

ASP2017: 27th Annual Meeting for the Australasian Society for Psychophysiology

CONFERENCE PROGRAM

Hosted by Western Sydney University
Parramatta City Campus
Level 9, Peter Shergold Building
169 Macquarie St, Parramatta NSW 2150, Australia
November 29 – December 1, 2017



| Day One: Wednesday, November 29 | | Day Two: Thursday, November 30 | | Day Three: Friday, December 1 | |
|---------------------------------|--|--------------------------------|--|-------------------------------|---|
| 08:00-09:00 | Registration Desk Opens Level 9 | 09:00-09:30 | Registration Level 9 | 09:00-09:30 | Registration Level 9 |
| 09:00-09:15 | Welcome to ASP2017: Professor Scott Holmes | | | | |
| 09:15-10:30 | Session 1: Oral Presentations | 09:30-10:30 | Session 5: Oral Presentations | 09:30-10:30 | Session 9: Oral Presentations |
| 10:30-11:00 | Morning Tea | 10:30-11:00 | Morning Tea | 10:30-11:00 | Morning Tea |
| 11:00-12:00 | Session 2: Keynote Speaker- A/Prof. Anthony Harris | 11:00-12:00 | Session 6: Keynote Speaker- Professor Peter Keller | 11:00-12:00 | Session 10: Keynote Speaker- Dr Tamara Watson |
| 12:00-13:00 | Lunch | 12:00-13:00 | Lunch | 12:00-13:00 | Lunch & ASP Annual General Meeting |
| 13:00-14:30 | Session 3: Oral Presentations | 13:00-14:30 | Session 7: Oral Presentations | 13:00-13:30 | Awards Presentation & Conference Close |
| | | | | 13:30-15:00 | Post-Conference Workshop 1 |
| 14:30-15:00 | Afternoon Tea | 14:30-15:00 | Afternoon Tea | 15:00-15:30 | Afternoon Tea |
| 15:00-16:30 | Session 4: Oral Presentations | 15:00-16:30 | Session 8: Oral Presentations | 15:30-17:00 | Post-Conference Workshop 2 |
| 16:30-18:30 | Welcome Reception & Poster Session | 18:30-21:00 | Conference Dinner: Sahra by the River | | |

Welcome to ASP2017!

The organising committee welcomes all delegates to ASP2017: the 27th Annual Meeting for the Australasian Society for Psychophysiology.

The three-day conference brings together researchers from psychology, psychiatry, neuroscience, and beyond to explore exciting new findings on the interrelationships between brain and behaviour. For all conference information please refer to the following sections of this conference program.

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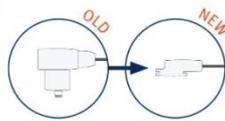
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Venue Information and Map

*Western Sydney University
Parramatta City Campus, Level 9, Peter Shergold Building
169 Macquarie St, Parramatta NSW 2150, Australia*

The Parramatta City Campus at 169 Macquarie Street is less than a five-minute walk from Parramatta train station.

Parramatta City
Precinct Map

| | | | | | |
|--|--|----------------------------|----|---------------------------|--------------|
| One Parramatta Square | Building 1 - D5 | Parramatta Public School | D5 | St Johns Anglican Church | S8 |
| Launchpad Parramatta 46 Phillip St | Building 2 - D3 | Parramatta Town Hall | C5 | Hoteles | |
| 100 George St Hours of Operation (Ground Floor) Mon - Fri, 9am - 6pm | Building X6 - D4 Mon - Fri, 9am - 6pm | Places of Worship | | Novotel Sydney Parramatta | C2 |
| Points of Interest | | IBBA Buddhist Centre | 60 | Parkroyal Parramatta | C3 |
| Western Parramatta City Campus | D4 | Greek Orthodox Church | 50 | Mantra Parramatta | D6 |
| Parramatta Park | A3 | Parramatta Catholic Church | 18 | Student Central | 1300 668 370 |
| Westfield Parramatta | B5 | Parramatta Mosque | 43 | Contact Service Centre | 1300 897 669 |
| | | | | Student Support Services | 02 9852 5199 |

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For more information on this campus go to www.westernsydney.edu.au/parramattacity
 For operational times and current locations of Shuttle Buses please go to <http://westernsydney.transloc.com/>

Registration and Delegate Information

Registration

The registration desk will be open from 08:00 on Wednesday November 29 (Day 1), and from 09:00 on both days two and three. The registration desk is located on level 9 at Western Sydney University, Parramatta City Campus (1PSQ).

Name Badges

Please wear your name badge at all times at the venue to facilitate interactions with other delegates, to verify your access to the campus, and your entitlement to refreshments.

Refreshments and Lunch

Morning teas, afternoon teas and lunches, will be provided on all three days. The cost is included in your registration.

Welcome Event

Drinks and canapés will be served during the poster session from 16:30 to 18:30 on Wednesday, November 29. The cost is included in your registration.

Trade Displays

Information for Presenters

Oral: The lecture theatre contains a Windows PC, document viewer, and laptop connection facilities. Please notify the registration desk on arrival at the conference if alternative audio-visual equipment is required.

PowerPoint presentations should be loaded using a USB memory stick. The maximum speaking time for each presentation is 15 minutes with an additional 5 minutes for questions. The session chair will warn you as you approach this time limit.

Speakers should ensure that their equipment needs are met and that their presentation slides are loaded no later than 15 mins before the start of their session.

Posters: The poster session will be held from 16:30 to 18:30 on Wednesday, November 29. Posters should be mounted on poster boards when registering or before the end of lunch on Wednesday, November 29. Posters will remain in place for the duration of the conference and may be

taken down after Morning Tea on Friday, December 1. Poster size should be A0 (841 mm x 1189 mm) in portrait orientation.

Assistance and Advice

Should you need any assistance or advice during the conference please visit the registration desk or speak to any of our conference volunteers who can be identified by the 'red dot' on their name badge.

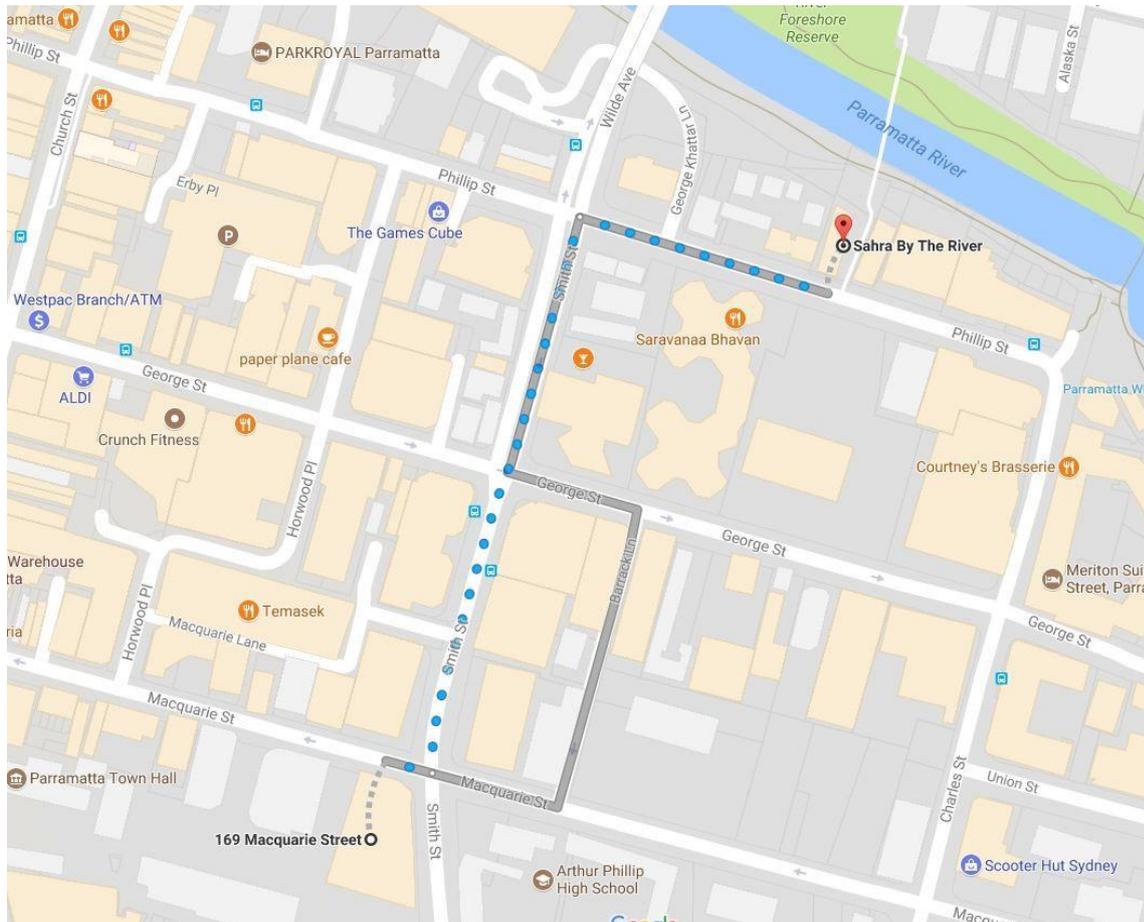
Conference Dinner

Sahra by the River

2/76 Phillip Street, Parramatta NSW 2150, Australia

www.sahrabytheriver.com.au

Sahra by the River is approximately a 6-minute walk from 169 Macquarie street (where the conference is held).



Keynote Speakers

Keynote 1.

Associate Professor Anthony Harris

*Associate Professor of Psychiatry, Westmead Clinical School
Clinical Director, Brain Dynamics Centre, The Westmead Institute
Consultant Psychiatrist, Prevention Early Intervention and Recovery Service
(PEIRS), Western Sydney Local Health District*



Gamma band synchrony: A mechanism for psychosis?

Dr Anthony Harris is an associate professor in the Discipline of Psychiatry at the University of Sydney and is the Clinical Director of the Brain Dynamics Centre at the Westmead Institute for Medical Research. He works in the Prevention Early Intervention and Recovery Service in Parramatta seeing young people with a range of severe mental illnesses. He is the President of the One Door Mental Health and is the deputy president of the Mental Illness Fellowship of Australia. His research interests centre on the psychophysiology and neuroimaging of mental illness, innovative treatment especially cognitive remediation and communicating what good treatment is.

Schizophrenia is described as a breakdown of the associative threads of thought. Many of its clinical features including hallucinations, delusions, formal thought disorder, cognitive deficits and loss of insight suggest a loss of the ability of the individual to integrate thoughts and perceptions rapidly and accurately. Although changes in structural and functional brain connectivity in psychosis have long been identified, they do not provide a mechanism for the failure in coordination of the distributed neuronal systems that underlie the symptoms and signs of psychosis. A disturbance

in the synchronisation of neural oscillations or synchrony is such a mechanism.

Keynote 2.

Professor Peter Keller

*Research program leader: Music Cognition and Action
The MARCS Institute for Brain, Behaviour and Development
Western Sydney University*



Representing self and other during musical group performance

Peter Keller is Professor of Cognitive Science and Australian Research Council Future Fellow in the MARCS Institute for Brain, Behaviour and Development at Western Sydney University, where he leads the 'Music Cognition and Action' research program. Peter's research is aimed at understanding the behavioural and brain bases of human interaction in musical contexts. He holds degrees in Music and Psychology from the University of New South Wales, and has previously held research positions at Haskins Laboratories (New Haven, USA), the Max Planck Institute for Psychological Research (Munich, Germany), and the Max Planck Institute for Human Cognitive and Brain Sciences (Leipzig, Germany), where he led the Max Planck Research Group for Music Cognition and Action. Peter has served as Editor of the interdisciplinary journal 'Empirical Musicology Review' and is currently an Associate Editor at 'Royal Society'.

Musical group performance is a sophisticated form of joint action that showcases the remarkable human capacity for precise interpersonal coordination. Such coordination requires some degree of self-other merging while maintaining the distinction between self and other. Integration of information related to one's own and others' actions assists in representing shared goals and evaluating joint outcomes. At the same time, segregation between the effects of actions produced by self and others facilitates agency attribution and autonomous movement control. In this talk, Peter Keller will present research addressing how self-other integration

and segregation are balanced in the auditory domain during musical joint action. Peter Keller report findings from sensorimotor synchronization experiments employing controlled laboratory paradigms and naturalistic musical tasks, as well as related computational modelling, neuroimaging, and brain stimulation studies. Results suggest that achieving optimal balance between self-other integration and segregation requires finely tuned internal models of self, other, and joint action outcomes.

Keynote 3.

Dr Tamara Watson

Senior Lecturer, School of Social Sciences and Psychology, Western Sydney University

MARCS Institute for Brain, Behaviour and Development



Vision despite disruption; questioning the exceptionality of perception around the time of eye movements

We are generally unaware of making several eye movements per second even though each eye movement should have a profound effect on vision. The brain should need to piece together changes in the visual scene caused by the change in eye position and to reduce the disruptive effect of perceiving the motion of the eye. Recent research questions how active the visual brain really is in suppressing the perception of motion that could be perceived with each eye movement. Moreover, rather than being a hindrance, the visual motion produced during an eye movement may aid some aspects of visual functioning. This talk will explore the extent to which the visual brain actively engages in creating the illusory sense of a stable and continuous world despite the many eye movements we make.

Tamara's research aims to understand dynamic processing of sensory stimuli. Focusing on the visual system she is interested in how and why unchanging stimulus can look so different to us depending on context and expectation. Tamara completed her PhD in 2007 at the University of Sydney, School of Psychology and subsequently moved to Rutgers University, Center for Molecular and Behavioral Neuroscience (New Jersey, USA) to complete a Human Frontiers Science Program Post Doctoral Fellowship. In 2009 she returned to the Brain and Mind Research Institute at the University of Sydney and joined Western Sydney University as a research lecturer in May 2010. At Western Sydney University she has

continued to tease apart the intertwining threads of context, expectation and evidence that comprise active perception.

Workshops

Workshop 1.

Dr Wei-Peng Teo

Neuroscientist, Deakin University



An Introduction into Functional Near-Infrared Spectroscopy (fNIRS): How, Why and When Should You to Apply fNIRS Into Your Research

In this workshop, Dr Teo, together with Artinis Medical Systems, will present the theory and methodology of fNIRS and discuss the practical applications of fNIRS in neuroscience research. Dr Teo will provide first-hand accounts of his experiences in setting up fNIRS capabilities to compliment his laboratory, and showcase some of the fNIRS systems and devices that are used regularly in neuroscience research.

Workshop 2.

Professor Robert Barry, Ms. Frances De Blasio and Mr. Jack Fogarty

Brain & Behaviour Research Institute, School of Psychology, University of Wollongong



Optimising psychophysiological data quantification using Principal Components Analysis (PCA)

This workshop will cover background and application of PCA to temporal, frequency, and time-frequency ERP, EEG, and event-related spectral perturbation (ERSP) data. Underlying principles, methodologies, and important considerations will be discussed. PCA demonstrations will be implemented using a freely available MATLAB toolbox.

Oral Program

| Day 1: Wednesday, November 29 | |
|--------------------------------------|--|
| 08:00-09:00 | Registration – Level 9, Parramatta City Campus (1PSQ) |
| 09:00-09:15 | Welcome to ASP2017 <i>Professor Scott Holmes</i> <i>Deputy Vice-Chancellor & Vice-President Research, Engagement, Development & International</i> |
| 09:15-10:30 | Session 1 Presentation 1- <i>Robert Barry & Frances De Blasio</i> <i>Testing the Go/NoGo Processing Schema for Children with Caffeine</i> Presentation 2- <i>Jack Fogarty, Robert Barry, & Genevieve Steiner</i> <i>Sequential Processing and Target Probability: Linking the Go/NoGo and Oddball Literatures</i> Presentation 3- <i>Janette Smith & Sharna Jamadar</i> <i>Towards Equivalent Inhibitory Tasks in ERP and fMRI Contexts</i> Presentation 4- <i>Artinis Medical Systems</i> |
| 10:30-11:00 | Morning Tea |
| 11:00-12:00 | Session 2: Keynote Speaker <i>A/Prof. Anthony Harris</i> <i>Gamma band synchrony: A mechanism for psychosis</i> |
| 12:00-13:00 | Lunch |
| 13:00-14:30 | Session 3 Presentation 1- <i>Sylvie Nozaradan</i> <i>Enhance Representation of Musical Meter in Cortical Versus Lower-Level Auditory Activity</i> Presentation 2- <i>Yatin Mahajan, Stephanie Borg, Jeeseun Kim, & Chris Davis</i> <i>Does Perceptual Load Influence Auditory Distraction Processing in Older Adults</i> Presentation 3- <i>Russell Chan, Lena Zou, Philip Alday, Kurt Lushington, Mattias Schlesewsky, Ina Bornkessel-Schlesewsky, & Maarten Immink</i> <i>Enhancing Sequential Action Through Single Session Meditation and Training: Behavioural and Neural Correlates of Meditation-Facilitated Motor Sequence Learning</i> Presentation 4- <i>Bill Budd, Paul Schofield & Bryan Paton</i> <i>Cross-modal Integration of Odour and Image Valence Using Time-Frequency Analysis of Chemosensory Event-Related and Induced EEG Activity</i> |
| 14:30-15:00 | Afternoon Tea |

| | |
|-------------|---|
| 15:00-16:30 | <p>Session 4</p> <p><i>Presentation 1- Jacqueline Rushby, Frances De Blasio, Travis Wearne, Katie Osborne-Crowley, Heather Francis, Skye McDonald, & Colleen Loo</i> <i>tDCS Electrode Montage Differentially Affects Autonomic Arousal and Working Memory Performance</i></p> <p><i>Presentation 2-Rebecca El-Helou, Jacqueline Rushby, Frances De Blasio, & Christopher Sufani</i> <i>Cognitive Control Processes Underpin Sex Differences in Self-Report Measures of Empathy</i></p> <p><i>Presentation 3- Grace Wei, Jacqueline Rushby, Christopher Sufani, & Frances De Blasio</i> <i>Influences of Social Cognition on Visuospatial Attention: A Neurophysiological Investigation</i></p> <p><i>Presentation 4- Wenting Chen, Skye McDonald, & Travis Wearne</i> <i>Examining Physiological Regulation in Dyadic Conversations and the Effect of Emotional Empathy</i></p> |
| 16:30-18:30 | Welcome Reception & Poster Session |

| Day 2: Thursday, November 30 | |
|-------------------------------------|--|
| 09:00-09:30 | Registration – Level 9, Parramatta City Campus (1PSQ) |
| 09:30-10:30 | <p>Session 5</p> <p><i>Presentation 1- Kaylene Kilham & Michelle Kelly Vicarious Ostracism and Empathic Accuracy</i></p> <p><i>Presentation 2- Olga Kamińska & Mikolaj Magnuski Not Always the Same, Sad. Psychological Correlates of Low or High Approach Motivation Sadness</i></p> <p><i>Presentation 3- Leah Sharman, Genevieve Dingle, & Eric Vanman Coping through Crying: A Laboratory Investigation of the Intrapersonal Function of Tears</i></p> |
| 10:30-11:00 | Morning Tea |
| 11:00-12:00 | <p>Session 6: Keynote Speaker</p> <p><i>Professor Peter Keller</i></p> <p><i>Representing self and other during musical group performance</i></p> |
| 12:00-13:00 | Lunch |
| 13:00-14:30 | <p>Session 7</p> <p><i>Presentation 1- Jessica Hazelton, Anna Hudson, & Fiona Kumfor Focusing on Your Heart: The Enhancing Effect of Interoception on Emotion Recognition</i></p> <p><i>Presentation 2- Emily Salanitro-Chafei & Fiona Kumfor How Does Context Affect Our Perception of Emotional Faces? Using Eye-Tracking to Explore Differences in Younger and Older Adults</i></p> <p><i>Presentation 3- Fiona Kumfor, Jessica Hazelton, Jacqueline Rushby, John Hodges, & Oliver Piguet Abnormal Psychological Responses to Emotional Stimuli in Dementia</i></p> <p><i>Presentation 4- Javad Soltani, Kian Motahari, Sharif Saleki & Ali Yoonessi Scale Dependent High-Level Features for Saliency Detection: An Eye-Tracking Study</i></p> |
| 14:30-15:00 | Afternoon Tea |
| 15:00-16:30 | <p>Session 8</p> <p><i>Presentation 1- Madilyn Coles, Genevieve Steiner, Francesca Fernandez, Diana Karamacoska, Emma Barkus, Samantha Broyd, Nadia Solowij, Christine Chiu, Joanne Lind, & Robert Barry The Effects on Resting State EEG Activity of the Catechol-O-methyltransferase (COMT) Val158Met rs4680 Polymorphism, and the Relationship to Schizotypy</i></p> |

| | |
|-------------|--|
| | <p>Presentation 2- Mahmoud Al-Dabbas, Genevieve Steiner, Francesca Fernandez, Ramit Narula, Emma Barkus, Samantha Broyd, Nadia Solowij, Christine Chiu, Joanne Lind, & Robert Barry <i>The Effect of KIBRA rs17070145 Polymorphism on Cortical Arousal</i></p> <p>Presentation 3- Adele Cave, Genevieve Steiner, Robert Barry, Caroline Smith, & Mike Armour <i>Eyes-Open Resting EEG of Women with Endometriosis Versus Age-Matched Controls</i></p> <p>Presentation 4- Emmanuel Jesulola <i>Frontal Alpha EEG Asymmetry: Is there a Severity Cut-off Point?</i></p> |
| 18:30-21:00 | Conference Dinner at Sahara by the River |

| Day 3: Friday, December 1 | |
|----------------------------------|--|
| 9:00-9:30 | Registration – Level 9, Parramatta City Campus (1PSQ) |
| 9:30-10:30 | <p>Session 9</p> <p><i>Presentation 1- Dale Harris, Timo Rantalainen, Muthalib, Liam Johnson, Rachel Duckham, & Wei-Peng Teo</i> <i>Impaired Cortical Inhibition May Underpin Deficits in Postural Control in People with Parkinson’s Disease</i></p> <p><i>Presentation 2- Jason He, Ian Fuelscher, Wei-Peng Teo, Peter Enticott, Pam Barhoun, & Christian Hyde</i> <i>Resting-State Cortical Inhibition Predicts Accuracy of Motor Inhibition</i></p> <p><i>Presentation 3- Catherine Offer, Ashlee Hendy, Mark Muthalib, Jason He, Peter Enticott, & Wei-Peng Teo</i> <i>The Effects of a Single-Session Continuous and Intermittent Theta-Burst Stimulation on Working Memory in Older Adults</i></p> |
| 10:30-11:00 | Morning Tea |
| 11:00-12:00 | <p>Session 10: Keynote Speaker</p> <p><i>Dr Tamara Watson</i> <i>Vision despite disruption; questioning the exceptionality of perception around the time of eye movements</i></p> |
| 12:00-13:00 | Lunch & ASP Annual General Meeting |
| 13:00-13:30 | Awards Presentation & Conference Close |
| 13:30-15:00 | <p>Post-Conference Workshop 1</p> <p><i>Dr Wei-Peng Teo</i> <i>An Introduction into Functional Near-Infrared Spectroscopy (fNIRS): How, Why and When Should you to Apply fNIRS Into Your Research</i></p> |
| 15:00-15:30 | Afternoon Tea |
| 15:30-17:00 | <p>Post-Conference Workshop 2</p> <p><i>Prof. Robert Barry, Ms Frances De Blasio, & Mr Jack Fogarty</i> <i>Optimising psychophysiological data quantification using Principal Components Analysis (PCA)</i></p> |

Poster Presentation Abstracts (alphabetical order)

Autonomic responding to scary and amusing film clips among young and older adults

Brooke Brady^{1*}, Phoebe Bailey¹, Ian I. Kneebone², and Craig J. Gonsalvez¹

¹Western Sydney University, Australia

²University of Technology Sydney, Australia

Aim: Most previous studies suggest smaller autonomic reactions to emotive stimuli in older than in younger adults. However, no previous study has examined age-related differences in autonomic reactivity in response to fear-inducing film stimuli. The aim of the present study was to investigate age-related differences in skin conductance levels (SCL) in response to scary and amusing film clips. **Method:** 36 young (M age = 21.33 years) and 28 older adults (M age = 71.67 years) viewed nine scary film clips and nine amusing film clips. Skin conductance levels (SCL) were measured continuously throughout the experiment. SCL data were segmented into seven time periods for each clip: baseline (2s pre-film), early 1, early 2, middle 1, middle 2, late 1 and late 2. SCL was averaged across individual clips for the fear and amusement condition at each time point. **Results:** Overall, older adults responded with reduced SCL relative to their younger counterparts, but demonstrated a similar pattern of responding. In response to both scary and amusing films, young and older adults' SCL increased from baseline to

early 1 and then decreased from baseline, but more rapidly for older (by early 2) than younger adults (by middle 2). Linear and quadratic effects for the six time points from early 1 to late 2 demonstrate a steep initial slope followed by a plateauing-off effect within each age group. Interestingly, SCL were greater in response to amusing than scary films only during the late 1 period, and only among young adults. **Conclusion:** Although skin conductance levels are reduced with age, young and older adults demonstrate a similar pattern of responding to scary and amusing film clips. These data contribute to an understanding of emotion processing in older age and will also be useful for identifying film clips for future research into ageing and emotion. b.brady@westernsydney.edu.au

HRV changes in response to working memory and attention tasks in white-collar workers.

Ardy Eslami^{1*}, Najah Nassif¹, Chris Zaslowski¹, and Sara Lal¹

¹School of Life Sciences, University of Technology Sydney, Australia

Aims: Occupations deemed as white-collared professions require a high level of neurocortical ability and any disruptions to cognitive function can have detrimental effects on performance. There is a growing body of evidence to suggest that associations exist between cognitive performance and various

cardiovascular diseases (CVD). Further exploration into the relationship between heart rate variability (HRV) and cognition may not only improve performance, but also, help to reduce the burden of CVD. This study aims to investigate differences in HRV parameters between baseline and active working memory and attention phases. Methods: Fifteen volunteers, aged 40 ± 12 years, underwent a 3 lead HRV assessment. Baseline HRV (10 minutes) and active HRV examinations were performed. The active neuropsychological tasks, Cambridge Neuropsychological Test Automated Battery (CANTAB), assessed working memory and attention. The assessments administered were the spatial working memory task, attention switching task, rapid visual information processing task, and the spatial span task. Results: The present study found significant reductions in both low frequency HRV ($p=0.012$) and in total power ($p=0.04$) during the spatial span task, as compared to baseline. Conclusion: The results of this exploratory study propose decreased sympathetic drive during working memory tasks, contrary to some findings throughout the literature. This may suggest that improvements in spatial working memory can contribute to improved performance, along with, improved health and a reduced risk of developing cardiovascular disease. However, further research into HRV and spatial working memory may

help to elucidate and confirm these findings.

ardalan.eslami@student.uts.edu.au

An Exploratory Study on the Psychophysiological Relationship Between Active Facial Imitation and Emotion Perception

Man Fai Edward Ho^{1*}, Christopher Sufani¹, Frances De Blasio¹, Jacqueline A. Rushby^{1*}, and Skye McDonald¹

¹School of Psychology, University of New South Wales, Australia

Aim: The Facial feedback hypothesis proposes that imitation of facial expression allows individuals to perceive, recognise and produce appropriate responses to the observed emotional facial expressions. The current study attempted to investigate whether actively imitating angry expressions, improves the behavioural performance in an emotion recognition task (ERT). Furthermore, we explore the utility of the arousal/activation model to reveal whether the arousal change induced by active mimicry (task activation) would be associated with performance improvement in the ERT. **Method:** Forty-four participants were randomly divided into three groups. These three groups were instructed to either actively imitating angry expressions (AM), passively viewing angry expressions (PA) or passively viewing neutral expressions (PN), while their skin conductance level (SCL) was recorded to assess arousal. At the end of manipulation

task, all groups received an ERT. Results: No performance difference was found between groups. However, it was found that the AM group improved significantly across intensity for angry expressions. Furthermore, a correlational analysis revealed inverse correlations between task activation and performance in response latency, which approached significance. Further, the correlational analysis also revealed that the performance in accuracy for angry and disgust emotions in AM group was significantly and negatively correlated with task activation. Conclusion: The results suggest that active imitation may improve the performance of accuracy over intensity in angry expressions. Furthermore, task activation may overly activate participants, which may impair behavioural performance. Thus, we speculate that there may be an optimal activation level to perform ERT. Overall, this study suggests that arousal change may be utilized to better understand the relationship between activation and performance. Future study may examine the effect of facial mimicry on global performance improvement of emotion recognition, and the association between accuracy performance and task activation. mfho92@gmail.com, jrushby@psy.unsw.edu.au

Task-Related Changes in EEG Affect Go/NoGo Performance

Diana Karamacoska^{1*}, Robert J. Barry¹, Genevieve Z. Steiner^{1,2}, Elle P. Coleman¹, and Emily J. Wilson¹

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Aims: Substantial research into the brain dynamics underlying cognitive functioning links the brain's task-based EEG activity to the stimulus-evoked ERP activity. This study focused on a neglected area of research in this field: how intrinsic EEG changes from rest to the task affect ERP stimulus-response processes and performance. Method: Forty young adults had EEG recorded during eyes-closed (EC) and eyes-open (EO) resting states, and then during an auditory Go/NoGo task. Delta, theta, alpha-1, alpha-2, beta-1, and beta-2 band amplitudes were analysed from the baseline EO state and from the 500 ms of prestimulus activity during the task, as a general measure of task-based EEG. Task-related change was calculated as the difference between prestimulus EEG and the EO state. Stepwise multiple regressions assessed the relationships between task-related EEG change and Go/NoGo behavioural outcomes and ERPs. Results: EEG amplitudes increased from the EO state to the task and these changes were found to significantly affect performance. Delta increases predicted poorer Go response accuracy and variability,

and enhanced Go Slow Wave (SW) positivity. Together with this increase in delta, lower alpha-1 increments were associated with longer mean RTs. Theta increases predicted larger Go N1-1 amplitudes but lower NoGo accuracy rates, while beta-1 increments were predictive of NoGo SW negativity. Conclusion: These findings suggest that increases in EEG amplitudes, from the EO state to the task, affect decision-making processes and performance. The present assessment of intrinsic EEG and the change into the task offers novel insights into the brain dynamics underlying cognitive processes.

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Effect of tone frequency on neural processing of rhythms: Superior role of bass

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Aims The spontaneous ability to entrain to a periodic pulse-like beat is central to the perception and production of music across cultures. There is increasing evidence that this ability involves a selective enhancement of neural activity at beat frequency, even when the beat is not physically marked by sounds as in syncopated rhythms. However, the frequency of the tone conveying the rhythm might also play a key role, as in music, low-pitched instruments usually carry the rhythm and attract

people's movements to the beat. **Method** To investigate the role of tone frequency in these neural processes, we recorded the EEG while 14 participants listened to rhythms conveyed either with high- or low-frequency tones. The rhythmic sequences differed in the degree of syncopation, to assess interactions between tone frequency and rhythm complexity. Neural activity at beat-related and unrelated frequencies was identified using a frequency-tagging approach. **Results** The selective enhancement of neural activity at beat frequency was greater for the low-frequency tone, especially when conveying the more challenging syncopated rhythm. This effect could not be accounted for by differences in loudness between low- and high-frequency tones, as a second experiment with a contrast of loudness alone did not yield significant differences across conditions. **Conclusions** Together, these results indicate a superior role of bass in entraining brain activity to the beat. The greater entrainment of neural populations to the musical beat when induced by low-frequency tones could account for the widespread practice of using bass instruments to carry the rhythmic foundations of a musical piece and to make people move to the beat.

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Relationships of hormone levels with hunger, weight gain and problematic eating behaviours in Major Depressive Disorder

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Aims: There is a growing research interest into the role of hormones in mental health, as they may have a mediating role in the development of affective, cognitive and behavioural symptomology. Leptin is related to satiety, with leptin resistance suggested as a mechanism for obesity. Altered appetite and weight are diagnostic criteria for Major Depressive Disorder (MDD), and those with MDD are at risk of obesity and associated chronic diseases. However, the role of leptin in weight gain in MDD is undetermined. This study investigates relationships between leptin, appetite, problematic eating behaviours and weight gain in MDD. **Methods:** Plasma leptin levels, psychopathology and biometrics were compared between participants meeting DSM-5 diagnostic criteria for MDD (n = 63, 28 male) and healthy controls (n = 60, 25 male). MDD participants were sub-categorised by their symptoms into those with increased, decreased or unchanged appetite and/or weight. Eating behaviours and food addiction were examined in a subset of depressed participants, using the Dutch Eating

Behaviours Questionnaire (DEBQ) and the Yale Food Addiction Scale (YFAS). **Results:** Depressed participants had higher leptin levels than controls, and females overall had higher leptin levels than males. Depressed participants with increased appetite/weight had higher leptin levels than those with decreased or unchanged appetite/weight. Leptin levels correlated with BMI and waist circumference, in addition to measures of problematic eating behaviour. One quarter of the depressed subset met the Yale criteria for food addiction. **Conclusions:** The current study identifies novel links between leptin, problematic eating behaviours, food addiction and MDD. The results indicate that leptin is associated with increased weight, appetite and risk factors for chronic disease in MDD, particularly in females. Leptin resistance may be a promising area of future research investigating risk factors for weight gain and potential early interventions aimed at preventing weight gain in those at risk due to MDD. jm290@uowmail.edu.au

The Effect of Oxytocin on Autonomic Flexibility Following A Traumatic Experience: A Pilot Study

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Aims: A traumatic experience can lead to poor emotion-regulation and hyperarousal. The hormone oxytocin appears to normalise emotional reactivity in persons with symptoms of psychopathology, and modulates the salience of social and emotional cues, leading to context-dependent changes in adaptive responding. The mechanistic effect of oxytocin following trauma remains unknown. **Method:** This small pilot study employed a double-blinded randomised crossover design to investigate the effect of oxytocin on autonomic-flexibility (high-frequency heart rate variability; HF-HRV) following a traumatic experience. This study also sought to determine whether effects were attributable to PTSD hyperarousal symptoms (Posttraumatic Checklist; PCL-5). Eleven participants (6 females, mean age 28) who experienced trauma (6-24 months prior) were asked to self-administer oxytocin (24IU) or placebo via nasal-spray, across two sessions at least one week apart. Each session included two tasks: a paced-breathing task (rest), which instructs participants to inhale and exhale at regular intervals, and the serial-sevens task (stress), which induces mild cognitive and physiological stress. HF-HRV was recorded from a

5-lead ECG system. Results: Following oxytocin administration, HF-HRV decreased during the paced-breathing task ($p = 0.03$) and serial-sevens task ($p = 0.056$) compared to placebo. This effect ceased when covarying for PTSD hyperarousal symptoms during the serial-sevens task ($p = 0.08$). Conclusions: These findings suggest that oxytocin increased the salience of cognitive stress, which was specifically attributable to hyperarousal symptoms. As an index of parasympathetic activity, lower HF-HRV suggests that oxytocin reduced the engagement of the parasympathetic nervous system (PNS). While caution is advised, given the small sample size, it appears that oxytocin may increase the perceived salience of, and attention to, stressors thereby exacerbating physiological stress states (i.e., decreasing the capacity of the PNS to dampen arousal).

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IQ level mediates ERPs during responses to semantical incongruence

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Aims There is a body of research reporting an increase in N400 amplitude while processing semantically incongruent verbal stimuli. However, there is no evidence

to suggest that ERPs during semantic incongruence might be associated with certain psychological parameters, such as IQ. We tested whether ERPs during responses to perceptions of verbal antilogies differed in participants with various IQ levels. We expected to find differences in the N400 and P600 components. Method We assessed the participants' (N=155) IQ with Raven's "Standard Progressive Matrices" and ranked them according to the scores they achieved. Out of the initial pool of participants, we composed 3 groups (N=15 each): HighIQ (120–130 scores), ModerateIQ (102–116 scores), LowIQ (83–100 scores). The groups were presented with 3 types of visual stimuli: verbal antilogies (to bereave generously), normal (to gift generously) and meaningless (to sink generously) phrases while ERPs were recorded. Results Differences in ERPs during responses for the 3 types of stimuli were found between the groups. HighIQ: N400 was more pronounced in response to antilogies and meaningless phrases vs. normal phrases; P600 was more pronounced in response to antilogies and normal phrases vs. meaningless phrases. ModerateIQ: N400 was more pronounced in response to normal phrases vs. antilogies and meaningless phrases; differences in P600 were the same as HighIQ. LowIQ: N400 was more pronounced in response to meaningless phrases vs. antilogies and normal phrases; no differences in P600 were found

between the 3 types of stimuli. Conclusions We interpret these findings as support for the idea that participants with higher IQ (unlike those with low or moderate IQ) use more sufficient cognitive schemes for processing semantic incongruence, which allow them to take antilogies as similar to normal phrases and opposite to meaningless ones.

Preliminary findings for intact sympathetic, but impaired central nervous system novelty processing in older adults with amnesic mild cognitive impairment

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Aims: Amnesic mild cognitive impairment (MCI) is conceptualised as the prodromal stage for Alzheimer's disease. In addition to memory deficits, people with amnesic MCI often demonstrate impairments in multiple domains such as learning and attention. The orienting reflex (OR) is a fundamental learning mechanism that directs an organism's attention towards novel stimuli. This

study examined OR changes in novelty processing with the aim of highlighting mechanisms underpinning learning-related pathophysiology in MCI due to Alzheimer's disease. Method: Ten adults with amnesic MCI (determined using the NIA-AA core clinical criteria for MCI due to Alzheimer's disease) completed an auditory dishabituation task whilst their electrodermal and 64 channels of electroencephalographic (EEG) activity were recorded. Two conditions (count vs. no count) were presented in a counterbalanced order; stimulus sequence: 10 standards, 1 deviant, 2 – 4 standards. Single trial skin conductance responses (SCRs) and event-related potentials (ERPs) were extracted for each subject and condition, and ERPs were submitted to temporal PCA. Response decrement, recovery, and dishabituation were assessed. Results: SCR showed the typical response decrement, recovery, and dishabituation previously established in younger adults; response recovery and dishabituation were greater for the count than no count condition. Similarly, fronto-central N1-1, and central-left PN showed decrement, recovery, and dishabituation that was greater for count compared to no count stimuli. A parietal P3 component resembling novelty P3, but occurring between P3a and P3b, showed response decrement, recovery, and dishabituation, with greater dishabituation to count than no count stimuli. Conclusions: These preliminary results demonstrate that

the sympathetic OR is intact in older adults with amnesic MCI. Response patterns in N1-1 and PN are unlike those reported previously in younger adults and may reflect pathophysiological changes in central learning and attention mechanisms. Future work will employ a larger sample and explore these preliminary findings further by comparing them against age and gender matched controls.

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The influence of body posture on social cognitive conflict: an event-related potential study

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Aims: The present study is aimed to examine whether body posture has an impact on the processing of social cognitive conflict. Previous research has found that some Caucasian Americans show exaggerated cognitive conflict processing when completing a weapons identification task that measured prejudice toward African Americans. In the present experiment, the weapons identification task was modified so that it was suitable for measuring conflict of being prejudiced toward Muslims. Method: The body posture of participants (sitting upright vs. supine), the face prime (White vs. Muslim), and the target (tool vs. gun) were manipulated. Participants' brain

potentials were simultaneously measured throughout the experiment. The behavioural results revealed the response biases in both reaction time and error rate. Results: Faster reaction times occurred on correct gun trials preceded by the Muslim prime, while higher error rates occurred on tool trials preceded by the Muslim prime. The ERP results revealed that erroneous responses elicited larger negative deflections than correct responses, typical of the error-related negativity (ERN). Moreover, the ERN magnitude of White-Gun errors was smaller in the supine posture than in the sitting upright posture. Conclusion: This result suggests that participants had decreased conflict in the supine posture. However, the Muslim-Tool ERN, the neural detection of prejudiced errors, was not modulated by body posture. These results may indicate that salient conflict, such as the prejudiced errors, may not be modifiable by body posture. Implications for motivation, prejudice, and self-regulation were discussed. hikaru924@gmail.com

Neurophysiological correlates of gaze processing

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Aims: Eye gaze information plays a fundamental role in facilitating interaction with both our physical and

social environment. The ability to use eye gaze as an attentional cue is proposed to be critical for both cognitive and social development in early life. In the behavioural literature, a robust attentional orienting response (i.e. gaze cueing effect) has been reliably shown to be faster to congruent relative to incongruent cues, even when the gaze cue is entirely non-predictive of the target location. This automaticity of the perception and orienting triggered by uninformative gaze cues evidences advantages in neural processing in response to socially relevant stimuli, wherein fundamentally, neurophysiological methods are able to provide a measure of processing that may be masked at a behavioural level. The present study aimed to identify the neurophysiological indices of the visuospatial attentional dynamics of gaze cueing, specifically considering on the functional dynamics of the N2. Method: Electroencephalographic (EEG) activity and behavioural response time (RT) was recorded from 31 healthy adult participants during a gaze cueing paradigm wherein participants responded to presentations of a lateralised target on valid (congruently cued) and invalid (incongruently cued) trials. The N2 component of the event related potentials (ERPs) were derived with separate PCAs for each cue type. Results: In line with behavioural gaze cueing effects (i.e. faster RTs to valid trials compared to invalid trials) ($t(30)=5.784, p<.001$), the N2b

amplitude was greater frontally on invalid trials relative to valid trials ($F=22.57$, $p<.001$). Conclusions: Enhanced frontal activation on invalid (incongruently cued) trials evidences an inhibitory mechanism in response to expectancy violations, wherein the N2b serves as a marker of the allocation of attention in the spatial domain. Neurophysiological investigations of gaze cueing may be extended to differentiate processing of social and non-social stimuli.

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The role of EEG localized activation and CNS arousal in executive function performance in children with AD/HD

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Aim: This study explored the relationships between resting state electroencephalogram (RS-EEG) localized activation, central nervous system (CNS) arousal, and two important types of executive function (EF) to extend prognostic utilization in children with AD/HD. **Methods:** Fifty-

eight children with AD/HD participated in the study. RS-EEG localized activation was derived from spectral power differences between EEG in eyes-closed and eyes-open conditions, and CNS arousal was measured based on alpha band power. A common EF score was obtained by calculating a Z-mean across three EF tasks (a switching task, a working memory task, and a response inhibition task). Everyday EF scores were measured by the Behavior Rating Inventory of Executive Function. **Results:** Frontal delta activation predicted common EF ability and posterior alpha activation predicted everyday EF. A serial mediation analysis found that lower CNS baseline arousal drove more arousal and delta activation in serial, which in turn caused poorer common EF. A follow-up study found that baseline arousal also elicited larger interference cost. **Conclusions:** RS-EEG is indicative of individual differences in two important types of EFs in children with AD/HD. Lower CNS arousal may be a driving force for poorer common EF performance. The current study supports the prognostic utilization of RS-EEG and AD/HD models that take resting brain activity into consideration in children with AD/HD.

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Oral Presentation Abstracts (alphabetical list)

The effect of KIBRA rs17070145 polymorphism on cortical arousal

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Aims: KIBRA (KIDNEY/BRAIN) is a postsynaptic scaffolding protein implicated in cell motility and polarity, learning and memory, and synaptic plasticity. A functional single nucleotide polymorphism (SNP) identified in the KIBRA gene (rs17070145, C/T substitution), that encodes the KIBRA protein, has been linked to improved episodic memory ability and reduced risk of Alzheimer's disease (AD). The present study aimed to investigate the association between KIBRA T allele carrier status and EEG activity to highlight neurophysiological mechanisms underpinning AD risk. Methods: Resting eyes open EEG activity from 97 young adults (Mean age = 21.3, SD

= 4.9 years) was continuously recorded from 30 scalp sites at 1000Hz for 4 minutes; all participants provided a saliva sample for DNA extraction and analysis. High-throughput MassARRAY® genotyping assay was used for identifying KIBRA genotypes. Mean EEG band amplitudes were analysed for delta, theta, alpha-1, alpha-2, beta-1, and beta-2. Results: Alpha-1 was significantly associated with the KIBRA T allele carrier (C/T and T/T): parietal amplitudes in the right hemisphere were larger for individuals who did not carry the T allele (non-carriers, C/C) than carriers. Midline delta, fronto-midline theta, parietal alpha-2, fronto-parietal beta-1, and frontal beta-2 were not associated with rs17070145 genotype. Conclusions: Results indicate that alpha-1 activity is associated with KIBRA T allele carrier status. Alpha activity is inversely correlated with arousal, which suggests that individuals carrying the KIBRA T allele have higher arousal than homozygous C allele carriers. This finding may support the implicated molecular role of KIBRA involving its binding to atypical protein kinase C zeta, leading to increased alpha-amino-3-hydroxyl-5-methyl-4-isoxazole-propionate (AMPA) receptor turnover. Consequently, this upregulates glutamate and may explain the increased arousal observed in T allele carriers. Given the role of AMPA

receptors in long-term potentiation, this finding may provide insight into a possible mechanism for reduced AD risk. mah.aldabbas@gmail.com

Testing the Go/NoGo processing schema for children with caffeine

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Aims: We recently developed a processing schema to describe the cognitive stages in the equiprobable auditory Go/NoGo task. Based on the PCA-derived ERP components observed in young adults, this has been used in a range of studies, and gradually extended to older and younger groups. A separate schema was developed for children, and recently updated using improved methodology involving separate Go and NoGo PCAs. Here we test the appropriate segregation of components in the separate Go and NoGo processing streams using caffeine's stimulant properties; processing-specific components in each stream should be amplified by caffeine. **Methods:** Twenty-four children, aged 8-12 years and light-moderate caffeine users, participated in two sessions 1 week apart. A single oral dose of caffeine (80 mg) was presented in a randomised double-blind placebo-controlled repeated-measures cross-over design. Each session included 4 blocks of 150 tones; half were 1000 Hz, half were

1500 Hz, presented in random order, with the target tone balanced over subjects/sessions. EEG was recorded at 512 Hz from 19 scalp sites. Artefact-free Go and NoGo trials were separately averaged to form ERPs (-100 to +750 ms) for the Caffeine and Placebo sessions, and each dataset was subjected to temporal PCA using covariance input, with extraction and Varimax rotation of all components. **Results:** Components extracted in Caffeine and Placebo matched those expected from the updated Child Processing Schema. Caffeine enhanced the Go Processing Negativity (PN), N2c, and P3b components. In NoGo, the PN and N2b components were enhanced. These caffeine amplifications match expectations of PN marking the end of stimulus categorisation, and the subsequent separate Go (N2c, P3b) and NoGo (N2b) processing streams. **Conclusions:** The amplifying/arousal properties of caffeine have confirmed the appropriateness of the major elements in our Processing Schema for children in this task.

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Workshop: Optimising psychophysiological data quantification using Principal Components Analysis (PCA)

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Background: Principal components analysis (PCA) has been implemented in a range of psychophysiological research for some years. PCA methodology has been developed for the quantification of electroencephalographic (EEG), event-related potential (ERP), and event-related spectral perturbation (ERSP) data, and published in articles across a range of topics, providing valuable insight into topics such as, but not limited to, development, healthy ageing, brain dynamics, cognitive control, psychopharmacological effects, and the orienting reflex. Content: This workshop will cover the background and applications of PCA in electrophysiological research. We will discuss temporal (and spatial) PCA of ERP data, frequency PCA of EEG spectra, and time-frequency PCA of ERSP data. PCA demonstrations will be implemented using a freely available MATLAB toolbox. Outcomes: Workshop participants will gain an understanding of PCA methods, considerations and outcomes, for the quantification of prominent electrophysiological measures. Participants will be more equipped to implement their own PCAs in accordance with best practice, and will have more confidence in choosing from amongst the variety of options available, and be aware of appropriate references to guide and support them. rbarry@uow.edu.au

Cross-modal integration of odour and image valence using time-frequency analysis of chemosensory

event-related and induced EEG activity

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Aims: Olfaction can be described as a 'final frontier' in sensory neuroscience since the cortical mechanisms responsible for our sense of smell remain relatively unexplored relative to our other senses. It is only quite recently that even the basic molecular organisation of olfactory receptors was identified (Buck & Axel, 1991). However, the relationship between stimulus structure and perception as well as the cortical processes mediating this relationship remain poorly understood. Contrary to popular belief, olfactory sensory acuity in humans is extraordinarily good, where odour detection thresholds have been observed on a part-per-trillion scale (Nagata & Takeuchi, 1990). Paradoxically, humans are notoriously bad at odour identification and recognition, which reflects the unique organisation and neuroanatomy of the olfactory sensory system. For example, olfactory signals propagate rapidly and directly from the periphery to primary cortex rather than via the thalamus as is the case for other sensory systems. Since the olfactory brain incorporates extensive limbic regions it is not surprising that conscious awareness of olfactory sensory information can be limited

and that affect (i.e. odour pleasantness) has been established as the primary perceptual dimension. Method: The purpose of this presentation is to provide an overview of ongoing research examining the influence of cross-modal affective congruence on EEG time-frequency activity. The results of a study using simultaneous presentation of randomly valenced images and odours to identify affective modulation of EEG oscillations are presented. Results: Synchronisation of high density EEG acquisition with odour stimulation was achieved using measures of inspiratory phase and EEG integration with a multi-channel computer-controlled constant flow air dilution olfactometer. Conclusions: The results are discussed in terms of solutions to the technical challenges in stimulus control and timing of odours and well as the unique opportunity time-frequency analysis of EEG/MEG offers for extending our understanding the cortical mechanisms underlying olfactory perception. Applications of EEG/MEG time-frequency analyses for sensory and consumer research in the food, wine, flavour and fragrance industry are also presented.

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Eyes-Open Resting EEG of Women with Endometriosis Versus Age-Matched Controls

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Aims: Endometriosis is a progressive disease where cells similar to those found in the uterus grow in other parts of the body. The most commonly reported symptoms of Endometriosis are fatigue and debilitating pain. Chronic pain is strongly underpinned by maladaptive cortical mechanisms. With few pain management options available, understanding the brain dynamics of women with Endometriosis is necessary. The present study utilised Electroencephalography (EEG) to measure resting brain activity with the aim of elucidating brain mechanisms underpinning chronic pain in women with Endometriosis cf. age-matched controls. Method: Participants were 20 women with a diagnosis of Endometriosis via laparoscopy in the past 5 years (mean age = 28.6, range = 21-40 years), and 20 healthy females (mean age = 26.0, range = 21-39 years). Four minutes of eyes-open resting EEG was recorded from 30 scalp sites, and EOG-corrected data were divided into 2-second epochs and Discrete Fourier Transformed. EEG band amplitudes (Delta, Theta, Alpha-1, Alpha-2, Beta-1, Beta-2) were compared between groups. Results: Across groups, Delta and Theta activity was largest frontally, and in the midline. Alpha-1 and Alpha-2 activity was largest in the parietally and in the midline, with the

addition of a right hemispheric elevation for Alpha-2. Beta-1 activity was elevated in the right hemisphere. Beta-2 activity was largest frontally. Between groups, significantly greater Delta activity was evidenced for healthy controls compared to the Endometriosis group. There were no further group main effects or group × topography interactions. Conclusions: Across groups, topographies were consistent with previous resting eyes-open EEG research. Between groups, women with Endometriosis produced less Delta activity than healthy controls, which is in line with previous findings linking reduced delta to impaired pain responsiveness. Findings implicate reduced eyes-open resting delta activity as a potential index of the cortical mechanisms associated with chronic pain in women with Endometriosis.

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Enhancing sequential action through single session meditation and training: Behavioural and neural correlates of meditation-facilitated motor sequence learning

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Aims: Understanding the conditions which can optimise motor sequence learning is an important challenge in our field. Recent theoretical models outline that motor learning can be influenced by cognitive control to derive different learning strategies. Growing evidence suggests that mental tasks such as focused attention meditation (FAM) can influence cognitive control by narrowing attention in a convergent control style, although support from more direct electrophysiological evidence has thus far been lacking. We aimed to better understand the neural correlates of motor learning improvements from FAM. **Methods:** 29 participants were randomised to one of three conditions reflecting the level of FAM experienced prior to a serial reaction timed task (SRTT): 21 sessions of FAM (MED21, N= 12), a single FAM session (MED1, N= 9) or no preceding FAM control (CON, N= 8). Continuous 64-channel EEG were recorded during SRTT where N200 amplitudes for correct trials, and error-related negativity (ERN) using difference in amplitudes for correct and error trials, were extracted. Component amplitudes, topography and behavioural outcomes were compared using mixed models between the groups. **Results:** MED21 demonstrated a significantly more pronounced N200 component over

frontal-midline and central-midline regions during SRTT compared to MED1 and CON. No differences in the ERN component were found. Med21 also had the greatest response rate improvements for SRTT learning, $M = -.50$ $SD = .32$, compared to MED1, $M = -.39$ $SD = .27$, and CON, $M = -.37$ $SD = .15$, although this trend was not as robust as the N200 findings.

Conclusions: The N200 is associated with the increase in top-down control of attentional and inhibitory processes, whilst the ERN is associated with conflict and the updating of an internalised plan. Our combined N200 and behavioural results suggests that FAM bias cognitive control for a convergent control style and thus, the adoption of stimulus-based learning, as opposed to plan-based learning.

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Examining Physiological Regulation in Dyadic Conversations and the Effect of Emotional Empathy

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Aims: The aim of this study was to investigate physiological regulation to conversational behaviours within a natural social interaction. This study also aimed to investigate emotional empathy as a moderator of this physiological responding. **Method:** Participants were asked to have a unrestricted thirty-minute conversation. Following this, videos of

these conversations were coded for eight behavioural variables, namely, floor holding, listening, unfloored overlapping speech, unfloored silences, own smiling, other's smiling, own laughter, and other's laughter. Skin conductance level and heart rate correlates of these behaviours were analysed with an exploratory time-series analysis. **Results:** There was physiological regulation across time found within conversations, such that floor holding was associated with increased heart rate, listening was associated with decreased skin conductance level, and positive affect was associated with an increase in heart rate and skin conductance level for self and other. Furthermore, there is some evidence to suggest that emotional empathy is positively associated with physiological changes. That is, as emotional empathy increases, changes in heart rate associated with unfloored silences, and viewing another's laughter increases. **Conclusions:** This study furthered a scarce area of research on physiological correlates of conversational components, and further developed a systematic way of quantifying conversations. This study was the first to utilise multiple autonomic measures in a micro-analytic approach to conversations, and also the first to investigate an individual difference variable. The results suggest that there is a physiological regulation to the sending and receiving of social cues throughout a conversation, and given its novelty, has a wide scope for

future directions.

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The effects on resting state EEG activity of the catechol-O-methyltransferase (COMT) Val158Met rs4680 polymorphism, and the relationship to schizotypy

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Aims: Schizophrenia, at the clinical end of the schizotypy spectrum, is characterised by abnormal electroencephalogram (EEG) profiles and dopamine dysregulation. The gene encoding the dopamine degrading enzyme catechol-O-methyltransferase (COMT) is thought to be a schizophrenia spectrum disorder susceptibility gene, with the Val variant (cf. Met) identified as the primary risk allele. To date, few studies have investigated the link between schizotypy, EEG activity, and

the COMT Val158Met polymorphism; this is the aim of this present study. **Methods:** Ninety-one healthy participants (Mean age = 21.4, SD = 5.0 years) had 4 minutes eyes-open resting state EEG activity recorded, were genotyped for the COMT rs4680 polymorphism (Val/Val, Val/Met, and Met/Met), and completed the Schizotypal Personality Questionnaire (SPQ; a 74-item true or false self-report); different facets of schizotypy were assessed. **Results:** Participant genotypes was represented as 22 % Val/Val, 44 % Val/Met, and 34 % Met/Met. Suspiciousness SPQ subscale scores were significantly lower for Val/Met genotype individuals compared to homozygous Val/Val and Met/Met genotypes. Val/Val genotype individuals showed reduced parietal delta, fronto-midline theta, parieto-midline alpha-2, fronto-midline beta-1 amplitudes, and reduced midline beta-2 (cf. Met/Met genotype individuals). Stepwise multiple regression showed that higher levels of delta, and lower levels of theta and beta-2 predicted 11.4 % unique variance in total SPQ scores. **Conclusions:** Findings indicate the importance of COMT in determining EEG oscillatory activity and trait suspiciousness, and suggest that neurophysiological function may serve as an intermediate between trait schizotypy and COMT-related differences in dopaminergic transmission. Results from theta and beta activity in this study contradict some patterns observed in schizophrenia, thus future studies

should seek to replicate these COMT and EEG related findings in clinical groups.

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Cognitive Control Processes Underpin Sex differences in Self-report Measures of Empathy

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Aims: A consistent finding across empathy studies is that females self-report higher affective empathy than males, yet this sex difference is less pronounced and often non-existent in more objective or implicit measures of empathy. This study aimed to investigate the neural underpinnings of response selection whilst participants completed a self-report empathy questionnaire called the Balanced Emotional Empathy Scale (BEES). **Method:** Electroencephalography was recorded on 40 participants (F=20) whilst the BEES and Eriksen Flanker Task was completed. The Flanker was used as a template from which components on the BEES could be compared. Temporal Principal Components Analyses were performed on the resulting response-locked ERPs on both tasks to extricate components. **Results:** For the Flanker, two negative post-response components were identified, an N200 that peaked around 200ms (maximal

at parietal brain regions) and N600 at 600ms, (maximal at central regions). For the BEES task, the N200 was maximal in the lateral regions and the N600 was maximal at frontal and central regions. No significant sex difference in self-reported empathy was found, however, higher empathy scores for males correlated positively with the incongruence component (N600) in the frontal regions of the brain (all $r(1,14) \geq .431$) and with the response monitoring component (N200) in parietal sites ($r(1,14) \geq -.428$). **Conclusion:** The results indicate that, for males only, scoring high on measures of empathy is more “incongruent” and at conflict with a socially desirable response. Such results are consistent with the hypothesis that for males, but not females, cognitive control processes underpin self-reporting on empathy questionnaires.

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Sequential Processing and Target Probability: Linking the Go/NoGo and Oddball Literatures

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Aims: Traditional Go/NoGo and Oddball tasks require participants to selectively respond to Go/targets and not to NoGo/nontargets, however,

target probability differs between these paradigms (i.e., frequent vs. rare, respectively). Due to that, and the differing cognitive processes elicited, separate literatures have developed for each task, with little cross-reference between them. The Sequential Processing Schema uses event-related potential (ERP) components to chart the cognitive processes in an Equiprobable Go/NoGo task, which is intermediate between the Traditional and Oddball paradigms (i.e., 50% Go/targets). We utilised that Schema over two studies to identify the similarities between these three paradigms, and link these disconnected literatures. Methods: In study 1, EEG/ERP data were acquired from 60 young adults (Mage = 20.4 years, SD = 3.1) completing a Traditional and Equiprobable Go/NoGo task. Temporal principal components analyses (PCAs) were then used to extract the ERP components associated with these tasks. Subsequently, the temporospatial features of corresponding components were compared, using Tucker's congruence coefficients, and topographic correlations. Study 2 repeated this approach to compare the processing in the Oddball and Equiprobable tasks, within 66 young adults (Mage = 20.1 years, SD = 2.5). Results: The range of ERP components identified in the three paradigms were largely equivalent, indicating that similar neurocognitive processes are required in each task. Novel ERP components were also extracted in

Study 1, reflecting minor task differences; however, these were anticipated given the probability differences. Conclusion: This research connects the Go/NoGo and Oddball literatures, facilitating an integration of those differing theoretical perspectives. These outcomes also replicate the Schema in paradigms with differing stimulus probabilities, and demonstrate its application in a broader range of tasks, advancing its value as a tool for psychophysiological research.

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Gamma band synchrony: A mechanism for psychosis

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Schizophrenia is described as a breakdown of the associative threads of thought. Many of its clinical features including hallucinations, delusions, formal thought disorder, cognitive deficits and loss of insight suggest a loss of the ability of the individual to integrate thoughts and perceptions rapidly and accurately. Although changes in structural and functional brain connectivity in psychosis have long been identified, they do not provide a mechanism for the failure in coordination of the distributed neuronal systems that underlie the symptoms and signs of psychosis. A disturbance in the synchronisation of

neural oscillations or synchrony is such a mechanism.

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Impaired cortical inhibition may underpin deficits in postural control in people with Parkinson's disease.

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Rationale: People with Parkinson's disease (PwP) have deficits in upper limb motor control that is associated with impaired cortical inhibition 'off' Levodopa (L-dopa) medication. However, it is currently not known if this effect translates to lower limb function. Aims: To determine if short- and long-interval cortical inhibition (SICI and LICI) and lower limb physical function are modulated by L-dopa medication for PwP. Methods: 18 participants with mild-to-moderate PD (Hoehn and Yahr of 2-3) were recruited to perform a randomised cross-over study ('on' vs 'off' L-dopa medication) with 2 weeks washout in-between testing sessions. SICI and LICI were measured using paired-pulse transcranial magnetic stimulation with interstimulus

intervals of 3ms and 100ms, respectively. The Mini Balance Evaluation Systems Test (mBEST) was used to measure balance and lower limb function, including anticipatory movement, postural control, sensory orientation and dynamic gait. Results: SICI was significantly increased ($p = 0.046$) for 'on' compared to 'off' medication, and this was accompanied with a significant increase in the mBEST aggregate scores ($p = 0.033$). No difference in LICI was observed ($p = 0.23$). The constructs of the mBEST showed no significant difference in anticipatory ($p = 0.57$) sensory orientation ($p = 0.29$) and dynamic gait ($p = 0.25$), except for a significant increase in reactive postural control ($p = 0.034$) when on medication. Pearson's r showed moderate positive correlations between SICI and mBEST aggregate scores ($r = 0.589$, $p = 0.01$) and reactive postural control scores ($r = 0.668$, $p = 0.002$) while in the 'on' state. No significant correlations were found between SICI and mBEST ($r = 0.462$, $p = 0.054$) and reactive postural control ($r = 0.382$, $p = 0.117$) while in the 'off' state. Conclusion: Our findings suggest that impairments in cortical inhibition, particularly SICI, may underpin deficits in reactive postural control in PwP. hdale@deakin.edu.au

Focusing on your heart: The enhancing effect of interoception on emotion recognition

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Aims: Interoception is the awareness of one's own physiological state (e.g., via cardiac cues). Better interoceptive abilities have been associated with enhanced emotional capacity. However, to date how brief periods of interoception directly influence emotion recognition has not been investigated. Moreover, recent evidence suggests declines in both interoceptive ability and emotion recognition with increasing age. Here, we investigated whether emotion recognition is influenced by interoception in younger and older adults. **Methods:** Forty healthy volunteers (23 younger: aged 21-35; 17 older: aged 55-75) completed two within-subject interoception conditions, where participants pressed a button each time they: 1) detected their heartbeat (Cardiac condition) or 2) heard a recorded heartbeat (Control condition). ECG was simultaneously recorded and an accuracy index was calculated for each condition. Immediately after, participants completed an emotion recognition task, where emotional faces were displayed for 3 seconds and participants selected a corresponding emotional label. **Results:** Interoceptive accuracy was

significantly different between groups ($p = .03$), with older adults showing worse cardiac accuracy than younger adults ($p = .02$), but comparable accuracy on the control condition ($p = .54$). Interestingly, both groups showed improved emotion recognition following the cardiac than the control condition ($p < .001$), despite older adults showing lower emotion recognition than younger adults overall ($p = .03$). Surprisingly, correlational analyses revealed no significant relationship between objective interoceptive accuracy and the enhancement of emotion recognition performance in either group (both $p > .05$). **Conclusions:** This study reveals enhancement of emotion recognition immediately following a cardiac interoception task in younger and older adults, suggesting that brief periods of focus on one's own heartbeat may foster improvements in emotion recognition, irrespective of objective accuracy of the task. Future research is needed to further understand the mechanisms of this effect, whether other dimensions of interoception (e.g., respiration) are similarly effective.

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Resting-state cortical inhibition predicts accuracy of motor inhibition

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Introduction: Transcranial magnetic stimulation (TMS) studies have shown that cortical inhibition within the primary motor cortex (M1) decreases just prior to movement, and increases immediately following the successful cancellation of a prepared or prepotent action. However, it is unclear whether the integrity of cortical inhibitory processes predicts individual differences in efficiency of motor response inhibition. The aim of the present study was to determine whether cortical inhibition of the M1 measured at rest predicts the efficiency of performance on converging gold standard measures of action cancellation (i.e. Go/No-go task and the Stop-signal Task). Method: Sixteen young healthy adults (18-26 years) underwent single and paired-pulse TMS to measure short-interval cortical inhibition (SICI), long-interval cortical inhibition (LICI) and cortical silent period (CSP). Participants also completed both a Go/No-go task, and a Stop-signal task. Results: Significant correlations were observed between a number of cortical inhibitory indices and performance on both the Go/No-go and Stop-signal Task. Most saliently, positive correlations were observed between SICI and accuracy on no-go trials of the Go/No-go task ($r = .55$, $N = 16$, $p = .028$), and total accuracy on the difficult stop-trials combined from the Stop-signal Task ($r = .72$, $N = 16$, $p = .003$). Conclusion: These findings are consistent with the view that the integrity of cortical inhibition of within the M1 (resting-state) may be a

predictor of actual motor performance, and in particular the efficiency of response inhibition.

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Frontal Alpha EEG Asymmetry: Is there a Severity Cut-off Point?

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Introduction: Elucidation of the pathophysiology of depression has led to investigation of the electrical activity in the brains of depressed individuals, with the aid of EEG measurements. From such measurements, frontal lobe electroencephalographic (EEG) asymmetry (FLA) has been identified as a marker for depression, because depressed individuals show greater electrical activity in their right frontal lobes than in their left frontal lobes, while non-depressed individuals demonstrate equal amounts of electrical activity in both frontal lobes. Individuals experience different severities of depression, requiring different treatment approaches. Previous studies have demonstrated FLA in depressed individuals only, yet the precise set point on the depression severity scale at which FLA sets in is largely unknown. Aim: To determine the cut-off point at which FLA occurs in depression. Methods: By measuring baseline-EEG under standardized laboratory procedures, FLA was determined in 100 adults. With the aid of the Zung

Self-rating Depression Scale (SDS), participants were classified into “clinically depressed” group (SDS scores greater than 40) and “non-clinically depressed” group (SDS scores less than 40); participants were further re-classified into “severe depression” group (SDS scores greater than 50) and “not-severe depression” group (SDS scores less than 50). Appropriate statistical analyses were performed to determine if significant differences in FLA exists between groups. Results: At SDS cut-off point of 40, there was no difference between “clinically depressed” and “non-clinically depressed” group. At SDS cut-off point of 50, participants with “severe depression” significantly differ from participants with “not-severe depression” (p value of 0.04). Conclusion: FLA is a valid marker of depression and depression severity is an important factor in the occurrence of FLA. By extension, the findings from this study highlight the importance of considering disease severity in the management of depression. ejesulola@csu.edu.au

**Not always the same, sad.
Psychophysiological correlates of low
or high approach motivation sadness.**

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Aims Sadness is widely considered as
a negative emotion with low arousal.

But results of studies
psychophysiological and cognitive
correlates of sadness exhibit
inconclusive results. In this study we
aimed to investigate sadness as a
heterogenous affective state, which
specifically can be characterized by
either low or high approach
motivation. Additionally, we wanted
to examine the neuro-underpinnings
of those two states based on the
frontal alpha activation, which has
been found to be related to a) valance
or b) motivational direction of
emotions. Method To verify this
statement, we measured 41
participants using EEG. First, we
recorded 4 minutes baseline EEG,
next participants were exposed to
neutral state induction (which
composed of a story read by an actor
or an actress, neutral music and
photos related to the story).
Afterwards depending on the
randomly assigned condition,
participants were exposed to 3
stories with either low or high
approach motivation sadness
(induction also composed of read
story, music - either low or high
approach motivation, and related
picture). After each of the stories
(neutral and each of the sad stories),
one minute of EEG signal with eyes
closed was recorded. For the
analyses, we compared frontal alpha
activation after neutral story and
after the third sad story, across
conditions. As the alpha frequency
varies between individuals, for each
person the individual alpha frequency
was acquired. Results The

comparison between high and low approach motivation sadness (the difference score between neutral and third sad story) for individual alpha frequency across frontal electrodes, revealed significant difference between conditions. For high approach motivation sadness condition frontal alpha power was elevated, while in low approach motivation sadness it was reduced. Conclusions Presented results suggest that based on the frontal alpha activation, sadness, due to its specific characteristics, can comprise different approach motivation intensity states.

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Representing self and other during musical group performance

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Musical group performance is a sophisticated form of joint action that showcases the remarkable human capacity for precise interpersonal coordination. Such coordination requires some degree of self-other merging while maintaining the distinction between self and other. Integration of information related to one's own and others' actions assists in representing shared goals and evaluating joint outcomes. At the same time, segregation between the effects of actions produced by self and others facilitates agency attribution and autonomous

movement control. In this talk, I will present research addressing how self-other integration and segregation are balanced in the auditory domain during musical joint action. I will report findings from sensorimotor synchronization experiments employing controlled laboratory paradigms and naturalistic musical tasks, as well as related computational modelling, neuroimaging, and brain stimulation studies. Results suggest that achieving optimal balance between self-other integration and segregation requires finely tuned internal models of self, other, and joint action outcomes.

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Vicarious ostracism and empathic accuracy

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Aim: Empathy is a complex construct involving both a cognitive and affective component, making it difficult to objectively measure. Increasingly researchers are incorporating physiological measures to allow quantification of the affective component. Further, researchers are employing reality-based paradigms to elicit more naturalistic empathic responding. The current study employs the Cyberball paradigm alongside physiological and self-report measures of empathy to determine whether the experience of vicarious ostracism can be used as a

proxy measure of empathic response. Method: Seventy undergraduate psychology students aged 18-56 years (15 male) attended the lab as dyads, where they were randomly allocated to either be the target (player) or observer. Each dyad participated in two conditions (exclusion and inclusion) of Cyberball, a computerised ball tossing game. The Cyberball Questionnaire was used to determine distress in targets following the games, and a modified version assessed observers' perception of the targets distress. Simultaneous physiological responses (skin conductance) were collected from both targets and observers throughout the game. Two measures of empathy (Interpersonal Reactivity Index and Balanced Emotional Empathy Scale) were used to measure trait empathy in observers. Results: Targets self-reported significantly greater distress following the exclusion condition [$F(1.74, 57.41) = 7.22, p = .002$], which was also perceived by the observers [$F(3, 102) = 7.83, p < .001$]. However, the groups differed in the magnitude of responses [$F(1, 67) = 9.58, p = .003$]. Associations between arousal and condition were not observed for either group, nor was a relationship found between skin conductance and self-reported affective empathy (p 's $> .05$). Conclusions: The accurate perception of ostracism, vicariously experienced and reported by observers, provides initial support for concordance with cognitive empathy, however the manipulation failed to

demonstrate an association with physiological or self-reported affective responses.

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Abnormal psychophysiological responses to emotional stimuli in dementia

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AIMS: Early theories of emotion processing propose that autonomic processing and cognitive appraisal of emotions are closely interlinked, with the perception of one's own emotional state and recognition of emotion in others, occurring secondary to the experience of somatic sensations. Patients with frontotemporal dementia show profound social cognition deficits and atrophy in regions known to be important in autonomic emotional responses (e.g., insula, amygdala, prefrontal cortex). Here, we aimed to investigate whether psychophysiological responding to emotional stimuli is abnormal in frontotemporal dementia syndromes. METHOD: Twenty-three behavioural-variant frontotemporal dementia (bvFTD) patients, 14 semantic

dementia (SD) patients and 22 healthy older controls were recruited. Participants viewed 6 x 2 min video clips which were either emotionally positive, neutral or negative. Surface facial (zygomaticus and corrugator) electromyography (EMG), skin conductance level and pulse were simultaneously recorded using an 8/35 Powerlab Data Acquisition System. RESULTS: Unlike controls, patients with bvFTD did not show differential facial EMG responses according to emotion condition, whereas SD patients showed increased zygomaticus responses to both positive and neutral videos. Controls showed increased skin conductance levels when viewing positive and negative videos, however, both bvFTD and SD groups showed no change in skin conductance level across conditions. Finally, no differences in heart rate were found across groups, despite bvFTD patients showing elevated heart rate at rest. CONCLUSIONS: Our results demonstrate that psychophysiological responses to emotional stimuli are abnormal in frontotemporal dementia, however, the nature of these differences varies across syndromes. While bvFTD patients show an overall dampening of responses, SD patients appear to show heightened physiological responses which are inconsistent with the emotional content of stimuli. These results identify potential mechanisms for the abnormal social behaviour in bvFTD and SD, and demonstrate that

psychophysiological responses are an important mechanism underpinning normal socioemotional functioning. fiona.kumfor@sydney.edu.au

Does perceptual load influence auditory distraction processing in older adults?

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Aim: To efficiently process target sounds in an environment of targets and non-targets requires that the irrelevant non-target sounds be ignored. Irrelevant sounds can however interfere with task performance because they capture attention (auditory distraction). Our previous work using a cross-modal distraction task showed that older adults can off-set the effects of distraction when the task requires involved top-down executive control, i.e., working memory (WM). The current experiment aimed to determine whether older adults could counter-act distraction effects by increased bottom-up attention in a unimodal distraction task. The degree of bottom-up attention was varied by manipulating the perceptual difficulty of the task, and distraction was measured electrophysiologically by examining ERPs. Method: We recorded ERPs from 24 older (62-76years) and 24 younger adults (21-35years) while they completed a tone

duration classification task in an auditory oddball paradigm with novel auditory distractors. Listeners performed a duration classification task that required an easy or difficult discrimination (with the degree of difficulty individual tailored based on a pre-test). Results: ANOVA results revealed a main effect of task difficulty (more errors on the harder discrimination) and a main effect of age (older adults were slower and made more errors). There was a task difficulty effect on P3a (a neural indicator of attention switch to distractor) and RON (an index of switching back to task after distraction) with both older and younger adults exhibiting larger P3a and attenuated RON for difficult discrimination trials. There was no age effect or interaction (between task and age) for these ERPs. Conclusions: Increasing perceptual task load in a unimodal distraction paradigm had a similar effect on auditory distractor processing for younger and older adults. This contrasts with the effect of increasing WM load on crossmodal distraction where older adults showed a larger effect, and points to the importance of modality and type of load in understanding distraction processing in older adults.

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Enhanced representation of musical meter in cortical versus lower-level auditory activity

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Aims. The spontaneous ability to entrain to meter periodicities is central to music perception and production across cultures. There is increasing evidence that this ability involves selective enhancement of neural activity at meter frequencies. This phenomenon has been observed in the human auditory cortex, yet it could be the product of evolutionarily older lower-level properties of brainstem auditory neurons, as suggested by recent work on midbrain responses to auditory rhythms in rodents. **Methods.** We addressed this question by taking advantage of a new method to simultaneously record human neuroelectric activity originating from cortical and brainstem sources, in the form of slow (<20Hz) and fast (>150Hz) responses to auditory rhythms. **Results.** Cortical responses showed increased amplitudes at meter frequencies, were sensitive to musical tempo, and were correlated with behavioural measures of rhythmic motor entrainment. In contrast, brainstem responses did not show selective emphasis at meter frequencies, but only in a more complex rhythm without prominent meter frequencies in the input. **Conclusions.** These findings demonstrate critical transformations, with stronger dissociation from the rhythmic input at cortical vs. lower-level auditory representations, thus moving a key step forward in our

understanding of the neural mechanisms underlying rhythmic entrainment in humans and its cross-species evolution.

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The effects of a single-session continuous and intermittent theta-burst stimulation on working memory in older adults.

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Introduction Non-invasive brain stimulation techniques such as theta-burst stimulation (TBS) have the ability to modulate neuronal plasticity and improve cognitive function in healthy adults. However, there is limited knowledge regarding the use of continuous or intermittent TBS (cTBS or iTBS) to improve working memory in healthy older adults. **Aim** This study aims to compare the effects of a single-session of cTBS or iTBS to the left dorsolateral prefrontal cortex (DLPFC) on cerebral hemodynamic response and short-term working memory in older adults. **Method** Fifteen healthy elderly (mean age 65.75yr, female 9, male 6) randomly received cTBS, iTBS and sham TBS to the left DLPFC separated by 7 days between sessions. The 1- and 2- back tasks were used to

measure short-term working memory. During the tasks, 4 pairs of functional near-infrared spectroscopy (fNIRS) transmitter and receivers located around the F3 and F4 region corresponding to the right and left DLPFC measured changes in oxyhaemoglobin (HbO₂) response before and after cTBS, iTBS and sham TBS. **Results** Our results showed that iTBS significantly improved reaction time ($p=.045$) and accuracy ($p=.039$) in the 1-back task and for the 2-back task (reaction time, $p=.05$; accuracy, $p=.038$). No significant difference was observed in the 1- and 2-back tasks between cTBS or sham iTBS. A significant increase in HbO₂ in the left ($p=.042$) and right DLPFC ($p=.035$) was recorded pre- post- iTBS during the 1-back task. Similarly, HbO₂ was significantly increased during the 2-back task in the left ($p=.035$) and right DLPFC ($p=.029$) post iTBS. No significant difference was recorded for cTBS or sham TBS. **Conclusion** Our findings suggest that a single-session of iTBS to the left DLPFC can improve short-term working memory and increase cerebral haemodynamic response during task activation in healthy elderly. coffer@deakin.edu.au

tDCS Electrode Montage Differentially Affects Autonomic Arousal and Working Memory Performance

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Aims. Transcranial direct current stimulation (tDCS) effects on working memory (WM) have been widely investigated, with generally inconsistent effects reported. Such variability has been attributed to inconstancy in stimulation parameters including stimulation montage, intensity and duration, and outcome measure/s. Moreover, the cognitive enhancement effects of tDCS may occur (at least partially) via the modulation of autonomic arousal, and this is yet to be well investigated. The current study thus assessed the effects of three tDCS montages on psychophysiological indices of arousal and behavioural performance during a WM task. **Methods.** Seventy-two healthy young adults completed a two-part study employing a counterbalanced cross-over design in which they received both an active and sham stimulation session one week apart. Participants were randomly assigned to the focal frontal (FF), broad frontal (BF), or broad parietal (BP) stimulation group. The 1- and 2-back variants of the n-back task were completed during active/sham tDCS administration. Pre- and post-task arousal was assessed via skin conductance level recorded during six minute eyes-closed/eyes-open/eyes-closed resting baseline conditions. **Results.** Higher arousal correlated with improved accuracy and faster response-time (RT) for the sham condition across the groups.

Following active tDCS, arousal showed a decrease for the FF group, no change in the BF group, and an increase for the BP group. These arousal changes differentially affected performance for each group. Arousal correlated with poorer accuracy for the FF group, the BF group performance differed little between active and sham sessions, and for the BP group, arousal was associated with poorer accuracy, and an increase in faster RTs. **Conclusion.** FF stimulation seemed to impair WM performance in this healthy sample, while BF stimulation had little effect, and BP stimulation appeared to increase behavioural impulsivity. The selection of tDCS montage has significant consequences for both arousal and behavioural outcomes in the n-back WM task.

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How does context affect our perception of emotional faces? Using eye-tracking to explore differences in younger and older adults

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Aims: Recognising emotional expressions is fundamental for successful social interactions. However, most emotion recognition studies use isolated, context-free

stimuli. Furthermore, how contextual information influences perceptions of faces with age has largely been unexplored. The current study investigated how contextual cues, such as body language and scenes, that varied in congruency, influenced younger and older adults' perception of emotional expressions. Additionally, we compared gaze patterns of age groups towards emotional stimuli, to determine whether older adults are more influenced by contextual information than younger adults. Method: Forty participants (21 younger; 19 older) completed three emotion recognition tasks (Face-Alone, Face-Body, Face-Scene) and were asked to identify facial emotional expressions. Eye-tracking data was simultaneously recorded to objectively measure the amount of time participants dwelled on the faces compared to the contexts, across tasks. Results: Contrary to previous findings, age groups did not differ in their ability to recognise context-free emotional stimuli. Notably, when the context was congruent (i.e. face and context emotion matched) participants performed better, irrespective of task ($p = .02$). Interestingly, when the context was incongruent on the Face-Body task, older participants performed worse than younger participants ($p = .01$). Eye-tracking results revealed that younger participants exhibited significantly longer dwell times towards the face and contextual interest areas compared to the older

participants, in the Face-Body ($p < .001$) and Face-Scene ($p = .001$) tasks. However, on the incongruent condition of the Face-Body task, older participants significantly increased their gaze attention towards the faces ($p = .004$). Conclusions: Our behavioural and eye-tracking analyses demonstrate that older individuals are more strongly influenced by incongruent body language than younger individuals, performing worse in their emotion recognition performance despite increasing their gaze attention towards faces. Hence, it appears that older individuals are more susceptible to the influence of body language, revealing the importance of context in emotion recognition processes. emily.chafei@gmail.com

Scale dependent high-level features for saliency detection: An eye-tracking study

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AIM: Saliency maps are mostly based on bottom-up models. We argue that by looking at an image in varying scales (i.e. looking at small parts of a whole image one at a time), our attention becomes dependent on different kinds of features of the image. As the scale grows and become closer to our usual daily scenes, semantic objects are added to the image, small parts becomes

adjoined and our holistic view becomes dependent on higher-level features. Method: We collected raw eye-tracking data from our 10 participants by presenting them with a free discovery visual task, in which they each viewed 255 images and named the objects or interesting parts of each image. Image stimuli were generated by cropping 3 parent-images to grids in three levels, 4, 16, and 64 images; yielding a total number of 84 sub-images per parent-image. This aim of the decomposition procedure was to investigate the matching of behavioural and computational saliency maps of a holistic scene. Results: Two models were used to create computational saliency maps from all of our 255 images. These models have different approaches for saliency detection, in using top-down methods (MDF) or incorporating low-level features (GBVS). NSS algorithm was used to compare computational saliency maps to behavioral fixation data. Low-level feature generated saliency maps better predict the fixations on small patches of an image, while top-down models has superior advantage for fixations in parent images and in total. Conclusions: Computational models of saliency which are based on high-level features are a better predictor of human eye movements and attention in rich context. Based on these evidence, we suggest that saliency models should incorporate the scale of image and relative distance of objects to observers in order to be a more accurate model of

human vision.

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Coping through crying: A laboratory investigation of the intrapersonal function of tears

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It is often suggested that one of the main functions of crying is to facilitate recovery after having been in distress. Attempts to explore this previously have used retrospective studies, with none experimentally testing a functional explanation. This experiment investigated the intrapersonal functional explanation of crying by evaluating if crying before a stressor would facilitate coping and recovery. Aim: Our aim was to better understand the physiological changes that occur during crying and how it may aid recovery from stressful events. Method: Participants were female undergraduate students (N=197) at the University of Queensland who were randomly assigned to either the sad or neutral video sequence. Both consisted of short videos lasting 17 minutes. 'Sad' videos were selected for their extreme emotion elicitation, i.e., sad crying responses. Performance on a stressor (cold pressor task) was then timed. Throughout the experiment participants heart rate, respiration, and facial expressions were recorded

through iMotions using FACET software. Salivary cortisol was also taken during the experiment at 4 separate time points. It is predicted that compared to controls participants who have cried will (a) be able to withstand a stressful task for longer; (b) show lower levels of cortisol following the stressor; and (c) have faster physiological recovery to baseline following the stress task measured using heart rate, respiration, and salivary cortisol. Results and Conclusion: Preliminary results suggest no physiological benefit to crying through heart rate or cortisol changes. Specifically, there appears to be no buffer for physiological change or mood when exposed to a stressful event. Further results and implications will be discussed. l.sharman1@uq.edu.au

Towards equivalent inhibitory tasks in ERP and fMRI contexts

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Aims: The Go/NoGo task has been used for decades to investigate inhibitory capacity in healthy adult controls as well as developmental changes across the lifespan, and in many psychiatric disorders, using neuroscientific techniques such as event-related potentials (ERPs) and functional magnetic resonance imaging (fMRI). fMRI techniques often require a slower presentation of

stimuli (about 1 every 3-4 seconds) due to the slow nature of the BOLD response, in comparison to many ERP studies which have a faster presentation rate (about 1 every second). However, recent research has shown that a slow presentation rate makes the task very easy and fails to tax the inhibitory processes of interest. Methods: In this study, we investigate three sets of feedback parameters designed to be used with a slow (fMRI-like) presentation rate, but to elicit inhibitory processing more similar to a fast (ERP-like) presentation rate. Data collection is ongoing, with data from 80% of the planned sample to be presented at the conference. Results: Preliminary analyses indicate that will focus on reaction time and error rate, as well as the N2 and P3 components of the event-related potential to NoGo stimuli. Conclusions: The outcome of the study will be a set of guidelines concerning feedback parameters for fMRI researchers to ensure that they sufficiently tax inhibitory capacity in studies designed to measure this construct.

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Workshop: An introduction into functional near-infrared spectroscopy (fNIRS): How, why and when should you to apply fNIRS into your research

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Functional near-infrared spectroscopy (fNIRS) is emerging as an effective optical neuroimaging technique to measure functional cerebral responses. The use of fNIRS is based on the principle of neuro-vascular coupling and measures the change in levels of oxy- and deoxyhaemoglobin in response to localised cortical activation. As fNIRS and functional magnetic resonance imaging (fMRI) techniques are sensitive to similar neurophysiological changes, both techniques are often used as comparable methods with validation studies showing a high level of correlation in fNIRS responses and blood-oxygen-level dependent (BOLD) signal in several well-established cognitive tasks. In this workshop, a summary of the history, evolution and theoretical underpinning of fNIRS will be provided. Following this, a demonstration of the different fNIRS systems will be provided to allow audiences an understanding of the strengths and limitations of fNIRS. This will include a demonstration of a combination of stationary and portable fNIRS devices for cognition and exercise research. Finally, the future directions of fNIRS will be discussed in particular, integration with other systems such as electroencephalography to provide a comprehensive neuroimaging package. weipeng.teo@deakin.edu.au

The relationship between pain, perceived instability and altered

spinal reflex excitability: potential mechanisms for injury

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Following an ankle sprain, up to 80% of individuals develop symptoms of chronic ankle instability (CAI): persistent pain and perceived instability of the ankle. Although these symptoms are not primary considerations for treatment, pain and perceived instability may drive altered spinal-level neuromuscular control and thus be important rehabilitation outcomes. Aims: to explore the relationship between altered spinal-level excitability, perceived instability and pain in CAI. Methods: Twelve individuals with CAI (4 females, 8 males; age, 25.2 ± 3.7 yr), twelve 'copers' (4 females, 8 males; age, 24.2 ± 4.7 yr) and twelve healthy (4 females, 8 males; age, 23.3 ± 4.5 yr) age, limb and gender-matched controls participated. H-reflex recruitment curves, pre-synaptic excitability of the spinal-reflex pathway and recurrent inhibition were examined during static double- and/or single-leg stance. Reporting of pain and perceived instability were used to perform a regression analysis on measures of spinal excitability. Results: Spinal reflex excitability was greater during single-leg stance in CAI compared to healthy and coper individuals [$F(2, 35) = 13.93$, $p < 0.001$]. Pre-synaptic inhibition was

three-times less in CAI participants compared to both healthy controls and copers [double-leg iPSI%, $F(2, 35) = 11.30, p = <0.001$; single-leg iPSI% $F(2, 35) = 12.434, p = <0.001$]. There were no differences between healthy and copers participants in spinal-level measures of sensorimotor control. Pain and perceived instability explained 16% and 22% of the variance in spinal reflex measures ($p < 0.05$). Conclusions: Altered spinal-level sensorimotor control likely predicts an individual's ability to recover following an ankle sprain – or the possibility that they will develop chronic ankle instability. Our findings suggest that pain and perceived instability may drive altered spinal-level sensorimotor control in CAI and therefore should be considered in treatment and future research.
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Vision despite disruption; questioning the exceptionality of perception around the time of eye movements

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We are generally unaware of making several eye movements per second even though each eye movement should have a profound effect on vision. The brain should need to piece together changes in the visual scene caused by the change in eye position and to reduce the disruptive effect of perceiving the motion of the eye. Recent research questions how active

the visual brain really is in suppressing the perception of motion that could be perceived with each eye movement. Moreover, rather than being a hindrance, the visual motion produced during an eye movement may aid some aspects of visual functioning. This talk will explore the extent to which the visual brain actively engages in creating the illusory sense of a stable and continuous world despite the many eye movements we make.

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Influences of social cognition on visuospatial attention: A neurophysiological investigation

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Aims: The reflexive orienting response triggered by non-predictive gaze cues is thought to be driven by a dedicated social neural network responsible for directing attention towards socially salient information. Atypical processing of eye gaze using concomitant perceptual features such as motion transients may underlie reflexive attentional orienting in groups with impairments in social cognition. Thus, reflecting the employment of qualitatively different cognitive mechanisms used to access social information. The present study examined the neurophysiological correlates of gaze processing, considering individual variability in social cognition and the relative

salience of social and perceptual cues on visuospatial attention. Method: Electroencephalographic (EEG) activity and behavioural response time (RT) was recorded from 26 healthy adult participants during a spatial cueing task. Participants responded to presentations of a lateralised target on valid (congruently cued) or invalid (incongruently cued) trials across 3 conditions; social gaze, mouth motion and eye motion. Scores on the AQ, LSAS and TAS-20 were used to assess social cognitive functioning. ERP components were obtained with separate PCAs for each cue type and condition. Results: Behavioural analyses revealed cueing effects for the social gaze and mouth motion conditions. Responses did not differ

significantly in the eye motion condition. In the social gaze condition, higher scores on the TAS-20 correlated with a reduction of the N2b frontal enhancement to invalid trials ($r=.439$, $p<.05$). In the mouth motion condition, higher LSAS and TAS scores were correlated with a greater overall N2b to invalid trials ($r=.403$, $p<.05$ and $r=.429$, $p<.05$ respectively). Conclusions: Findings suggest the social gaze cue is less salient for those with greater alexithymic traits. An attentional bias towards perceptual changes (mouth motion) parallel impairments in social cognitive functioning, and thus may reflect reduced sensitivity to social stimuli. Such paradigms may benefit investigations in clinical populations. g.wei@student.unsw.edu.au

