboriginal and Torres Strait Islander Resilience Scale and the participants feedback. There was an unexpected outcome with feedback on western education and empowerment. Positive feedback was gained on the resilience scale as being a valuable measurement of Aboriginal and Torres Strait Islander resilience and culturally appropriate. Throughout the process of conducting the research, limitations were identified and noted for future studies. It was also identified that there would need to be attention paid to wording of questions to suit the area research conducted. It was recommended that the delivery of surveys would need modification for future research to reach a wider region of participants.

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**Myf Nizette**  
University of Notre Dame Australia

#### **Who's Responsible? A Foucauldian-inspired policy analysis of the New South Wales RSA & RCG competencies**

The Responsible Service of Alcohol (RSA) and Responsible Conduct of Gambling (RCG) competencies are mandatory for all pub, club and casino workers in New South Wales. While the policies surrounding these competencies impact upon the drinking and gambling behaviour of the vast majority of NSW residents, they remain largely unexamined and unquestioned. This study provides a discourse analysis of the relevant policy documents in order to examine, from the perspective of Foucauldian governmentality, what rationalities of government these policies represent and how the issues of 'binge-drinking' and 'problem gambling' are represented by policy-makers. The

study found that the subjects of the RCG are constructed as able and obliged to self-govern, while the subjects of the RSA are deemed to be in need of authoritarian intervention by venue staff. Dividing practices are used to established these designations, based on contested constructions of 'moderation' and 'excess.' These findings suggest that policy-makers represent excessive sessional alcohol consumption as a public issue and therefore the responsibility of the public to address, while representing excessive gambling as a private issue that is the responsibility of the individual gambler to remedy.

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**Diane Salim**

The Australian National University

### **A new turbulence-regulated star formation law**

Star formation is inefficient. What drives this inefficiency is still highly debated, but observations and simulations have shown turbulence to be a significant star formation suppressor. Understanding the source of this inefficiency is crucial for understanding the mechanisms that drive galaxy evolution. We present a new universal star formation law based on the probability density function (PDF) and sonic Mach number of the turbulence in star-forming clouds. In our relation the star formation rate (SFR) correlates with the molecular gas mass per multi-freefall time. We show that the actual SFR is only about 0.45% of the maximum possible SFR, confirming the observed low efficiency of star formation. We show that placing observations in the framework of our developed relation yields a significantly improved correlation with 3/4 times reduced scatter compared to previous star formation relations. We use this new relation to develop a new method for estimating the column density of cold molecular gas ( $\Sigma_{\text{gas}}$ ) using integral field spectroscopy. We utilise the spatially resolved H $\alpha$  maps of flux and velocity dispersion from the Sydney VAO Multi-Object Integral field spectrograph (SAMI) Galaxy Survey to make our estimates. Finally, we present and utilise data from the Combined Array from Research in Millimeter Astronomy (CARMA) and Herschel Space Telescope to measure the star formation efficiency across the face-on Hickson Compact Group galaxy NCG7214. We find that this galaxy is extremely inefficient and cannot be described by star formation relations developed in previous literature. We therefore extend our multi-freefall star formation relation to take into account the virial parameter of the turbulent clouds, which

yields significantly improved predictions of the SFR compared to any previous star formation law.

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**Suzanne Volejnikova-Wenger**

University of the Sunshine Coast

### **Serious games in health professional education: a qualitative study exploring student experiences with a learning intervention**

#### *Introduction*

Health professional education is increasingly exploring the use of digital intervention in course curriculum to provide consistent and measurable learning experiences.

Environmental hazard and safety assessment is an integral part of proficiency for a growing healthcare workforce. The serious game "Safe Environments" was developed for this purpose. It educates players while using different healthcare scenarios that require students to apply knowledge and skills in environmental home safety assessment. There is a dearth of research specifically focused on participants' perception of a serious game and their lived experiences with this form of learning.

#### *Purpose*

To evaluate students' perceptions of the efficacy of a serious game. The research question was: 'What are health students' experiences using a serious game to learn environmental hazard and safety assessments in community and residential healthcare settings?'

#### *Methods*

Hermeneutic phenomenological research design used semi-structured interviews post gaming session to collect data on the lived experience of students engaging with the serious game "Safe Environments". Interview transcriptions were then examined according to Interpretative Phenomenological Analysis.

#### *Results*

Four themes were identified; 'Knowing', 'Navigating', 'Engaging' and 'Learning'. Sub-themes addressing individual nuances explained the impact of prior knowledge, technical ability and engagement on learning using gaming approaches which increase or decrease achievement of learning outcomes. The 'KNavEL' model illustrates the interactions of the four themes and raises the issue of students potentially being disadvantaged if computer literacy and navigation are not addressed within a learning intervention.

### *Conclusion*

This research gives a voice to students' experiences, provides valuable information for future development for serious games in health education from a student perspective, and provides important insights for academics seeking to use serious games as a curricular delivery and assessment method.

## **Session 6**

**Gemma Campbell**, A.J. Turner, K.J. Robinson, N.A. Everett, J.L. Cornish and S.J Baracz  
Macquarie University

### **Are male or female rats more vulnerable to the effects of early life and adolescent stress?**

Childhood neglect and adolescent social stress can alter brain development and the probability of developing psychological disorders later in life. In humans, encountering multiple stressful events during the developmental period can increase the probability of poor mental health outcomes. In addition, women are more at risk of developing both anxiety and depression, yet the majority of preclinical animal research continues to be conducted on male rats and often only evaluates the impact of one stressor in a single developmental period. This study aims to assess the accumulative effect of early life and adolescent stress on adulthood anxiety and depression in male and female rats. Nine pregnant Long Evans female rats were used, giving birth to a total of 84 experimental rats (46 males and 38 females). Pups were separated from the mothers once daily from PND1 to PND21 for either 15 minutes (control condition) or for 6 hours (early life stress condition). On PND 22, considered early adolescence, pups were weaned from their mothers and either single housed or housed in same sex groups of 3-4 pups. On PND 43, single-housed rats were re-socialised into groups of 3-4 pups. In adulthood (PND 57 onwards), four well-established behavioural tests were conducted and anxiety-like and depressive-like behaviour were measured. Preliminary results suggest that anxiety and depression-like behaviours differ between conditions and are dependent on sex. Initial analyses suggest there is a trend towards a significant interaction between maternal separation condition and gender on anxiety-like behaviour. However, at the conclusion of the experiment further analyses will be completed and the implications of these findings will be discussed.

### **Nicholas Gibson**

Central Queensland University

### **Improving university students' algebra competence: a digital approach**

In Australia, there is a continued decline in Algebra results achieved in schools (Thomson, De Bortoli, & Underwood, 2015). The implementation of an online portal to teach numeracy in universities could help improve Australia's declining Algebra results. Traditionally, people have preferred and thought face-to-face instruction has been the optimal way to teach Algebra. In a recent study, comparing a face-to-face course to an online course, the online course students were performing and retaining information more effectively (Tunstall & Bossé, 2015). The goal of this research is to demonstrate an online portal can significantly increase student's algebra competency.

The methodology of the study is a quantitative design. Specifically, I will be using a pretest posttest design. I will create a self-paced online portal for university level students to improve algebra skills. The Portal's curriculum is setup so students complete the pretest then work through reading tutorials, watching tutorial videos, completing activities, and completing quizzes at their own pace. Upon the completion of the portal, students will be given a posttest to complete which has identical questions to the pretest but arranged differently to maintain an accurate assessment of improvement. Because the portal is self-paced, meaning students can do as much or as little as they want at any time, forums have been implemented alongside the portals curriculum to allow students to ask questions to myself or other students to gain further understanding or clear up any misunderstandings. Constant monitoring of the portal is also required to monitor student engagement and achievement so improvements can be made to any weak areas of the portal. Following the collection of the quantitative data, I will use an ANOVA (analysis of variance). An ANOVA is a collection of statistical models used to analyse the differences among group means (Diez, Barr, & Cetinkaya-Rund, 2017). The prediction is that students will have a significant improvement to numeracy results.

### *References*

Diez, D. M., Barr, C. D., & Cetinkaya-Rund, M. (2017). *OpenIntro Statistics* (3rd ed.). OpenIntro.

Thomson, S., De Bortoli, L., & Underwood, C. (2015). PISA 2015: A first look at Australia's results. Australian Council for Educational Research.

Tunstall, S. L., & Bossé, M. J. (2015). Promoting Numeracy in an Online College Algebra Course through Projects and Discussions. *Numeracy*, Vol.8(2), A.10.

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**Charlotte Logan**

Central Queensland University

**Can group work in STEM improve girls' academic engagement?**

Statistically 28% of science, technology, engineering and mathematics (STEM) jobs in America are worked by women, despite women making up 50% of the population (Dasgupta, Scircle, & Hungsinger, 2015). STEM is the way of the future, and encouraging women to pursue STEM careers will increase their workforce sustainability. Research has shown that female students who participate in STEM group work are more interested than students who partake in other pedagogical methods. This research can be traced back as far as John Dewey (1916), who explains that students should be encouraged to work as members of a community. Recent studies (e.g. Fung, & Lui, 2016; Gnesdilow, Evenstone, Rutledge, Sullivan, & Sadhana, 2017) show students increase their knowledge when peers ban together, bringing their individual schema, resources, and differing perspectives. A case study (Dasgupta, Scircle, & Hungsinger, 2015) that had female university students divided into three groups; 75% women, 50% women and 25% women, showed that the women participated more and were more academically inclined in the higher percentage groups.

Further explanation is needed to explain why women prefer collaborative group work and how this can be developed in primary classrooms, which has led to this study that will examine what occurs in the female groups to increase their academic engagement.

This study is a qualitative case study of year seven girls participating in a STEM based program designed to encourage collaborative learning. The data of this case study was recorded through observations, as well as focus group interviews. Preliminary data analysis supports previous research that female students are more academically engaged when they are involved in a

collaborative work environment. The findings add to the current research by demonstrating that through collaborative group work, the female students problem-solved, brought individual expertise that they depended on each other for, developed their interests in creative ways, and increased content learning.

*References*

Dasgupta, N., Scircle, MM., & Hunsinger, M. (2015) Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering. *Proceedings of the National Academy of Sciences of the United States of America*, 112(16). Retrieved from <https://www.ncbi.nlm.nih.gov.ezproxy.cqu.edu.au/pmc/articles/PMC4413283/>

Fung, D., & Lui, W. (2016). Individual to collaborative guided group work and the role of the teacher in junior secondary classrooms. *International Journal of Science Education*, 38(7), 1057-1067. Retrieved from [https://www-tandfonline.com.ezproxy.cqu.edu.au/doi/abs/10.1080/09500693.2016.1177777](https://www.tandfonline.com.ezproxy.cqu.edu.au/doi/abs/10.1080/09500693.2016.1177777)

Gnesdilow, D., Evenstone, A., Rutledge, J., Sullivan, S., & Puntambekar, S. (2013). Group work in the science classroom: How gender composition may affect individual performance. In N. Rummel, M. Kapur, M. Natha, & S.Puntambekar (Eds.), *Proceedings of 10th International Conference on Computer-Supported Collaborative Learning* (pp. 34–37). Madison, WI: University of Wisconsin - Madison.

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**Alex Pan**

The Australian National University

**The New Life Movement in China's 'cosmopolitan' Anglophone press**

The New Life Movement was a bold social reform movement which aimed to instil morality in 1930s China. Historians have tended to view this movement as either a failed attempt at nation-building or an ideologically Fascist movement. These views largely stem from Chinese language primary sources, to the neglect of Anglophone publications, which can provide greatly differing perspectives. This paper analyses how four Anglophone periodicals, all published in the cosmopolitan melting-pot of Shanghai, viewed the New Life Movement. Despite the diversity of these

periodicals, they have tended to have similar views. However, these views tended to differ greatly from secondary interpretations. For example, these secondary sources rarely linked the movement with Fascism, instead tending to view the movement as a state-building movement with distinct characteristics. Therefore, these periodicals provide a valuable insight into how Anglophone authors viewed the movement, representative of the diverse Anglophone media of Republican China.

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**Birgit Sambell**

Central Queensland University

**Creating stronger university-school partnerships**

An analysis of NAPLAN tests has shown a steady decrease in writing skills over the past several years (ACARA, 2017), thereby demonstrating a compelling need to address student performance in writing. Professional literature supports the use of Mentor Texts (e.g. Culham, 2014; Fletcher, 2011; Gallagher, 2011) with primary students as a model to improve writing skills; however there is little research illustrating the effectiveness of this type of instruction. The lack of research leads to teachers experiencing uncertainty of Mentor Texts as a viable method of instruction. Primary school leaders and teachers from the Bundaberg region will be invited to attend a symposium at CQ University Bundaberg to develop a curriculum program featuring Mentor Texts that can aide teachers in implementing effective writing instruction. The purpose of this research project will be to monitor the interactions at the symposium and learn how university-school partnerships are established. The data collected can be used to contribute to the growing body of research in Australia around creating university-school partnerships (e.g Brady, 2002; Broadbent & Brady, 2013; Jones et al., 2016; Mockler, 2013).

For the purposes of this symposium, we will be using a case study (Merriam, 1998) design. The data will be collected from surveys, observer notes, questionnaires, and teacher-researcher interactions to develop a picture of how the university and school leaders create effective partnerships. We expect to find that giving primary school stakeholders opportunities to voice their opinions will create agency and develop more buy in to the plan. In addition, school leaders will be given a chance to voice any of their concerns or barriers with the program and help to create a successful research plan, which will also develop

strong partnerships between CQU and local schools.

*References*

ACARA (2017). NAPLAN national report. Retrieved from <http://www.nap.edu.au/results-and-reports/national-reports>.

Brady, L. (2002). School university partnerships: What do the schools want. *Australian Journal of Teacher Education*, 27(1), 1-8.

Broadbent, C., & Brady, J. (2013). Leading change in teacher education in Australia through university-school partnerships. *The European Journal of Social & Behavioural Sciences*, 4(1), 687-703.

Culham, R. (2014). *The writing thief: Using mentor texts to teach the craft of writing*. Newark, DE: International Reading Association.

Fletcher, R. (2011). *Mentor author, mentor texts: Short texts, craft notes, and practical classroom uses*. Portsmouth, NH: Heinemann.

Gallagher, K. (2011). *Write like this: Teaching real-world writing through modelling and mentor texts*. Portland, ME: Stenhouse.

Jones, M., Hobbs, L., Kenny, J., Campbell, C., Chittleborough, G., Gilbert, A., Herbert, S., & Redman, C. (2016). Successful university-school partnerships: An interpretive framework to inform partnership practice. *Teaching and Teacher Education*, 60, 108-120.

Merriam, S.B. (1998) *Qualitative Research and Case Study Applications in Education: Revised and Expanded from Case Study Research in Education*. 2nd Edition, Jossey-Bass, San Francisco.

Mockler, N. (2013). The slippery slope to efficiency? An Australian perspective on school/university partnerships for teacher professional learning. *Cambridge Journal of Education*, 43(3), 273.

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**Tandee Wang**

The Australian National University

**The lowly and hated Formosan: Taiwanese national identity in the trial of Japanese war criminals Sgt Matsushima Tozaburo and others**

This presentation seeks to understand the complex positioning of the Taiwanese subject in the Japanese Empire within a particular Australian war crimes trial, R55. Australian trials of Japanese war criminals following WWII were beset by numerous procedural problems. Rules of evidence were relaxed, for example, and there were provisions allowing military officers to preside over cases concerning crimes perpetrated against their own nationals. These problems were exacerbated by the difficulty of gathering evidence against specific individuals. Such conditions provide an interesting context in which to view the positioning of Taiwanese (Formosan) subjects. Following the start of WWII, Taiwan, a Japanese colony since 1895, was simultaneously subjected to aggressive assimilatory policies and recruitment in various roles in the Japanese army. The Taiwanese were, therefore, included within the empire, but their rank was also clearly tinged by an awareness of their non-Japanese status.

This is therefore a small microhistory, which focuses on the case of Sergeant Matsushima Tozaburo and Others (National Archives of Australia A471/80915). It involved the prosecution of two Japanese officers and seven Formosan civilians (military labourers), for involvement in an alleged murder of 30 Chinese prisoners on two separate occasions. By examining the arguments put forward by both sides in this case, this essay finds that the Taiwanese people deliberately positioned themselves as lowly within the Japanese hierarchy to absolve responsibility. Simultaneously, they claimed to be despised by the Chinese and testimonies reflect an acute contemporary sense of racial betrayal for the role played by the Formosan workers. The case, therefore, provides a specific instance in which historians may come to a deeper sense of the construction of identity in Australian war crimes trials in this period.

## Session 7

**Harry Carey**

Macquarie University

**Oxytocin administered to adolescent rats attenuates early life stress induced neuronal changes and anxiety-like behaviours differentially between genders**

Early childhood has been identified as a critical developmental period for the oxytocin system, a neural network associated with social bonding and attenuating fear and anxiety. Stress during this period, referred to as 'early life stress' (ELS), has been shown to alter the neural development of the oxytocin system, contributing to anxiety-like behaviours which endure into adulthood. Recently oxytocin administered in adulthood has been shown to reduce ELS induced anxiety-like behaviours however how oxytocin administered in adolescence following ELS effects these behaviours is unknown. Our aims were to determine whether adolescent oxytocin treatment attenuates anxiety like behaviours and the cellular changes in hypothalamic oxytocin neurons induced by ELS.

During early childhood, between postnatal day (PND) 1 and 21, rats underwent maternal separation for either 15 minutes (MS15) or 6 hours (MS360). In adolescence, PND 28-42, rats were given daily intraperitoneal injections of either 1mg/kg oxytocin or vehicle (0.9% saline). Between PND 60-65 rats (adulthood) were tested on the open field paradigm to measure anxiety-like behaviours,. Brains were collected two hours post test for examination.

In males ELS significantly increased the frequency of low leaning and significantly decreased time spent in the center of the open field, compared to MS15 males suggesting increased anxiety. Oxytocin treated MS360 males showed increased high leaning and increased time spent in the outer central area of the open field, suggesting oxytocin treatment had attenuated the anxiogenic effects of ELS. Consistent with the males, frequency of high leaning was higher in MS360 females compared to MS15 females. Oxytocin treatment increased high leaning in both the stressed and non-stressed females. Brain tissue analysis will also be discussed.

**Elvis Gleeson** and Tandee Wang  
The Australian National University

### **Why are you studying in Canberra? A qualitative study of the barriers faced by regional students in coming to university**

Australian universities have sought and failed to significantly increase their representation of non-metropolitan students. Figures from the Department of Education and Training reveal that although non-metropolitan people receive 25.2% of university offers, they only make up 20.8% of commencing students. This is significantly lower at Group of Eight university ANU, with ANU Planning revealing only one in ten domestic students is from a non-metropolitan background. Therefore, our primary research aim was to explain the causes of this severe under-representation. It differed from the extant literature by providing qualitative research in a field that is largely quantitative. Our methodology involved gathering primary data through in-depth interviews with 16 non-metropolitan, undergraduate, ANU students. Participants were selected through snowball sampling and were interviewed in a semi-structured format. Interview transcripts were then coded, and 'grounded theory' was used to analyse the resulting five categories: aspiration, cost, family, community and distance. We found that the most consistent factors shared by participants were a general aspiration to go to university and the presence of familial support. Indeed, with aspiration and familial support, many students expressed both willingness and ability to overcome other barriers such as cost and distance. We suggest, therefore, that it is not so much specific barriers that obstruct university attendance, but factors preventing the formation of university aspiration over the longer term. Consequently, we argue that universities and public institutions should address participation beyond the scope of the end of high school.

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**Nicholas Lovett**  
Central Queensland University

### **Punctuation and grammar: can a digital curriculum improve instruction?**

In a society flooded with digital technologies, there has been an increase of digital platforms aimed at improving literacy skills (Burnett, 2016). Preliminary results from the 2017 National Assessment Program – Literacy and Numeracy (NAPLAN) tests show a 19.02% decrease in grammar and

punctuation skills in Year 9 (National Assessment Program: Literacy and Numeracy, 2009 & 2018). Due to the increase in digital literacies in societies (Christenbury, Bomer & Smagorinsky, 2009), it is logical to deliver grammar and punctuation instruction in a digital format. Using a digital format can support diverse ways of learning and address the deficiency in grammar and punctuation. This study proposes that a digital curriculum will improve students' grammar and punctuation abilities.

The digital format for instructing grammar and punctuation would be an online portal that is a self-monitored, interactive curriculum with step-by-step instructions, quizzes, and instructional videos. It will involve a pre-test that assesses literacy skills. The results of this pre-test determines the students' instructional group. There are two groups. One group is for students who require more support and guidance. The other group is for students who require less support. After working through their group, the students will then complete the post-test, determining the success of the portal.

The methodological composition used to validate this digital curriculum is a pre-test post-test design of the quantitative nature. The collected data should show a significant improvement in results. This will be achieved by running an Analysis of Variance. An Analysis of Variance, or ANOVA, can be defined as a collection of statistical models that can be used to analyse the differences within means among groups and the procedures associated with these groups (Iversen & Norpoth, 1987). It is predicted that grammar and punctuation competency would show a significant improvement from the implementation of a digital curriculum.

#### *References*

- Burnett, C. (2016) *The Digital Age and its Implications for Learning and Teaching in the Primary School*. York: Cambridge Primary Review Trust.
- Christenbury, L., Bomer, R., & Smagorinsky, P. (2009). *Handbook of Adolescent Literacy Research*. New York: Guilford Press.
- Iversen, G., & Norpoth, H. (1987). *Analysis of variance* (2nd ed., Sage university papers series. Quantitative applications in the social sciences; no. 07-001). Newbury Park, [Calif.]; London: SAGE.
- National Assessment Program: Literacy and Numeracy. (2009). Retrieved from [https://www.nap.edu.au/\\_resources/2ndStageNationalReport\\_18Dec\\_v2.pdf](https://www.nap.edu.au/_resources/2ndStageNationalReport_18Dec_v2.pdf)

National Assessment Program: Literacy and Numeracy. (2018). Retrieved from [https://www.nap.edu.au/docs/default-source/default-document-library/naplan-national-report-2017\\_final\\_04dec2017.pdf?sfvrsn=0](https://www.nap.edu.au/docs/default-source/default-document-library/naplan-national-report-2017_final_04dec2017.pdf?sfvrsn=0)

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**Hamish Phillips**  
Macquarie University

### **From 'scrawny' to 'swole': body dissatisfaction and perception of muscularity**

Many people make inaccurate judgements when assessing their own body. This phenomenon, known as body shape and size misperception (BSSM), is a recognised risk factor for various psychological disorders (e.g. Anorexia Nervosa, Muscle Dysmorphia). Increases in BSSM rates are thought to reflect the changing body ideals that media portrays of males (muscular) and females (thin). It has been proposed that overexposure to bodies representing these ideals causes a bias such that subsequently seen bodies appear opposite. For example, overexposure to thin bodies makes an average body appear fatter. For those who study perception, this is reminiscent of the process known as adaptation, which is followed by a perceptual aftereffect.

Body shape and size aftereffects have been rigorously researched in the laboratory to explore the perceptual basis of BSSM. While 2 minutes of exposure to a specific body shape is sufficient to induce a perceptual aftereffect in healthy participants, those with severe body dissatisfaction react differently. Females with higher body dissatisfaction appear to have pre-existing adaptations through real-world experiences, operationalized by BSSM (i.e. a misperception of normal bodies being fat), along with resistance to further adaptation (i.e. exposure to thin models does not change their perception of body size).

We used this framework to investigate whether males with varying muscle dissatisfaction levels show differences in their perception of muscularity, and in their muscularity aftereffects. Participants judged images based on how "normal" they looked in terms of muscularity before and after prolonged exposure to bodies that were unusually muscular or scrawny. If adaptation is an accurate model for BSSM in terms of muscularity, participants higher in muscle dissatisfaction may view normal bodies as being low in muscularity and may be resistant to further adaptation. Results will be discussed in the

context of the development of potential treatments for Muscle Dysmorphia.

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**Crystal Santos**  
The University of Queensland

### **Are autistic traits associated with reduced cooperation in a Prisoner's Dilemma? Testing a self-categorisation model of autism spectrum disorder**

Autism Spectrum Disorder (ASD) is a severe childhood disorder characterised by social and communication deficits, alongside the presentation of unusual or restricted, repetitive behaviours or interests. Prevailing theory argues that these clusters of features are distinct, coexisting outcomes of a modular cognitive system, brought about by a dysfunctional Theory of Mind (ToM) mechanism and an abnormal preference for local information processing – known as 'weak' central coherence (WCC). However, recent developments in the field highlight the role of self-categorisation in uniting these seemingly separate features. The present study builds upon the integrated self-categorisation model of autism (ISCA), developed by Skorich and colleagues (2016, 2017) who argue that ASD is caused by a fundamental categorisation dysfunction which disrupts the ability to engage in self-categorisation – the social psychological process which allows people to perceive themselves as distinct individuals or as relatively interchangeable members of social groups. This study specifically investigates whether individuals with more autistic traits are less susceptible to self-categorisation processes which influence interdependence in the form captured in a three-iteration Prisoner's Dilemma. It was expected that participants would be more likely to cooperate with ingroup (rather than outgroup) members at Time 1, but that this effect would be weaker to the extent they had more autistic traits (AQ). As predicted, high AQ was related to low social identification with the ingroup, however, the effect of ingroup favouritism was not found. Future cooperation at Time 2 and 3 was expected to be influenced by whether the opponent cooperated, and whether they were an ingroup or outgroup member. Participants were more likely to reciprocate cooperation with cooperation in future rounds. However, an interaction revealed that those with high (rather than low) AQ were more likely to reciprocate cooperation with competition. These findings have significant theoretical and practical implications.

**Yunan Ye**

The University of Queensland

### **Understanding the developmental plasticity of brain connections**

Integrated and coordinated brain functions are achieved by long-range axonal connections linking distant brain regions. Although damages to these connective highways are often detrimental in adults, the developing brain shows a remarkable ability to adapt to novel environments and injuries. The prevailing hypothesis explaining this phenomenon is the existence of “developmental long-range axonal plasticity”, where alternative brain connections are made in a developmental critical window to compensate for the loss of a normal neuronal route. However, the characteristics, functions and mechanisms of long-range axonal plasticity remain unknown. Here, we establish a surgically-induced callosotomy mouse model to investigate the effects of developmental loss of a major axon tract, the corpus callosum (CC). Using diffusion imaging and tractographic analysis, we found global connectivity changes, including novel long-range connections and altered axon distribution patterns. Moreover, we histologically validated the presence of a novel connection between the primary somatosensory cortex (S1) and the anterior septum. Our results demonstrate that long-range axonal plasticity occurs when normal connections are disrupted during development. The experimental paradigm we have established allows for the investigation of both large-scale connectivity characterisations and specific ectopic pathways. We anticipate our study to be a starting point for a systematic investigation of the patterns and functions of developmental long-range axonal plasticity.

**Tuesday, 25 September**

## **Session 8**

**Intifar Chowdhury**

The Australian National University

### **Window dressing with no real power? Australian female ministers and the saliences of their cabinet portfolios**

Although women are better represented in the Australian cabinet today, they appear to be relegated to low prestige- and hence, less salient-portfolios. To investigate whether gender plays a critical role in appointment, it is important to appropriately rank cabinet posts. Unfortunately,

existing studies regard saliency as a stable characteristic and, thus, use unreliable methods for ranking portfolios. The most popular method of surveying experts is not free of response biases. In this study, I provide a methodological prescription; I define saliency as the importance of a portfolio and the power it confers, which change over time and space. I use an objective method of text analysis (i.e. word frequency) on parliamentary speeches from 1980-2012 to rank portfolios in an ordinal scale. This is based on the underlying assumption that ministers occupying more-salient portfolios (need to) speak more than ministers in portfolios that matter less. I find that finance is by far the most salient, followed by prime ministership, environment and employment. Surprisingly, highly prestigious portfolios like defense and justice are lower in the hierarchy. Time-series analyses show that portfolio saliences change across ministries following influential events (e.g. transport after 9/11 and defence during 2003 Iraq war). In line with feminist institutionalist (FI) expectations, I find that women have a higher likelihood of being appointed to portfolios of lower salience. Despite the changes in salience across ministries, this confinement to positions with limited power is an informal institutional rule. It continues to enforce gender bias in ministerial recruitment. As such, this study advances knowledge across the fields of elite and gender studies by questioning our subconscious ideas about high profile portfolios. It highlights the need for future formal rules to increase women’s access to higher echelons of power.

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**Benjamin Halpin**

Central Queensland University

### **Families and school achievement: does divorce hinder university graduation**

Family structure has a major impact on the way students develop and interact with the school environment (Bray, 2010). Researching divorce as an issue in family structure is important, because approximately 40 percent of couples divorced in 2016 (Australian Bureau of Statistics, 2017). The impact of divorce tends to have a negative effect on children, because it affects their psychological development and academic performance (Shansky, 2002). Potter (2010) showed there is a significant decrease in the academic achievement in children of unmarried parents compared to children of married parents. The goal of this paper is to illustrate the disparity in university graduation rates

between students' with married parents and students with unmarried parents.

The methodological composition of this research paper is to conduct a quantitative, descriptive analysis of university students' graduation rates and their parent's marital status. This has been conducted through the analysis of census data. The data analyses supported Potter's (2010) study. The results revealed a significant gap in university graduation rates between children of married versus unmarried parents. Female students from married families graduate at a rate of 40.2 percent (United States Census Bureau, 2012); however, female students from unmarried families graduate at a rate of only 11.1 percent. The same disparity is relevant in male students. Male students from married families graduate 37.6 percent of the time (United States Census Bureau, 2012); whereas, male students from unmarried families graduate only 7.6 percent of the time (United States Census Bureau, 2012). Shockingly, the data illustrates that parental marital status plays a crucial role in student university graduation rates.

#### References

Australian Bureau of Statistics. (2017). Marriages and Divorces, Australia, 2016. Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3310.0>

Bray, J. (2010). Families and Schools. In *The Wiley-Blackwell Handbook of Family Psychology* (pp. 515-526). Oxford, UK: Blackwell Publishing.

Potter, Daniel. (2010). Psychosocial Well-Being and the Relationship Between Divorce and Children's Academic Achievement. *Journal of Marriage and Family*. University of Virginia.

Shansky, Janet. (2002). Negative effects of divorce on child and adolescent psychosocial, adjustment. *Journal of Pastoral Counseling*, 37, 73.

United States Bureau of Statistics. (2012). *America's Families and Living Arrangements: 2012 Population Characteristics*. Retrieved from <https://www.census.gov/prod/2013pubs/p20-570.pdf>

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**Elaine LK Luc**

The University of Queensland

#### **On the economic convergence to the zero-growth equilibrium and evaluation of significant drivers of income growth across countries**

The levels of income per worker in different countries have been growing at different rates. The present study has found evidence of income growth petering out to zero as income rises, hence the so-called phenomenon of convergence in light of the Solow-Swan model. Such convergence has been taking place among the groups of OECD and Roman countries, within each group the lower-incomes having been growing at higher rates, hence joining the higher-incomes at their common long-run equilibrium where income growth is no longer powered endogenously. However, no evidence of convergence was found among the groups of 50 highest-income countries and 50 lowest-income countries, which is largely due to their disparity in various structural characteristics despite their shared income status. As we examined the panel data of 182 countries over the period from 1980 to 2014, we argued for the likelihood of truth of a hypothetical converging path that we sketched through a subgroup of the low-income countries whose structural characteristics manifest similarity. Despite the presence of such local convergence, countries are disunited when it comes to pinpointing the most significant determinant that has driven their own income growth, with the major drivers being technology progress, human capital improvement, and physical capital accumulation. As the residually calculated technology accounts for income growth in a majority of countries, we evaluated rule of law, trade openness, and economic complexity as the candidate variables that might have constituted technology, which therefore are additional potential drivers of income growth. Result of the Fixed Effect Model indicates significance in all three variables as we controlled for human and physical capital.

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**Tyler Philp**

The University of Queensland

#### **Measuring Hubble's Constant with peculiar velocities and a new standard siren**

Currently, there is disagreement in the astrophysics community over the value of Hubble's constant; the rate of expansion of the universe. In 2017, a new era of astronomy was heralded by the detection of a kilonova event; GW170817, providing the

opportunity to independently measure Hubble's constant. GW170817 was an inspiral event of two neutron stars, which produces gravitational waves. These waves are ripples in space-time and are detectable by the LIGO interferometer. The fact that GW170817 was two neutron stars meant it also had an electromagnetic counterpart, meaning it was able to be observed with conventional telescopes. Gravitational waves allows a new type of distance measurement, and by also measuring its velocity with a conventional telescope, a value for Hubble's constant was calculated from this single gravitational wave event. The result is not precise enough to resolve the Hubble constant debate, but is exceptionally promising, given there has only been a single event measured to date.

The aim of my project is to improve the distance to GW170817, and improve the techniques for future gravitational wave measurements, and improving the determination of the sources' peculiar velocities – their motion independent of the Hubble. By using simulated galactic data to construct a velocity field, I will test the necessary observable region and required accuracy to obtain the most accurate measurement for Hubble's constant possible.

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**Abigail Slater**

The Australian National University

### **Initial characterisation of immune cell entry to the brain in a mouse model of multiple sclerosis**

Multiple sclerosis (MS) is a neurodegenerative disease in which immune cells enter the central nervous system (CNS) and damage the nerve insulating substance myelin. This condition leads to ascending paralysis and loss of neurological functioning. Although MS is known to cause neurodegeneration, the disease still has no cure. Investigating immune cell population changes over the disease course and their infiltration into the CNS is essential to understanding how potential new treatments could prevent or alter the disease. Based on prior research, we hypothesised that the immune cells enter the brain via the choroid plexus, the interface between the blood and cerebrospinal fluid in the ventricles.

A relapsing-remitting mouse model was used, in which immunisation with a peptide induced auto-inflammatory disease of the CNS. This model replicates the relapsing-remitting pathology of most MS sufferers, who experience periods of acute inflammation alternating with periods of remission.

We performed sectioning, immunohistochemistry and confocal microscopy of the brains at control, preclinical and acute stages of disease. Flow cytometry was used to measure corresponding immune cell changes in the blood.

Examination of the blood at acute disease showed significant decline in T-regulatory immune cells, suggesting their suppression as important to disease onset. Neutrophils (immune cells which are rapidly recruited to inflammatory sites) showed a preclinical increase and subsequent decrease at acute disease. This corroborates existing studies, and suggests the cells may have either died or travelled into the brain.

Markers for immune and brain cell (neuron and astrocyte) populations were measured around the choroid plexus and cortex to determine the location of immune cell infiltration. Preliminary results suggest the meninges, a membrane which covers the brain, as an alternate point of immune cell entry. These results will form the mechanistic basis of investigation into new treatment options for MS.

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**Donald Zhang** and Dennis Kimtai  
The University of Adelaide

### **Novel flexible materials for wearable antennas**

The emergence of wearable intelligent systems has benefited from high performance antennas which are primarily used for communication purposes including monitoring of patients in hospitals, defence, navigation, tracking and public safety. Conventional antennas have often consisted of a laminate and ceramic materials. Those conventional materials have typical drawbacks including but not limited to being hard and brittle, lacking in flexibility, and being vulnerable to impact which may lead to breakage or variation in performance. The material characterization in related design aspects involving antenna theory and computer-assisted design with state of the art electromagnetic simulations tools are discussed in this project. The substrates should be lightweight and robust for the realization of various types of wearable antennas with an aim to achieve good results without much variation in performance.

In this paper, the available dielectric materials bought and measured include felt, fleece, foam, leather and rubber with relative permittivity range from 1.21 to 6.50 achievable in which the best and worst losses need to be compromised. Two types of antennas for operation in the industrial, scientific,

and medical frequency band (ISM band) will be considered. The first one is an omnidirectional flat-monopole type antenna, based on a square substrate integrated cavity radiating between four eyelets shorting. The antennas effectively create a square loop of magnetic currents along the length of the patch. The radiation patterns have an omnidirectional radiation as an electric monopole in a fundamental TM<sub>11</sub> mode with resonant frequency of 2.45 GHz. The second one is a directive PIFA-type antenna with two eyelets shorting in the aperture of three side walls. The two types of applications of the omni and directional antennas are on-body communication between sensors and off-body communication to a base station. The ongoing fabricated prototypes need to be tested to compare with the simulation and designation.

## Session 9

**Madeleine Cox**, Ali Aflatounian, Melissa Edwards, Valentina Rodriguez Paris, Robert B. Gilchrist, William L. Leger, David J. Handelsman and Kirsty A. Walters

The University of New South Wales

### **Unravelling the role of steroid androgens and aberrant adipocyte function in polycystic ovary syndrome (PCOS)**

Polycystic ovary syndrome (PCOS) is the most common endocrine disorder affecting women of reproductive age. It is a complex disorder associated with a wide-variety of traits including endocrine, reproductive and metabolic. PCOS is a common source of fertility problems, which often leads to many women turning to assisted reproductive technologies such as in vitro fertilisation (IVF). Unfortunately, since the origins of PCOS are poorly understood, there is no cure and treatment is suboptimal. It has been well-established that excessive levels of steroid androgen hormones (including testosterone) are the most consistent feature observed in PCOS patients and recently a role for aberrant adipose function in the development of PCOS has been proposed. By inducing PCOS in a novel adipose-specific androgen resistant mouse model we aimed to define the mechanistic impact of adipose androgen actions in PCOS. Control wild-type (WT) and adipose-specific androgen receptor knockout (AdARKO) mice were each exposed to a blank or PCOS inducing dihydrotestosterone (DHT) implant for 3 months. Following this, mice were assessed for the presence or absence of PCOS traits. Experimental PCOS control females, as expected,

displayed a range of characteristic reproductive traits including irregular estrous cycles ( $p < 0.001$ ), ovulatory dysfunction through the absence of corpora lutea ( $p < 0.0001$ ) and more unhealthy mature ovarian follicles ( $p < 0.05$ ). Despite the presence of androgen excess in the DHT-AdARKO mice, females exhibited regular estrous cycles, corpora lutea indicating recent ovulations and no difference in the health of mature follicles compared to controls. These findings indicate that androgen actions on adipose tissue play a key role in the development of PCOS reproductive traits, and hence provide a possible therapeutic target for the development of novel treatments for PCOS.

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**Gavin Height**, Annabelle Pendlebury, Laura Cripps, Bronte Slinger and Hannah Schürholz  
La Trobe University

### **Images of influence: the power of visual media in influencing public opinion of asylum seekers**

This research aims to ascertain the influence of visual media on the public's opinions regarding asylum seekers. This is an important area of research as global refugee numbers have risen significantly in recent years, and issues regarding asylum seekers feature prominently in Australian election campaigns. Utilising previous research on image traits that are 'humanising' and image traits that are 'dehumanising', the research team conducted an online survey of 162 Australians, showing them a series of either 'humanising' or 'dehumanising' images of asylum seekers. Along with collecting demographic data, participants' pre-existing political opinions were surveyed, so that these could be taken into account when analysing results. Using quantitative and qualitative methods, we found that the different types of images viewed did have an effect on participants' opinions regarding asylum seekers. Participants that viewed 'dehumanising' images were substantially more likely to express anti-asylum seeker views following the image slideshow. Our participant group was predominantly aged 18-30, female, and politically left leaning – providing a snapshot of a segment of Australian society. The results highlight the influence of visual media on public opinion, and given its immediacy and importance, this pilot study should be built on in future research.

**Deva Ly**

The Australian National University

### **Truthiness under deep and critical thinking: can we be protected?**

Truth comes from the gut and not from books—most of the time when people are trying to decide what is real, they are drawing on feelings, rather than on facts. As a result, people are easily swayed by peripheral details that have nothing to do with truth. For example, a growing body of work shows that people are more likely to believe claims that appear with decorative photos, even when the photo does not bear on the truth of a claim — “truthiness” (Newman et al., 2012; Newman, et al., 2015; Schwarz and Newman, 2017). That is, when people see a claim like “Giraffes are the only mammals that cannot jump,” they are more likely to believe that claim when it is paired with a decorative photo of a giraffe. This robust effect has been replicated across various contexts—photos bias claims about future events, products, and claims about their own recent actions. In my honours research I am investigating whether getting people to engage in analytical processing—thinking more carefully or elaborately—will protect people from the biasing effects of photos. Participants completed a survey containing 32 difficult true-false trivia claims that sometimes appeared with a decorative photograph. In one condition, participants were instructed to think deeply before responding. In another condition, participants were told to think critically before responding. We examine whether these modes of analytical processing (elaboration or critical thinking) have converging effects on people’s assessments of truth—reducing people’s susceptibility to the biasing effect of photos. The results from this research will contribute to our understanding of how people come to believe things are true and whether one can ward off cognitive biases and misinformation.

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**Joel Pienmunne**

Macquarie University

### **What is normal variability on the King-Devick (K-D) test over time?**

Sports concussion can have devastating long-term effects such as Alzheimer’s disease (Dziemianowicz et. al., 2012). There are numerous symptoms which can manifest differently among individuals and overlap with other sports induced conditions such as heatstroke (Dziemianowicz et. al., 2012).

Consequently, accurate and reliable diagnosis of concussion is difficult and a gold standard measure has not been established. The K-D test is a rapid number naming task used by amateur sporting teams to test the visual functioning of athletes, which may decline in the presence of concussion (Dziemianowicz et. al., 2012).

Currently, individuals’ complete two error-free trials at baseline with the faster time representing the baseline score. One trial is completed when a concussion is suspected and completion times are compared with the baseline score. A slower time, or an error during the trial, are considered indicators of concussion. This method is questionable because it does not account for the learning effect between trials at baseline or intra-individual variability. Studies have reported that 33% of non-concussed individuals have been falsely diagnosed with concussion (Molloy, Murphy, Gissane, 2017).

The aim of the current study was to identify how K-D performance varies over time in non-concussed individuals. In doing so, the faster time of two trials at follow-up testing, conducted three weeks after the baseline assessment, was compared against the baseline score. It was predicted that two trials at follow-up would improve reliability and reduce false positives. Preliminary results suggest that comparing the faster of two trials at follow-up with the baseline score increases reliability and accuracy. This is based on data from the baseline and first follow-up sessions, with further analysis planned following collection of data at six weeks post-baseline.

## **Session 10**

**Laura Cripps**

La Trobe University

### **“Permission not a directive.” An analysis of family veto in organ donation in Victoria**

In Australia the family of a deceased person will be consulted prior to proceeding with organ donation. This consultation occurs regardless of whether the individual has consented to donation during their lifetime. This allows the family to veto the deceased’s wishes to donate on the basis that they personally object to donation or that the concept of organ donation is distressing to them. Therefore, a person’s choice to donate their organs cannot be enforced after their death, but if an individual has objected to donation during life is a binding decision and must be followed by the family and medical practitioners.

There are very few areas of law which allow for an individual's competent decisions to be overruled by another, or for an individual classified as incompetent to be represented by a person who they have not elected themselves. This paper investigates, firstly, whether the practice of family veto in Victoria by medical practitioners based on practice guidelines is consistent with the current law. It will then consider the veto rules in relation to other areas of end of life law, such as burial instructions, wills and advanced care planning, to ascertain whether the family veto rule should be acceptable, given the law's interpretation of the extent of a person's autonomy before, during and after death. Ultimately, this paper argues that the current approach by medical practitioners to organ donation consent is inconsistent with the modern legal understanding of personhood and autonomy and may be contrary to Victorian law. This paper proposes that law and practice should be altered to allow for individuals to have the choice to make a binding decision about whether to donate their organs after death.

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**Timothy Hill**

Macquarie University

**Bremelanotide: originally developed to treat sexual dysfunction, but how about methamphetamine addiction?**

Oxytocin has emerged as a potential pharmacotherapy for methamphetamine (METH) addiction, as it reduces METH intake and relapse following protracted withdrawal in animal models of addiction. However, peripherally administered oxytocin has poor penetration of the blood brain barrier (~1%) and a half-life of 10 minutes, severely limiting its efficacy in humans. Clearly then, alternative strategies for increasing brain oxytocin levels are needed. Bremelanotide (BMT) is a neuropeptide which activates melanocortin-4 receptors located on oxytocin-synthesising neurons of the hypothalamus. BMT administration has been shown to increase brain oxytocin concentrations and induce oxytocin-like behavioural effects. Importantly, BMT has passed phase III clinical trials for female sexual dysfunction, a behaviour which involves the central oxytocin system. These findings indicate that BMT may be an effective stimulator of brain oxytocin, with potential for translation to human therapy for addiction. Therefore, this project investigates whether BMT treatment reduces motivation to self-administer METH, and relapse to METH-seeking behaviours after a period of withdrawal. Male Sprague-Dawley rats received

surgical implantation of jugular vein catheters, for METH self-administration purposes. All rats acquired METH self-administration on a fixed-ratio-1 schedule of reinforcement for 2-3 weeks and were subsequently split into two cohorts. Cohort 1 was trained on a progressive-ratio (PR) schedule, a well validated model of impaired control over drug-taking. Once PR responding stabilised, the effects of BMT treatment on METH self-administration were assessed. Cohort 2 underwent two weeks of behavioural extinction, during which METH was unavailable. Once responding on the drug-paired lever ceased, rats were then relapsed to METH-seeking behaviour by exposing them to drug-associated cues, METH, or a stressor. The effects of BMT administration on these three forms of relapse were assessed. The potential of BMT as an addiction pharmacotherapy will be discussed.

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**Seak-Lin Ly**, Juan Botía, Samuel Kelsey, Mina Ryten and Elizabeth A. Milward  
University of Newcastle

**Gene expression patterns in the human brain provide evidence that iron interacts with the nerve coating myelin which facilitates electrical signalling**

The brain contains a fatty substance called myelin, which provides insulation for nerve cells, enhancing electrical signal transmission. Our group has found evidence that in mouse brain, myelin also acts as a store for excess iron. This may be a way of protecting the brain from damage when iron levels are high and may be important in various brain diseases involving myelin, such as multiple sclerosis.

My research is addressing the question of whether regulatory interactions between iron and myelin may also occur in human brain and, in particular, whether there are relationships between the expression patterns of genes responsible for regulating iron levels and those of genes involved in making myelin in the human brain. The expression pattern of the genes is a measure of how actively each gene is generating intermediary biomolecules (RNA transcripts) that eventually give rise to the proteins involved in iron regulation or myelin formation.

My research first required compiling a list of 128 iron-related genes and 366 myelin-related genes. Next, advanced computational methods were used to assess how strongly these genes are expressed together ('co-expressed'). This was done by

identifying genes with similar expression patterns across 101 human brains, using a United Kingdom database that contains RNA transcript measurements for all the genes expressed in the human brain. The results revealed that a subset of iron-related genes were consistently co-expressed with myelin-related genes in all brain regions studied.

In conclusion, the research has provided evidence for relationships between iron-related genes and myelin-related genes in the human brain, supporting our previous mouse brain research. This extends our understanding of iron regulation in the human brain and suggests that human myelin may also serve as a reservoir for excess iron. This may be important in myelin diseases such as multiple sclerosis, which may involve iron dysregulation.

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**Tim Porter**, Claudia Boccaccio, Mitchell Brunker and Gerald Manning  
The University of Adelaide

#### **Litigation funds in improving access to justice and increasing corporate accountability**

While the class action law suit has had a pivotal role in ensuring that large corporations are held accountable for breaking the law, it has some inherent limitations. There is a reluctance to join legal proceedings where there is so much uncertainty surrounding both the outcome of a matter, and the associated costs. These prohibitive costs can pose a serious obstacle to access to justice, preventing all but the wealthiest of Australians from seeking relief.

The growth of third-party funds, known as litigation funds, have helped to take away some of this uncertainty in this process, and allow people from all financial backgrounds to receive justice. These funds enter into agreements with individuals where they cover all of the costs associated with the law suit in exchange for a proportion of the funds recovered. They have recently been used to help shareholders of all backgrounds to pursue claims against big businesses, including AMP and the Commonwealth Bank of Australia.

The popularity of the litigation fund has skyrocketed, and even the Courts have recognised its importance. However, given the increasing reliance placed on these funds, it becomes important to recognise the legal and ethical issues arising from their use.

Our research has focused on some of the issues surrounding the growth of these funds. We examined the recent decision of Money Max, where the court made all members of a class action pay into a third-party fund. We also considered whether there should be a limit on how a litigation fund can take from a successful class action and whether they are creating a “culture of litigiousness” in Australia. This research required us to look to cases considering these third-party funds, as well as law reform commission reports and academic commentary in the area.

## **Session 11**

**Liam Daly Manocchio**  
The University of Queensland

#### **Ending denial of service cyber attacks with negative selection**

The Australian census attack in 2016, was one example of the devastating effects of denial of service (DoS) attacks. It cost Australian Tax Payers \$270 million dollars and eroded public confidence. These attacks occur when a cyber-criminal prevents legitimate users from accessing a service by overwhelming it with malicious requests. It costs industry approximately \$40,000 per hour, with the average cost of a single attack rising to over 2 million dollars in recent years. Using real UQ Network traffic, we demonstrated the effectiveness of a ground-breaking, artificial immune inspired approach, capable of mitigating 80% of the effects of a DoS attack within five minutes, while maintaining a profoundly low 0.0012% false positive rate. This demonstrated our system enables extremely low cost, effective DoS mitigation, which can be implemented with minimal risk to legitimate traffic. The system was tested against a real life Caida DoS attack data set and found to be effective and has the capabilities to stop events similar to the 2016 census attacks.

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**Nur Fikriyah Ihsan**  
The Australian National University

#### **Characterising a novel protein in *the Toxoplasma gondii* cytochrome c oxidase complex**

*Background*  
Emerging evidence suggests that apicomplexan parasites have unique mitochondrial proteome compared to their host cells. A preliminary study has identified a number of mitochondrial proteins

unique to the cytochrome c oxidase complex (complex IV) in *Toxoplasma gondii*'s electron transport chain. One of these proteins is TgApiCox35.

#### *Objectives*

This study aims to characterise TgApiCox35 by determining whether it truly localises to the *T. gondii* mitochondria and is part of complex IV, assess its significance for parasite growth, and subsequently its role in oxidative phosphorylation.

#### *Methods*

CRISPR/Cas9 gene editing was used to integrate an epitope tag and regulatable promoter into TgApiCox35. Using the epitope tag, localisation to the mitochondria was visualised via an immunofluorescence assay. A Blue Native PAGE was conducted to measure the size of the complex TgApiCox35 belongs to and co-immunoprecipitation reactions were used to evaluate its interactions with a known complex IV protein, TgApiCox25. Using the regulatable promoter, TgApiCox35 expression was knocked down and plaque assays comparing the wild type and knocked down strains were conducted to assess its effects on parasite growth. Oxygen consumption rates (OCR) of wild type and knocked down TgApiCox35 were measured using a Seahorse assay.

#### *Results*

TgApiCox35 was found to localise in the *T. gondii* mitochondria and was part of a 600 kDa protein complex. Co-immunoprecipitations revealed that TgApiCox35 interacts with TgApiCox25, indicating that it is a component of complex IV. Smaller plaque formation in the knocked down strain indicates that the protein is important, though not necessarily essential for parasite growth. Decreased OCR in the knocked down strain suggests that TgApiCox35 may play a role in oxidative phosphorylation.

#### *Conclusion*

TgApiCox35's uniqueness to *T. gondii* and other apicomplexan parasites, as well as its potentially important roles in parasite growth and oxidative phosphorylation makes it a promising drug target. Additional studies investigating its specific roles are therefore required.

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#### **Carl McCombe**

Flinders University

#### **Symbiosis in the photic zone: identifying nanoscale marine relationships**

Oceanic plankton constitute the world's largest ecosystem, and include a multitude of species able to significantly impact human health and our marine-based industries. Abiotic factors and complex biotic interactions dictate the relative abundance of planktonic species, and hence control marine ecosystem composition and functionality. Despite the importance to both mankind and the overall wellbeing of our oceans, biotic interactions between plankton are poorly characterised. We aimed to increase the understanding of planktonic ecosystems by utilising publicly-available metagenomic data, and bioinformatic software. Our main goal was to identify biotic interactions occurring between abundant, surface-water, nanoplankton species. To achieve these aims, relative abundance data originating from metagenomic datasets published by the Tara Oceans Consortium, were converted for analysis within Cytoscape v3.6.0 software. Co-net, a Cytoscape application, was used to define common biotic interactions between genera from 8 different sampling locations around the globe. A co-occurrence network was produced, enabling visualisation of both negative (mutual exclusion) and positive (copresence) interactions between the microbial community members. All relationships presented in the co-occurrence network were significant ( $p$  value  $< 0.005$ ,  $q$  value  $< 0.05$ ), and strongly supported by Pearson and/or Spearman correlation coefficients ( $\rho$  and/or  $r > 0.88$ ). The methodology resulted in the identification of previously unreported interactions between a diverse group of heterotrophic prokaryotes, and a number of potentially harmful eukaryotic plankton with the potential to form toxic algal blooms, ravage mollusc populations, and infect critically important seagrass. Our analysis indicates that the presented interactions occur ubiquitously in the world's oceans, and may help direct future widespread methods of biological control. However, real-world experiments are required to determine if manipulation of the described biotic community can minimise harmful species abundance. Overall, the initial results presented here represent a small but significant step towards understanding and controlling marine biotic interactions.

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**Appurva Raaj**

The University of Adelaide

### **Remote Aboriginal community well-being and South Australia's driving and licensing offences**

The purpose of the research was to investigate the operation of South Australian driving and licensing penalty and enforcement systems to assess the impact such systems have on the well-being of Aboriginal communities in the APY Lands. The catalyst for the research was the disproportionately high number of outstanding fines for driving and licensing related penalties in the APY Lands.

The research question concerned how the penalty and fines enforcement systems for driving and licensing offences impacted the well-being of Aboriginal communities. This required a three-part approach:

The first part is an examination of the existing penalty and fines enforcement systems, this includes the deconstruction of the legislative structures of driving and licensing offences and penalties.

The second part of the report required the analysis of the systems of offence, penalties and enforcement in the APY Lands, specifically focusing on the system results in the disproportionately high number of fines. This analysis involved examining the practical issues with the current systems and of concepts underpinning the systems. The conclusions drawn include the recognition of a fundamental incongruence between the 'white fella' norms that inform Australian law and Aboriginal norms and values.

The third and final part of the report focused on the impact on the well-being of Aboriginal communities. The findings demonstrate that the current systems exacerbate the existing transport disadvantage on the APY Lands, aggravating the poverty and lack of economic development as well as contributing to the continued criminalisation of Aboriginal people in South Australia.

The research methodology involved the analysis of empirical data on traffic offences on the APY Lands provided by On the Right Track Remote. Due to the lack of empirical data specific to the APY Lands, the research methodology required travel to the APY Lands to consult and gather first-hand, anecdotal evidence from service providers.

# Notes