AUSTRALASIAN SOCIETY
FOR SOCIAL & AFFECTIVE NEUROSCIENCE

5th Annual Conference

Wednesday 20th & Thursday 21st June 2018

The Ship Inn, Brisbane

CONTENTS

WELCOME

On behalf of the Australasian Society for Social and Affective Neuroscience (AS4SAN) Executive Committee and the Local Organising Committee, we would like to welcome you to the Ship Inn, Southbank in Brisbane for the 5th AS4SAN Meeting.

This is the second time the AS4SAN Meeting has been held in Brisbane and we have chosen a different venue to host it. Southbank was the location of the 1988 World Expo and is now a cultural, social, educational, and recreational precinct in Brisbane, Queensland, Australia. Apart from attending the meeting and enjoying scientific presentations and discussions, we hope you take some free time to enjoy what Southbank has to offer.

In keeping with the AS4SAN tradition, the Brisbane meeting will maintain the single stream format that covers topics from a wide range of areas. Thank you to those who submitted abstracts, we have put together an interesting program, which includes a diverse range of topics from animal modeling to clinical research. We hope that such a diversity triggers creative works and productive collaborations between disciplines. We are pleased to have international and national speakers who are world-leaders in their respective fields sharing their expertise and latest research with you over the next two days. Prior to the conference, we also held two workshops on 19th June 2018 in the Centre for Advanced Imaging at the University of Queensland, St Lucia campus. We appreciate the time and effort of our workshop presenters in making these wonderful sessions happen.

Finally, we would like to thank our local committee members for their dedication and hard work, as well as our sponsors and exhibitors for their generous support. We are looking forward to dynamic and productive scientific dialogues with you all and hope you enjoy the conference.

David Shum and Maryam Ziaei

Conference Convenors

Conference Organisers

David Shum
Maryam Ziaei
Alexandra Adams
Liza van Eijk
Alan Pegna
Christy Hogan

AS4SAN Executive Committee

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Pascal Molenberghs
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Juan Dominguez
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Bernadette Fitzgibbon

PRESIDENT'S NOTE

It is my pleasure to welcome you all to Brisbane for the 5th Annual AS4SAN Conference. It is wonderful to be able to return to Brisbane, where we first became an official society. I would like to thank Prof David Shum and Dr Maryam Ziaei and their team, for all their hard work in making this conference happen.

Over the last year during my time as President, we have made some great achievements as a society. We have started our quarterly newsletter, which is now subscribed to by more than 500 people in the Australasian region and internationally. We have also grown our social media reach. Our Facebook page has over 500 likes and our Twitter account has over 100 followers.

We have also been able to support the Inaugural AS4SAN PhD and ECR Training Grant. This award of $1000 is designed to enable students and ECRs to visit labs within the region and learn new techniques to enhance their research in the field.

We are delighted to launch our survey at this conference, to gain insights into the field of social and affective neuroscience in Australia. The results from this survey will be used to help us understand how the society can help its members to improve both research and translational impact in the field. We also hope to use this information to help lobby policy makers and philanthropic groups to support this important field of research.

Finally, as we grow as a society, we are refining our rules to minimise administrative processes and enhance transparency in our operations. These will be voted on at the AGM held at the conference.

I hope you all have a wonderful time at this 5th Annual AS4SAN conference, and that you learn and engage, form new collaborations and friendships, and leave inspired by the fantastic work being conducted in this innovative and fast-moving area of research.

Fiona Kumfor

President

Australasian Society for
Social & Affective Neuroscience

CONFERENCE INFORMATION

Venue

The Ship Inn, constructed in 1864, was once a rowdy sailor's drinking den that has since been transformed into a civilised gastro pub complete with a separate function and convention facility located upstairs. The function room can cater for up to 200 guests and is complemented by a four metre wide wrap-around veranda to enjoy a view over the Parklands below.

The conference will be held in the upstairs function room and posters will be displayed in here as well as in the foyer and on the veranda.

Address: Cnr Stanley & Sidon Streets
Southbank Parklands
Brisbane QLD 4101

Getting There

By Car - South Bank's underground car park, which offers more than 800 spaces (including eight disabled bays) is located at Little Stanley Street with entry via Tribune or Glenelg Street. There is stair accessibility from both its north and south entrances with a lift operating at the north entrance. The maximum cost per day is $36. Street parking is for a maximum of two hours (from 7am to 6pm) on unsigned streets unless there are parking meters or signs showing otherwise.

By Public Transport - There are numerous bus and train services that will take you to the South Bank busway station and South Bank Station, respectively. From these locations, it is a five-minute walk to The Ship Inn. There is also a CityHopper ferry service which stops at South Bank 3 Ferry Terminal. From here, it is again just a five-minute walk to The Ship Inn. For detailed instructions on public transport options, you can visit www.translink.com.au or download the MyTransLink app.

Registering

The registration desk will be located in the foyer outside the function room, and will be open from 8am until 3pm on both days. If you are speaking, please report to the lectern inside the function room in the break immediately before your session to upload your slides. You are welcome to upload slides earlier if you wish.

CONFERENCE INFORMATION

Catering

Morning tea, lunch, and afternoon tea will be served on the veranda. Those who have indicated special dietary requirements, please speak to one of the catering staff as these have been ordered for you.

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Disclaimer

- The information given by presenters at the conference does not represent the views of the Australasian Society for Social and Affective Neuroscience Executive Committee, and does not constitute therapeutic advice.
- We strongly advise conference presenters to take out their own professional indemnity insurance.
- In the event of industrial action, force majeure or other unforeseen disruption, the conference organisers do not take responsibility for any loss of monies incurred by conference delegates. We strongly advise conference delegates to arrange their own personal insurance.
- The conference will not be liable for any participant failing to take out their own insurance.
- Whilst every reasonable precaution is taken, the organisers and the Ship Inn accept no liability for any loss or damage occurring to persons or property at the conference.
- The organisers have made every attempt to ensure that all information in this publication is correct. The organisers take no responsibility for changes to the program or any loss that may occur as a result of last minute changes to the program.
- Some of the information contained in this publication has been provided by external sources. Although every effort has been made to ensure accuracy, currency and reliability of the content, the organisers accept no responsibility in that regard.
- Delegates and other invitees must observe the requests or directions of The Ship Inn staff.

CONFERENCE DINNER

The Conference Dinner will be held at Mado Turkish Restaurant on Wednesday 20th June at 7pm. The cost of the dinner includes a Turkish Banquet and two drinks of your choice (beer, house wine, or soft drink). Those who have indicated special dietary requirements will have special meals arranged.

Banquet Menu

Entree

- Freshly Made Turkish Bread
- Mixed Dips Platter (GF) - Hummus, Eggplant, Cacik, Carrot & Beetroot Dips
- Mixed Green Salad

Main

- Kalamar (Marinated Fresh Calamari) - Freshly Crumbed Calamari with Mado's Special Sauce
- Ispanakli Pide (Spinach Pide/Pizza) - Pastry Filled Spinach & Herbs, topped with Mozzarella & Feta Cheese
- Mixed Grill Platter - Lamb Shish, Chicken Shish, Lamb Patties (Kofte Izgara) served with Rice & Turkish Bread

Dessert

- Mixed Dessert & Fruit Platter (Baklava, Turkish Delight, Watermelon and Rockmelon)
- Tea or Coffee

About the restaurant

Turkish food is one of the most delicious and healthy cuisines in the world. At Mado Turkish Restaurant, we hope to open your eyes to traditional dishes that have been handed down through generations. Try something you have never tasted before.

All our flavoursome meals are based on simple fresh ingredients. The benefits of the Mediterranean diet are well known. We use sun-ripened vegetables and the finest selection of meats. We combine extra-virgin olive oils and the wonderful aroma of herbs and spices like basil, oregano, mint, cumin and sumac. Enjoy our unbeatable desserts. Beautiful exotic food products and gifts display for sale opposite the reception.

Location

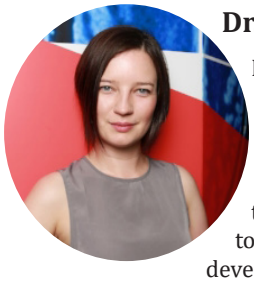
Mado Turkish Restaurant is located just a two-minute walk from The Ship Inn.

Address: Shop 1-3
The Galleria Apartments,
15 Tribune Street
South Brisbane QLD 4101

KEYNOTE SPEAKERS

Prof. Raymond Chan

Prof. Raymond Chan has been conducting research actively in neuropsychology and mental health, particularly in understanding cognitive deficits in patients with schizophrenia and its underlying psychopathology. He is now a distinguished professor of neuropsychology and applied cognitive neuroscience at the Institute of Psychology of the Chinese Academy of Sciences. He is also the honorary director for research at the Institute of Mental Health, Castle Peak Hospital (Hong Kong) and honorary director for the Translational Neuropsychology and Applied Cognitive Neuroscience Lab at the Shanghai Mental Health Centre, and honorary professor at the Department of Psychiatry, the University of Hong Kong. His research record has earned him the Distinguished Young Scientist Award from the National Science Foundation China, Young Investigator Award from NARSAD, and the Distinguished Griffith Visiting Researcher. He is also an elected Fellow of the Association for Psychological Science in 2017. He is the Regional Representative for Asia for the International Neuropsychological Society. He holds numerous funds from various funding agents, including the National Science Foundation of China, the Chinese Academy of Sciences, the Ministry of Science and Technology of China, NARSAD, and the Smart Futures Fund (QLD), National and International Research Alliances Program. Prof. Chan has published over 300 scientific peer-reviewed articles and 6 book chapters dealing with schizophrenia research and traumatic brain injury. He is currently serving at the editorial boards of "Schizophrenia Bulletin", "Neuropsychology", "Scientific Reports", "Psychiatry Research", "Clinical Rehabilitation", "Cognitive Neuropsychiatry", and "Neuropsychological Rehabilitation" and four local professional journals.



Dr. Emma Burrows

Dr Emma Burrows is a NHMRC-ARC Dementia Research Development Fellow and leads a research program at the Florey Institute of Neuroscience and Mental Health aiming to understand the neurobiology underlying cognitive disorders. After completing her PhD at Melbourne University 6 years ago, Dr Burrows travelled to The University of Cambridge, on a Victoria Fellowship to train with Professors Lisa Saksida and Tim Bussey, who originally developed rodent touchscreen testing. Dr Burrows has since established the touchscreen testing facility at the Florey and has subsequently evaluated several mouse models of cognitive dysfunction. Burrows and her team are developing novel tasks to assess executive dysfunction and attention in disorders/diseases such as Autism Spectrum Disorder, Attention Deficit Hyperactivity Disorder and Dementia. Dr Burrows has also recently developed a novel analysis method for detecting mouse ultrasonic vocalisations for studying impaired social communication. Her research applies novel technologies to assess behavioural changes in mouse models with a focus on translation to the clinic.

KEYNOTE SPEAKERS

Dr. Dhanisha Jhaveri

Dr Dhanisha Jhaveri has a joint appointment at Mater Research and the Queensland Brain Institute (QBI) and is a Mater Foundation Senior Research Fellow. She leads the research group investigating the fundamental mechanisms that drive the renewal of neurons in the adult brain with the goal of harnessing this form of neural plasticity to relieve the emotional and cognitive deficits associated with anxiety and depression.

Dhanisha received her PhD from the Tata Institute of Fundamental Research in India, where she unravelled the molecular mechanisms that wire the olfactory axons in the fly (Drosophila) brain. In recognition of her doctoral work she was awarded the Indian National Science Academy medal for Young Scientist of the Year in 2003. She then joined the laboratory of Professor Perry Bartlett at the Queensland Brain Institute as a Human Frontiers Science Program Postdoctoral Fellow. Her discoveries have transformed our understanding of the neural stem cell regulation in the adult brain. In particular, her work uncovered that a subclass of antidepressants directly activates neural stem cells in the hippocampus, a brain region implicated in regulating mood and cognitive functions. She also pioneered the development of a new cell sorting protocol to purify neural stem cells which has provided an unprecedented opportunity to unravel the regulatory mechanisms. More recently, her research demonstrated that new neurons are generated in the adult amygdala, a brain region implicated in emotion processing.

Dr. Christine Guo

Dr. Guo received a B.Sc in Biological Sciences from Peking University and a Ph.D. in Neuroscience from the Stanford University, School of Medicine, followed by postdoctoral training at the Memory and Aging Center (UCSF). She is now a Team Head at the Mental Health Program at QIMR Berghofer. She has broad research experience, from molecular biology and genetics to electrophysiology and systems neuroscience. Her work focuses on understanding selective vulnerability at the network level in health and in neurodegenerative diseases, using modern neuroimaging techniques. She is also developing novel methods and techniques to understand the body-brain interaction and its breakdown in neurological and psychiatric disorders.

PROGRAMME - WEDNESDAY

08.00 - 08.30 Registration & set-up of posters

08.30 - 09.00 Opening & Welcome to Country

Session 1 - Keynote Presentation (Chair: David Shum)

09.00 - 10.00 **Raymond Chan**: Hedonic processing impairments in clinical and subclinical samples: Convergent evidence from findings of self-reported, behavioural and imaging paradigms.

Morning Tea

Session 2 - Platform Presentations (Chair: Michelle Kelly)

10.30 - 10.45 **Katherine Bray**: The relationship between affective and cognitive empathy and grey matter density in the anterior insula in late childhood.

10.45 - 11.00 **Soukayna Bekkali**: Is the putative mirror neuron system associated with empathy? A meta-analysis.

11.00 - 11.15 **Valentina Lorenzetti**: Emotion regulation using virtual environments and real-time fMRI neurofeedback.

11.15 - 11.30 **Pascal Molenberghs**: The neuroscience of harming others.

11.30 - 11.45 **Skye McDonald**: Exploring the mechanisms of impaired empathy in people with TBI: An EmoStroop study.

Session 3 - Datablitz Presentations

11.45 - 11.50 **Trung Ngo**: Advancing a neurogenomics oscillator model of bistable affective-cognitive states, behaviour and disorders.

11.50 - 11.55 **Olivia Whalen**: The effectiveness of a joint attention eye tracking paradigm in measuring social cognition in the first year of life.

11.55 - 12.00 **Kimberley Wallis**: Developing a measure of social cognition in schizophrenia and acquired brain injury.

12.00 - 12.05 **Sally Richmond**: The impact of family environments on brain structural covariance networks in late childhood.

Lunch & Posters

Session 4 - Keynote Presentation (Chair: Alan Pegna)

13.30 - 14.30 **Emma Burrows:** Translational behaviour in preclinical mouse models of brain disease.

Afternoon Tea

PROGRAMME - WEDNESDAY

Session 5 - Platform Presentations (Chair: Juan Dominguez)

15.00 - 15.15 **Grace Wei:** Seeing eye to eye: The social dynamics of gaze following.

15.15 - 15.30 **Peter Enticott:** Can early visual processing explain variability in human mirror system activation?

15.30 - 15.45 **Rosalind Hutchings:** Considering hemispheric specialisation in face processing: Visual attention in left- and right-lateralised semantic dementia.

15.45 - 16.00 **Kristen Baker:** Examining neural processes of facial expression perception using fast periodic visual stimulation.

16.00 - 16.15 **Michelle Kelly:** To grow old and wise, you must first have to be young and ostracised.

Drinks in Ship Inn Beer Garden (at own cost)

Conference Dinner

19.00 - 22.00 At **Mado Turkish Restaurant** ($50 per person - see page 7 for more information)

Wednesday Posters

Poster #1 **Jason Turner:** The effect of acute alcohol intoxication on the ability to detect sarcasm and metacognitive judgements of sarcasm detection ability.

Poster #2 **Jenna Scambler:** The effects of temporal lobectomy on electrical brain potentials in response to emotional stimuli.

Poster #3 **Sayedhabibollah Ahmadi Forooshni:** The relationships between thought suppression, autobiographical memory specificity, social problem-solving, and psychosocial adjustment: A structural model in children of war-veterans with post-traumatic stress disorder

Poster #4 **Emiko Kashima:** Culture, impulsivity, and serotonin transporter gene polymorphisms (5-HTT).

Poster #5 **Trung Ngo:** Advancing a neurogenomics oscillator model of bistable affective-cognitive states, behaviour and disorders.

Poster #6 **Olivia Whalen:** The effectiveness of a joint attention eye tracking paradigm in measuring social cognition in the first year of life.

Poster #7 **Kimberley Wallis:** Developing a measure of social cognition in schizophrenia and acquired brain injury.

Poster #8 **Sally Richmond:** The impact of family environments on brain structural covariance networks in late childhood.

PROGRAMME - THURSDAY

08.30 - 09.00 Arrival & set-up of posters

Session 6 - Keynote Presentation (Chair: Maryam Ziaei)

09.00 - 10.00 **Dhanisha Jhaveri:** Neural mechanisms of anxiety and depression: What do animal models tell us?

Morning Tea

Session 7 - Platform Presentations (Chair: Lincoln Tracy)

10.30 - 10.45 **Cheng T. Liang:** Mapping behavioural and cortical trajectories in non-fluent primary progressive aphasias and Alzheimer's disease: A role for emotion processing.

10.45 - 11.00 **Elena Pozzi:** Association between maternal communication and the neural correlates of emotion processing in children: Implications for internalising symptoms.

11.00 - 11.15 **Travis Wearne:** It takes two to tango: Physiological responding during dyadic conversations.

11.15 - 11.30 **Stephanie Wong:** Impaired learning of social rewards in behavioural-variant frontotemporal dementia.

11.30 - 11.45 **Fiona Kumfor:** Facial mimicry and arousal in frontotemporal dementia: Phenotypic clinical profiles and neural correlates.

Session 8 - Datablitz Presentations

11.45 - 11.50 **Juan F. Dominguez D.:** Structural and functional correlates of theory of mind impairment post-stroke.

11.50 - 11.55 **Michelle Lamblin:** Neural homophily of adolescent friendship dyads**.**

11.55 - 12.00 **Chase Sherwell:** Physiological synchrony as an index of co-operative activity in the classroom.

Lunch & Posters

Session 9 - Keynote Presentation (Chair: Pascal Molenberghs)

13.30 - 14.30 **Christine Guo:** Probing the neural and physiological basis of emotion using dynamic naturalistic paradigms.

14.30 - 15.15 **AS4SAN Annual General Meeting**

Afternoon Tea

PROGRAMME - THURSDAY

Session 10 - Platform Presentations (Chair: Fiona Kumfor)

15.45 - 16.00 **Guy Prochilo:** The effects of a 16-week combination aerobic exercise and mindfulness-based intervention on indices of stress its psychological, cardiovascular, and neurobiological mechanisms: A pilot study.

16.00 - 16.15 **Chao Yan:** Positive and negative dimensions of schizotypy are associated with differential prefrontal and mesolimbic alterations during reward anticipation and consummation.

16.15 - 16.30 **Nicola Acevedo Horvath:** Interactive effects of music and prefrontal cortex stimulation in modulating response inhibition.

16.30 - 16.45 **Joanne Beames:** Neural correlates of practicing self-control: The domain of anger provocation.

16.45 - 17.00 **Milan Andrejević:** Integration of morally relevant context in a novel moral judgement updating task.

17.00 - 17.15 **Closing & Awards**

Thursday Posters

Poster #9 **Lulu Liu:** Neural substrates of time perspective: A resting-state functional connectivity study.

Poster #10 **Jennifer Lee:** Differential trajectories of non-progressive behavioural variant frontotemporal dementia: Diagnostic implications and insights into social cognition.

Poster #11 **Sarah Baracz:** Adolescent oxytocin treatment alters anxiety-like behaviour elicited by early life stress differently depending on sex.

Poster #12 **Matthew Westgarth:** A scoping review of the use of NIRS for measuring haemodynamic changes during emotion processing tasks.

Poster #13 **Juan F. Dominguez D.:** Structural and functional correlates of theory of mind impairment post-stroke.

Poster #14 **Michelle Lamblin:** Neural homophily of adolescent friendship dyads.

Poster #15 **Chase Sherwell:** Physiological synchrony as an index of co-operative activity in the classroom.

ABSTRACTS - WEDNESDAY

Session 1: Keynote Presentation

Hedonic processing impairments in clinical and subclinical samples: Convergent evidence from findings of self-reported, behavioural and imaging paradigms.

Raymond Chan
Neuropsychology and Applied Cognitive Neuroscience Laboratory, CAS Key Laboratory of Mental Health, Institute of Psychology, Chinese Academy of Sciences, Beijing, China

Schizophrenia is associated with a wide range of cognitive and emotional impairments including the reduced ability to experience pleasure and happiness, namely anhedonia. Anhedonia is one of the key negative symptoms affecting the ultimate functional outcome and has an adverse impact on quality of life for patients with schizophrenia. Yet, very little is known about whether at-risk individuals for psychosis will also show similar deficits in experiencing pleasure and happiness. The current presentation will seek to examine the ability of experiencing pleasure in individuals at-risk for psychosis by using a 2-facet framework of anhedonia, namely the anticipatory and consummatory pleasure. I shall provide evidence that these at-risk individuals have already demonstrated subtle behavioural manifestations and structural brain and functional connectivity abnormalities. These findings are consistent with the impairment of the "social brain" system observed in patients with established schizophrenia and highlight the need for early identification and corresponding intervention for assisting these individuals to cope with their daily functioning.

Correspondence: rckchan@psych.ac.cn

Session 2: Platform Presentations

The relationship between affective and cognitive empathy and grey matter density in the anterior insula in late childhood.

Katherine Bray[1], Christos Pantelis[2], Vicki Anderson[3], Sarah Whittle[4]
[1]University of Melbourne
[2]Melbourne Neuropsychiatry Centre, Department of Psychiatry, The University of Melbourne and Melbourne Health, Melbourne, Australia
[3]Melbourne School of Psychological Sciences, University of Melbourne, Melbourne, Australia
[4]Murdoch Children's Research Institute, Melbourne, Australia

Empathy refers to the understanding and sharing of others' emotions, and comprises cognitive and affective components. While several studies have examined associations between empathy and brain function in adults, fewer studies have investigated brain structural associations with cognitive and affective empathy components, and none have been performed in children. Empathy (particularly cognitive empathy) continues to develop during childhood and adolescence. Investigating relationships between empathy and brain structure during development is important to understand the full picture of the neural correlates of empathy across the lifespan. In a sample of 124 community-dwelling 9-10 year olds, we measured empathy traits using self-report questionnaires and conducted VBM analysis using T1-weighted structural MRI scans. ROI-based analyses were conducted using the insula and MCC/dmPFC based on previous work. We found that affective sharing and empathic concern (both affective empathy components) were positively related to grey matter density in the right insula. Cognitive empathy scores were not related to brain morphology in the insula or MCC/dmPFC. This study is the first to our knowledge to investigate brain morphology and empathy in children. It provides evidence that the structural correlates of affective empathy may be similar to that of adults. The lack of association between cognitive empathy and brain morphology may represent a developmental effect relating to underdeveloped cognitive empathy centres in the brain, or alternatively how children report their own empathy.

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Is the putative mirror neuron system associated with empathy? A meta-analysis.

Soukayna Bekkali, George J. Youssef, Peter H. Donaldson, Natalia Albein-Urios, Peter G. Enticott
Cognitive Neuroscience Unit, Deakin University

Theoretical perspectives suggest that the mirror neuron system (MNS) is an important neurobiological contributor to empathy, but empirical support is mixed. Here, we adopt a summary model for empathy, consisting of motor, emotional, and cognitive empathy. This systematic review and meta-analysis provides an overview of existing empirical studies investigating the relationship between putative MNS activity and empathy in healthy populations. 52 studies were identified that investigated the association between the MNS and at least one domain of empathy, representing data from 1044 participants. Our results revealed emotional and cognitive empathy to be moderately correlated with MNS activity, while motor empathy showed no relationship. Results varied across techniques used to acquire MNS activity (TMS, EEG, and fMRI). Overall, results provide some evidence for a relationship between the MNS and empathy. Our findings also highlight methodological variability in study design as an important factor in understanding the relationship between MNS and empathy. We discuss limitations regarding these methodological variations within the literature and important implications for clinical and community translations, as well as suggestions for future research. Public Significance: Since their discovery in macaque monkeys in the early 1990s, the role of "mirror neurons" in empathy has been highly contentious. This meta-analysis combined all studies examining measures of mirror neurons and empathy in humans, and provides preliminary evidence for a positive association between the mirror neuron system and some forms of empathy. Researchers must now examine the precise nature of this relationship, and whether it might contribute to our understanding of social processing disorders.

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Emotion regulation using virtual environments and real-time fMRI neurofeedback.

Valentina Lorenzetti[1,4,5], Bruno R. Melo[2,3], Rodrigo Basilio[3], Chao Suo[4], Murat Yucel[4], Carlos J. Tierra-Criollo[2], Jorge Moll[3]
[1]School of Psychology, Australian Catholic University
[2]Cognitive and Behavioral Neuroscience Unit, Instituto D'Or de Pesquisa e Ensino (IDOR), Brazil
[3]Biomedical Engineering Program, COPPE, Universidade Federal do Rio de Janeiro, Brazil
[4]School of Psychological Sciences & Monash Institute of Cognitive and Clinical Neurosciences, Monash University, Australia
[5]Psychological Sciences, University of Liverpool, United Kingdom

Neurofeedback (NFB) enables voluntary regulation of brain activity, with promising applications to enhance and recover emotion and cognitive processes, and the underlying neurobiology. It remains unclear whether NFB can be used to aid and sustain complex emotions, with ecological validity implications. We provide a technical proof of concept of a novel real-time fMRI NFB procedure to measure/enhance neural patterns associated with complex emotions. The NFB interface (FRIEND Engine) was adapted to present VR scenes and musical excerpts to induce the emotions of tenderness and anguish, aided by personalized strategies. Eight participants from two sites performed NFB on two consecutive days in a counterbalanced design. NFB was delivered using a region of interest (ROI) method on day one, and a support vector machine (SVM) classifier on day two. Participants were asked to change the color of the VR scenes using their subjective emotions (tenderness or anguish, cued during each block by musical excerpts). During the Tenderness NFB condition, participants recruited the septo-hypothalamic area, frontal / temporal pole regions and the precuneus. During the Anguish NFB condition, participants recruited the amygdala, dorsolateral prefrontal and additional cortical regions. These findings were observed at the individual subject level, were reflected in self-reported emotions, with both ROI and SVM NFB methods and across both assessment sites. Our multimodal VR/NFB approach appeared technically feasible and holds promise as an engaging tool for brain-based interventions to enhance adaptive emotional states in normative samples and restore normal states in psychopathologies associated with anxiety and stress or reduced empathy.

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The neuroscience of harming others.

Pascal Molenberghs[1], Jean Decety[2], Winnifred Louis[3], Juan F. Dominguez D.[4]
[1]School of Psychological Sciences, The University of Melbourne
[2]Department of Psychiatry and Behavioral Neuroscience, The University of Chicago
[3]School of Psychology, University of Queensland
[4]School of Psychology, Australian Catholic University

How we interact with others is context dependent. Usually we act friendly towards others, but in extreme situations (e.g., war) we sometimes have to harm others to save our own life. To provide insight into how our brain adjusts to these different types of situations, three fMRI experiments were conducted. The first fMRI experiment showed that in groups that have no strong animosity towards each other, ingroup bias is more about ingroup love than outgroup hate. That is, brain regions involved in rewarding others (medial orbitofrontal cortex and striatum) were more active when rewarding ingroup members. However, brain regions involved in punishing others, such as the lateral orbitofrontal cortex (lOFC), were equally active when harming ingroup and outgroup members. The second fMRI experiment showed that in warlike situations the group membership of the victim (i.e., innocent civilian vs. soldier) is very important. Harming innocent civilians led to the usual increase in lOFC activation but when the participant felt the violence was justified (i.e., killing an opposing soldier) no increase was observed in this region. In the third fMRI experiment, participants had to decide to shoot a person or not, depending on whether they believed the person was holding a gun or not. Similar as fMRI experiment 2, killing an innocent person (i.e., a person who was not holding a gun) led to an increase in lOFC activation. Combined, the results provide insight into how context modulates the neural responses involved in harming others.

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Exploring the mechanisms of impaired empathy in people with TBI: An EmoStroop study.

Skye McDonald, Katie Osborne Crowley, Emily Wilson, Jacqueline Rushby
University of New South Wales

Background: Emotional empathy allows the observer to share, or 'resonate' with, the emotional state of others. People with traumatic brain injury (TBI) often have a reduced ability to resonate with the emotions of others but there has been little research into the mechanisms for this. The perception-action model (PAM) of empathy proposes a mechanism whereby, when an observer pays attention to another's emotional state, all relevant conceptual representations relating to the observed emotional experience are rapidly and automatically activated providing access to the meaning in the stimuli. This study aimed to determine whether people with TBI are also rapidly accessing parallel emotional information, making them susceptible to incongruity in an Emotional Stroop task. Method: Twenty six people with TBI and 30 matched control participants were presented with 105 trials in which they were asked to categorise an emotional word, superimposed on a congruent facial expression, an incongruent facial expression or a neutral face. Measures of empathy and emotion recognition were also taken. Results: People with TBI were slower than controls overall. They did, however, demonstrate a similar magnitude Stroop effect on incongruent trials. Stroop performance was not related to emotion perception accuracy of self-reported empathy. Conclusion. This study found that rapid conceptual processing of emotional faces was preserved in people with TBI, despite substantially slowed processing speed. There was no evidence that this conceptual processing of emotional faces plays a role in the ability to recognise or to resonate with the emotions of others after a TBI or in healthy controls.

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Advancing a neurogenomics oscillator model of bistable affective-cognitive states, behaviour and disorders.

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Binocular rivalry is a visual phenomenon in which simultaneous presentation of different stimuli — one to each eye — results in perceptual oscillations or rivalry between the two images. The rate of bistable switching — i.e., binocular rivalry rate (BRR) — has been proposed as a potential endophenotype for the heritable psychiatric condition, bipolar I disorder (BD), because the trait is slower in BD than controls and is heritable (0.52). In a large sample of 14-year old healthy twins with BRR data (N=1091), a genome-wide association (GWA) analysis revealed no associations at genome-wide significance level (P<5e-8). However, functional annotations and post-GWA analyses with FUMAgwas (an online platform using GTex data) revealed a suggestive association between BRR (Hz) and higher expression of CHN1 — an α-chimaerin gene in brain tissue — albeit at a less stringent significance threshold (P<5e-5). In mammals this gene is associated with abnormal motor coordination, a phenotype which was also found alongside insulin regulation and energy metabolism in recent GWA pathway analyses of BD (bioRxiv 173062). Together these results advance a neurogenomics oscillator model of bistable switching behaviour, which incorporates the functional and evolutionary significance of complementary, alternating affective-cognitive states and conserved biological pathways in amphibians through to mammals (e.g., locomotor CPG circuits, insulin growth factor). The twins data, this new model and further research directions will also be presented, i.e., GWA meta-analyses to increase power for elucidating BRR-associated variants and their genetic relationship with cognitive/educational measures (e.g., IQ), BD and related disorders (e.g., depression, schizophrenia, autism).

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The effectiveness of a joint attention eye tracking paradigm in measuring social cognition in the first year of life.

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Tracking an infant's eyes as they view other people engaging in meaningful activities provides insight into the emergence of social understanding in infancy. The ability to follow another's gaze develops from 4 months of age and is mediated by social context. We assessed gaze following in a brief eye tracking task in a cross-sectional sample of 6 month old (n=10) and 12 month old (n=10) infants. Participants viewed a video of a woman who made eye contact and said "Hi baby, look at this!" in infant-directed speech. The woman then turned her head and gaze toward an animated visual stimulus. To add noise, there was an identical distractor stimulus occurring simultaneously in the opposite corner of the screen. We recorded fixation timing and duration (which refers to the short time window that the eyes remain still when looking at a stimulus), as well as dwell time (sum of the duration of all fixations) for our face, cue and distractor areas of interest. Early analyses showed that 6mth olds and 12mth olds used the social cue effectively and performed similarly on the task. There were no differences between the two ages in dwell time spent on the face, cue or distractor stimuli. However, there were significant differences between the two age groups on the number of fixations on the face ($t(18)=2.229$, $p=.039$), with 12mth olds having fewer fixations. Thus, this paradigm is a promising way of measuring individual differences in social cognition in early infancy.

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Developing a measure of social cognition in schizophrenia and acquired brain injury.

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Introduction: Social functioning impairments are defining features of Schizophrenia and acquired brain injury (ABI), despite this, there are no well validated clinical screening tools of social functioning. The Brief Assessment of Social Skills (BASS) was developed to screen for social functioning impairments in people with dementia and has been found to reliably identify subtle impairments in this population, the current study aims to validate the BASS in two populations, people diagnosed with Schizophrenia or ABI. Method: Given the subtle differences seen in the social cognition profile in ABI and Schizophrenia adjustments to the BASS have been made, including updating the Famous Faces subscale and the addition of a Social Attribution Bias subscale. The intended sample is 120 healthy participants, 30 people with a diagnosis of Schizophrenia and 30 people with an ABI. To date we have assessed 15 healthy control participants. Participants complete a battery of tests including the BASS, the CANTAB as well as other social cognition and social functioning measures to allow for examination of validity and reliability. Results: Preliminary results will be presented however we anticipate that performance on the BASS will be associated with, but not better accounted for, by measures of general cognition, and that participants in the clinical groups will perform significantly worse than healthy controls. Moderate positive correlations are expected between the BASS and established measures of social behaviour. Conclusion: Evidence for the validity of the BASS in these clinical populations will hopefully lead to the inclusion of the BASS in routine clinical assessment, enabling identification of social cognition treatment targets.

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The impact of family environments on brain structural covariance networks in late childhood.

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Background: There is growing evidence for a negative impact of adverse experiences on brain structure. However, relatively little attention has been given to the impact of positive and negative parenting behaviors. The influence of parenting behaviors are likely to be pronounced during periods of rapid brain reorganization, such as late childhood. The aim of the current study was to investigate the association between parenting and the properties of structural brain networks in late childhood. Methods: Observation data were collected from a cross-sectional sample of 160 mother-child dyads (91 female children, M age 8.2 years, SD 0.3 years) recruited from across Melbourne, Australia. Parenting behaviors were coded from two lab-based interaction tasks. T1 weighted images were acquired from children and processed using FreeSurfer to extract cortical thicknesses (CT). Structural covariance (SC) networks based on partial correlation between CT estimates were constructed, and estimates of local and global network efficiency were obtained. Results: Analyses showed significant associations between observed parenting variables and local efficiency of network nodes. Negative and positive parenting behaviors were associated with decreased and increased local efficiency, respectively. Frontal, temporal and parietal regions involved in emotion regulation and social cognition were particularly implicated. Minimal support was found for an association between parenting behaviors and global network efficiency. Conclusion: These results suggest that parenting may affect structural brain networks in late childhood, and extend current knowledge about environmental influences on structural connectivity in a developmental context.

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Session 4: Keynote Presentation

Translational behaviour in preclinical mouse models of brain disease.

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Despite highly promising preclinical data, the majority of compounds developed to treat brain diseases fail to progress to end stage clinical trials. The reasons behind this failure are multifaceted. The absence of overt biomarkers to monitor response to treatments in real-time and to characterise the translatability of preclinical animal models is a large obstacle. Brain disorders are diagnosed by behavioural criteria and correlates in animal models are approximate and do not reflect methods used in clinical populations. Emma will discuss recent advances in the use of technology for assessing behavioural changes in mouse models with a focus on direct translation to clinical studies. Emma's research spans both psychiatric and neurological disorders including Autism Spectrum Disorder, Schizophrenia and Alzheimer's disease.

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Session 5: Platform Presentations

Seeing eye to eye: The social dynamics of gaze following.

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In autism, a lack of gaze following has been related to characteristic difficulties in social interactions. Behavioural studies of gaze processing in autism, however, have found intact gaze cueing effects. These experiments designed to test these abilities fail to consider the different lenses through which we may see the world. A dedicated social neural network has been linked to the reflexive following of eye gaze, and is thought to be responsible for prioritising attention towards socially salient information. Alternatively, the ability to detect the direction and location of eye gaze could involve simply attending to its concomitant perceptual features. Here, we examined the neurophysiological correlates of visuospatial attention using principal components analysis (PCA) to clarify the event related potential (ERP) components elicited by a spatial cueing task. We found enhanced frontal activation to incongruent cues, wherein modulation of the N2b serves as a marker of the allocation of attention in the spatial domain. Importantly, divergent patterns of visuospatial attention emerge when considering the relative salience of social (gaze) and non-social (motion) cues. Preferentially biased attention to perceptual changes in individuals with greater impairments in social cognitive functioning reflect underlying differences in sensitivity to social stimuli. These findings inform the understanding of the neurophysiological mechanisms of gaze processing and shed light on the links between perceptual processes and social cognition.

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Can early visual processing explain variability in human mirror system activation?

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Introduction: Observation of others' motor behaviour produces activation of motor-related cortical regions. Often referred to as the "mirror system," and thought to involve mirror neurons, this activation is underpinned by well-described neural circuitry involving visual, temporal, parietal, and frontal cortices. Mirror system activation, however, varies considerably across individuals, and there is some evidence to suggest that there are deficits in individuals with autism spectrum disorder (ASD). As ASD also involves deficits in visual processing, it is possible that the observed differences and variability is attributable to inputs from early visual regions within the mirror system network. Methods: We have conducted a series of studies, in both typically developing individuals and people with ASD, that combine eye-tracking, transcranial magnetic stimulation (TMS), electromyography (EMG), and

electroencephalography (EEG) during the observation of motor behaviour. Results: Our initial findings suggested a link between gaze (i.e., fixation counts in biological and non-biological interest areas) and mirror system activation, suggesting that early visual processes might significantly modulate the mirror response. Subsequent studies in ASD, however, yield a more complex picture, with inconsistent mirror system activation in ASD, a lack of group differences in eye-tracking data, and weak links between gaze and mirror system measures. Discussion: Eye-tracking variable associated with early visual processing appears to explain limited variance in the activation of the human mirror system. Differences in visual processing styles, however, do not appear to explain apparent mirror system deficits in ASD. These data highlight the importance of better understanding the various nodes of mirror system circuitry, and how they interact to provide interpersonal motor resonance.

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Considering hemispheric specialisation in face processing: Visual attention in left- and right-lateralised semantic dementia.

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Face processing relies on a network of occipito-temporal and frontal brain regions. Temporal regions are heavily involved in attention to emotional faces but the contribution of each hemisphere to this process remains under debate. Semantic dementia (SD) is a neurodegenerative brain condition characterised by anterior temporal lobe atrophy, which is either predominantly left- (left-SD) or right-lateralised (right-SD). This syndrome therefore provides a unique lesion model to understand the role of laterality in face processing. Here, we investigated facial scanning patterns as a measure of visual attention in 10 left-SD and 6 right-SD patients, compared to 22 healthy controls. Eye tracking was recorded via a remote EyeLink 1000 system, while participants passively viewed fearful, happy and neutral faces over 72 trials. Analyses revealed that right-SD patients had more fixations to the eyes than controls in the Fear ($p = .04$) condition only. Right-SD patients also showed more fixations to the eyes than left-SD patients in all conditions (Fear ($p = .01$), Happy ($p = .008$), Neutral ($p = .04$)). In contrast, no difference between controls and left-SD patients was observed for any emotion. No group differences were observed for fixations to the mouth, or whole face. This study is the first to investigate visual attention to faces in SD, demonstrating greater visual attention to the eyes in right-SD. From a theoretical perspective, these findings suggest the right temporal lobe is important in directing visual attention to emotionally-salient regions of the face. Future neuroimaging analyses are planned to confirm this hypothesis.

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Examining neural processes of facial expression perception using fast periodic visual stimulation.

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Recognition of facial expressions is vital for guiding social communication and emotion regulation. Although much research has investigated the neural basis of emotion recognition, fundamental issues remain unresolved. For instance, are emotions categorical or dimensional in terms of their underlying structure. The categorical theory proposes emotions are processed in circumscribed neural regions and reflect evolutionary adaptations to distinct survival pressures. In contrast, the dimensional theory proposes emotions are processed dependent on their location on two dimensions: valence and arousal. This implies the same brain regions are responsible for the processing of all emotions. Thus, these two different theories imply fundamentally different patterns of brain activation. To investigate this we used a recently introduced paradigm, Fast Periodic Visual Stimulation, whilst EEG was recorded. Participants viewed series of faces whereby new images appeared on the screen every 166.67ms. The image series were structured such that rotational angle of the face changed every image, identity every fifth image and emotion every second image. Thus, emotion changes occurred at a frequency of 3 Hertz. In four different experimental blocks there were different emotion transitions; angry-neutral, disgust-neutral, fear-neutral, happy-neutral. We compared power spectral density at 3 Hz across all pairs of conditions. Analysis of spatial statistical maps

provided support for a partial combination of the theories with respect to different emotions. Response topographies to anger and fearful expressions suggested distinct patterns of neural activation. In addition, an area for unpleasurable valence processing was identified in the parieto-occipital region. This evidence suggests that certain emotions may be viewed as distinct categories, however a dimensional appraisal may occur in parallel for emotions of unpleasurable valence.

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To grow old and wise, you must first have to be young and ostracised.

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Introduction: Ostracism, or being socially excluded, is thought to have a differential effect dependent on the age of the target. This study investigated the effects of ostracism on participants' self-reported distress and physiological arousal measured by skin conductance. Method: Twenty early adulthood (aged 18 – 24; M = 19.5, SD = 1.05), 17 middle adulthood (aged 40 – 60; M = 54.6, SD = 5.2), and 15 late adulthood (aged 75 and older; M = 79.8, SD = 3.1) participants played Cyberball, a virtual ball tossing game. All participants completed both the inclusion and exclusion conditions (counterbalanced). Skin conductance was measured continuously throughout each condition, and response quantified as the difference between mean baseline and each 10 second-epoch throughout the task. After each game participants completed a number of questionnaires. Results: Ostracism negatively affected participants' basic needs satisfaction (belonging, self-esteem, meaningful existence and control), and, the size of the effect was larger in the younger group compared to the two older groups [$F(2, 49) = 6.24$, $p = .004$)]. The anticipated difference in physiological response to ostracism across age groups was not observed ($p > .05$). Conclusions: Those in early adulthood may experience increased sensitivity to ostracism relative to their older counterparts when measured with self-report instruments. Further investigation is needed to identify any protective mechanisms in play for older adults, and also to determine why objective, physiological measures, do not support this effect.

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Wednesday 'Poster Only' Abstracts

The effect of acute alcohol intoxication on the ability to detect sarcasm and metacognitive judgements of sarcasm detection ability.

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Objective: Alcohol occupies a significant place in Australian culture. Acute excessive alcohol use in particular has been linked to negative social behaviours. At the extreme, this may include increased aggression, one-punch assaults, and partner-related violence. However, the mechanisms underpinning this link remain poorly understood. This study aimed to establish whether alcohol intoxication impairs the ability to detect and differentiate sarcasm, a type of theory of mind ability, from more sincere remarks or direct lies. An additional aim of the study was to examine if metacognitive judgements (insight) of sarcasm detection ability is impaired following alcohol intoxication. Participants and Methods: Following quasi-random allocation counterbalancing for gender, 47 participants were administered either an alcohol (Mage = 23.31, SD = 4.33) or placebo (Mage = 22.71, SD = 3.23) beverage. Sarcasm detection ability was assessed using The Awareness of Social Inference Test – Short Version (TASIT-S). Metacognitive performance was measured by obtaining confidence ratings for each TASIT-S detection item. Results: No overall impairment in sarcasm detection ability was found for alcohol-intoxicated individuals. Alcohol intoxicated individuals were however poorer at comprehending how an individual was feeling (but not doing, saying, or thinking) when the individual was being sincere and telling direct lies. That is, they were more likely to indicate that these individuals were being sarcastic when they were not. Intoxicated individuals also demonstrated some evidence of impaired insight into, and displayed some over-confidence in, their ability to detect and differentiate sarcasm from sincere remarks and lies. Conclusions: These findings provide new insight into the possible role of acute alcohol intoxication on the ability to detect affective aspects of literal and direct social communication in negative social behaviours.

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The effects of temporal lobectomy on electrical brain potentials in response to emotional stimuli.

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Brain imaging and lesion studies have shown that the amygdala is necessary for processing of emotional facial expressions. However, the time course of activation of this structure remains unclear. In an attempt to identify the timing of amygdala activation, EEG studies have investigated the ERP response to emotional faces, recently pointing to an early modulatory role, occurring within 200ms of stimulus presentation (i.e., during the N170 or even possibly the P100). Nevertheless, due to the difficulties of EEG in identifying deep electrical sources, it is impossible to ascertain whether such modulations are in fact linked to the activity of the amygdala at all. In an attempt to answer these questions, an EEG/ERP was performed in patients having undergone removal of the amygdala and anterior temporal lobe for surgical alleviation of epileptic seizures, while emotionally expressive faces and bodies, as well as stimuli eliciting empathy were presented. The ERP responses for emotional stimuli were compared to those for neutral ones, in order to determine the time course of brain activation for emotionally-laden stimuli. More importantly, these effects were compared for patients with and without unilateral amygdala ablation so as to determine if these modulations depended on amygdala integrity. Preliminary results suggest that emotional content affects the ERP component at the N170 level, but that this modulation disappears in patients following unilateral amygdala resection. These findings suggest that the amygdala is responsible for early modulation of brain activity for emotional stimuli.

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The relationships between thought suppression, autobiographical memory specificity, social problem-solving, and psychosocial adjustment: A structural model in children of war-veterans with post-traumatic stress disorder.

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This study aimed to investigate a structural model of relationships between thought suppression, autobiographical memory specificity, social problem solving, and psychosocial adjustment in children of war-veterans with Post-Traumatic Stress Disorder. The participants of the study included 96 young individuals (aged 15-29) whose fathers were war-veterans with PTSD diagnosis. White Bear Suppression Inventory (WBSI), Autobiographical Memory Test (AMT), Social Problem Solving- Revised- Short Form (SPSI-R: S), and Bell Adjustment Inventory (BAI) were used for assessments. The data were analyzed by SPSS-25 and AMOS-25 using path analysis method. The fitness of the model was confirmed through various fitness indexes (e.g. $x2 = 3.11$, $p = .37$; NFI = 0.95; TLI = 0.99; CFI = 0.99; RMSEA = 0.02). Based on the model, autobiographical memory specificity and social problem solving can be considered as mediating factors in the relationship between thought suppression and psychosocial adjustment amongst the children of war-veterans with PTSD. Based on the procedure, higher tendencies to suppress negative thoughts and memories lead to less specific autobiographical memory which can result in poor social problem-solving and finally poor psychosocial adjustment. The results suggest that the cognitive processes, recognized for traumatized people, can also be the case for their children. In addition, the process presented in the model of this study can be considered in psychological interventions for psychosocial adjustment of traumatized people and their family.

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Culture, impulsivity, and serotonin transporter gene polymorphisms (5-HTT).

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The influence of genes, culture and environment on impulsivity remain unclear. Previous evidence implicates polymorphisms of the 5-HTT gene-linked promotor region (5-HTTLPR) with motor impulsivity and how individuals respond to aversive stimuli. Nomura et al. (2013) show that in Japan, SS-allele carriers are lower in impulsivity, measured by the number of commission errors made during a Go/Nogo task, than SL-allele carriers, likely due to differences in sensitivity to punishment between these groups. The cultural norm of tightness (punishment for norm violation) is higher in Japan than in Australia, and may explain some of the observed differences in impulsivity between SS- and SL-allele carriers. Here, we replicated Nomura et al.'s study in Australia with Australia-born individuals of East Asian descent, to understand how culture moderates the relationship between 5-HTTLPR polymorphisms and impulsivity. Our results show that SS-allele carriers (n = 53) exhibit lower impulsivity than SL-/LL-allele carriers (n = 43). Furthermore, these differences were due to increased impulsivity of SL-/LL-allele carriers when punishment was imposed for incorrect responses; whereas the SS-allele carriers regulated their responses consistently across both reward and punishment conditions. Interestingly, we found that there was a difference in the pattern of commission error rate between Australian participants in our study and Japanese participants in Nomura et al.'s study, suggesting there are cultural differences in impulsivity. Together with previous evidence these findings suggest the role of 5-HTTLPR in motor inhibitory control may be moderated by cultural contexts.

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Session 6: Keynote Presentation

Neural mechanisms of anxiety and depression: What do animal models tell us?

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Disruption in neuronal function in key brain regions is believed to underpin major neuropsychiatric disorders including anxiety and depression. However, our mechanistic understanding is limited, and finding effective treatments remains a major challenge. Although, it is difficult to fully recapitulate the human condition in preclinical models, animal models are both useful and necessary to investigate causality and to provide insights into the neural circuitry regulating anxiety and depression-associated behavioural deficits. In this talk, I will review the anatomical and functional connectivity of the hippocampus and amygdala in the regulation of emotion and cognition. In particular, I will discuss the role of adult neurogenesis - the production and integration of new neurons, which has emerged as a vital player in the regulation of these fundamental brain functions. I will present our findings that demonstrate the regulation and function of distinct populations of neural stem/precursor cells in the hippocampus and highlight our recent discovery that has found newly generated neurons in the basolateral amygdala of adult mice. These findings together with our current efforts in utilising a mouse model of depression/anxiety now provide the framework for not only understanding the function of these adult-born neurons but also for manipulating their activity to regulate circuitry and behaviour.

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Session 7: Platform Presentations

Mapping behavioural and cortical trajectories in non-fluent primary progressive aphasias and Alzheimer's disease: A role for emotion processing.

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Nonfluent variant and logopenic variant of primary progressive aphasia are characterised by expressive language deficits. Given these overlapping language features and the significant heterogeneous disease course, differential diagnosis and prognosis remains challenging. Recent studies have indicated divergent emotion processing performance at presentation between these two syndromes, however, whether this difference in emotion processing is maintained over time is unclear. Here, we aimed to characterise non-fluent aphasia syndromes by investigating brain-behaviour relationships in emotion processing and cognitive performance over time. Fifteen nonfluent-variant and 14 logopenic-variant progressive aphasia patients were compared with 15 Alzheimer's disease patients and 14 healthy controls. Patients completed an annual assessment of general cognition, emotion processing battery and underwent structural MRI for up to 5 years. Linear mixed effects models were fitted to examine brain-behaviour associations. Longitudinal analyses revealed a significant decline in general cognition in logopenic patients compared to other patient groups. Importantly, comparable rates of decline in emotion processing were identified in both aphasia groups. This decline in emotion processing was associated with frontal and bilateral thinning in nonfluent patients and right superior temporal thinning in logopenic patients, reflecting the unique contribution of divergent cortical atrophy profiles in these syndromes. Our results reveal that despite

showing similar language deficits at presentation, aphasia patients manifest divergent clinical courses, with rapid cognitive decline in the logopenic variant and emotion processing impairment in both nonfluent and logopenic patients. These analyses demonstrate that concurrent assessment of social and emotion processing capacity can inform diagnosis and monitoring of these aphasia syndromes.

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Association between maternal communication and the neural correlates of emotion processing in children: Implications for internalising symptoms.

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Background: The importance of parenting in influencing mental health outcomes, particularly depression, during childhood and adolescence is well known. However, the mechanisms are unclear. Emotion processing impairments are thought to be both influenced by negative parenting behaviours, and fundamental to depression. As such, investigating the effect of parenting behaviour on the neural underpinnings of emotion processing in children may provide fundamental clues as to the link between parenting and depression. Methods: Ninety-four children (49 females, mean age=9.9 years) who were part of a larger longitudinal study (the Families and Childhood Transition Study) participated. Observational measures of parenting behaviour were collected during mother-child interactions. Functional magnetic resonance imaging was performed during an implicit emotion-processing task and measures of internalising symptoms were collected. Results: Maternal negative behaviour was associated with decreased activation, while maternal positive behaviour with increased activation, in the lingual gyrus, during implicit processing of negative emotional stimuli (i.e., angry and fearful faces). Greater maternal communicative behaviour (e.g., listening, clarity of thought and providing explanations) was associated with increased activity in the middle orbitofrontal cortex in the whole sample, and in the temporal pole, somatosensory cortex and amygdala in females. Activation in the amygdala was related to lower parent-reported depression/anxiety symptoms. Further, positive maternal behavior was associated with amygdala connectivity with the middle temporal gyrus. Conclusions: Maternal behaviour may influence the development of brain regions involved in the identification of, and attribution of meaning and intention to, affective stimuli, which may in turn influence risk for depression.

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It takes two to tango: Physiological responding during dyadic conversations.

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Aims: The aim of this study was to investigate physiological regulation during naturalistic conversations and to determine whether emotional empathy moderates physiological responding during these dyadic interactions. Method: Pairs of participants were asked to have an unrestricted thirty-minute conversation. Video recordings were then coded for eight behavioural variables, including floor holding, listening, unfloored overlapping speech, unfloored silences, own smiling, other's smiling, own laughter, and other's laughter. Skin conductance and heart rate associated with 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 dyadic interactions. This study was the first to utilise multiple autonomic measures in a micro-analytic and an individual difference approach to conversations. 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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Impaired learning of social rewards in behavioural-variant frontotemporal dementia.

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The ability to learn from social feedback is critical for adaptive behaviour in social settings. Evidence from clinical populations suggests that social dysfunction may stem from deficits in processing social rewards. Individuals with behavioural-variant frontotemporal dementia (bvFTD) show impairments in social cognition and alterations in reward processing. However, it is unclear whether the ability to adapt their behaviour in response to social stimuli is impaired, and whether these impairments are specific to social rewards. The current study contrasted reward learning for monetary versus social rewards. Here, bvFTD patients (n=7) and age-matched healthy control participants (n=7) performed two computerised probabilistic reward learning tasks – one involving social feedback (pictures of smiling or angry faces) and the other involving monetary feedback (winning or losing money). While overall learning accuracy was lower in the bvFTD patients compared to controls, performance in the social condition was disproportionately impaired in bvFTD (p=.042). In contrast, controls showed preserved learning, which was similar across both social and monetary feedback (p=.117). Our findings demonstrate a greater deficit in reward learning for social relative to monetary rewards in bvFTD. Disproportionate impairments in social reward processing may contribute to the social dysfunction observed in bvFTD. Future group studies are planned to replicate these findings and to explore associations between physiological and neural markers of social reward processing in bvFTD.

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Facial mimicry and arousal in frontotemporal dementia: Phenotypic clinical profiles and neural correlates.

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Early theories of emotion processing propose an interplay between autonomic function and cognitive appraisal of emotions. Patients with frontotemporal dementia show profound social cognition deficits and atrophy in regions implicated in autonomic emotional responses (insula, amygdala, prefrontal cortex), yet how this relates to emotional contagion and arousal has been relatively unexplored. Here, we investigated psychophysiological responses (surface facial electromyography (EMG); skin conductance level (SCL)) to emotional stimuli in 23 behavioural-variant frontotemporal dementia (bvFTD) patients, 14 semantic dementia (SD) patients and 22 healthy older controls, while viewing emotionally positive, neutral or negative video clips. Voxel-based morphometry was conducted to identify neural correlates of responses. 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 greater arousal (SCL) when viewing positive and negative videos, however, both bvFTD and SD groups showed no change in SCL across conditions. Regardless of group membership, right insula damage was associated with dampened zygomaticus responses to positive film stimuli. Reduced arousal (SCL) was associated with integrity of the caudate, amygdala and temporal pole. Our results demonstrate that while bvFTD patients show an overall dampening of responses, SD patients appear to show heightened physiological responses. Abnormal responding is related to cortical and subcortical brain atrophy. 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.

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Structural and functional correlates of theory of mind impairment post-stroke.

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The ability to understand the mental states of others – also known as Theory of Mind (ToM) – is critical for normal social interactions. We combine behavioural probes with structural and functional brain imaging to provide the first comprehensive analysis of ToM deficits following stroke. First, fMRI was used to identify the functional brain network involved in a non-clinical cohort. Results indicated that, relative to a control task, the RMET increased activity in a widespread functional network. Activity within this same network was substantially reduced in stroke patients who scored below the normal range on the RMET. We then identified the critical lesion site associated with impaired scores on the RMET using voxel-based lesion-symptom mapping on structural MR images from 60 stroke patients. Low scores on the RMET were associated with damage to large swathes of white and grey matter in the right hemisphere. Finally, we employed diffusion-weighted imaging to compare white matter integrity for two patients with abnormal scores on the RMET and two patients with relatively preserved scores. We found significant white matter anomalies around the site of the lesion in the impaired patient group. Together, these findings suggest that making judgements about the mental states of others imposes demands on a large functional network which can easily be disrupted, both by damage to the brain regions involved in the network directly, or the white-matter pathways that connect them.

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Neural homophily of adolescent friendship dyads.

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Studies of social networks have shown that we are innately drawn to people who are similar to us, whether by personality, attitudes and common interests, or by inherent factors such as age, race and gender. This phenomenon is known as homophily- the tendency for like to attract like. Recent evidence suggests that homophily may also manifest at the levels of genetics and brain function, suggesting that similarity in biological characteristics may influence the likelihood that similar individuals will forge friendships. High school populations offer a unique opportunity to study social network homophily as teens experience significant social, emotional and physical developmental change throughout this time. To investigate neural homophily amongst peers, we first characterized the social network of an entire year-10 school level (n= 215; age 15-16y; 126 females). A sub-sample of 49 of these students then underwent a resting-state fMRI scan. Functional connectivity was calculated between each pair of 82 anatomically defined brain regions, resulting in 861 functional connectivity estimates across the entire brain, for each person. These estimates were then correlated between pairs of people in the social network as an index of brain similarity. We fit an ordered logistic regression model with clustered errors to account for dependencies between dyads in the social network, predicting social distance (indexed by the minimum path length between pairs of people) from brain similarity scores, while co-varying for dyad variations in gender, handedness, ethnicity and classroom. The model identified a statistically significant effect of brain similarity ($z = -2.94$, 95% CI: -6.257 -1.248, $p = 0.003$), such that a 1 SD increase in brain similarity was associated with a 24% increase in the likelihood of two people being 1 social tie closer in the social network (e.g., moving from being the friend of a friend to a direct friend). These results suggest that neural similarity tracks social distance within adolescent peer networks, consistent with a neural form of homophily.

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Physiological synchrony as an index of co-operative activity in the classroom.

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Social interaction and cooperative group work induce reciprocal changes in the cognitive state of participants, leading to synchronous variation in physiological activity known as social physiological compliance. As student engagement in cooperative activities is believed to be critical to successful learning, the measurement of mutual engagement between students is of increasing interest to education research. We measured students' interpersonal physiological coherence via electrodermal activity (EDA) recorded from unobtrusive wearable devices in classroom settings. Using multivariate graph analysis, graph metrics of student 'connectivity' are compared between times when students were engaged in varied learning activities that differed in the degree of social interaction. We assess several graph metrics in terms of sensitivity to changes in social dynamics, and their relationship to measures of student performance and behaviour. Our analysis pipelines have been compiled within a flexible, open-source Matlab toolbox (SoChro) to enable researchers across fields to easily compute similar measures for any research involving social physiological compliance. We argue that biometrics recorded in ecologically valid settings can be a valuable tool for investigating interpersonal cohesion, providing an objective measure with which to corroborate traditionally observational data.

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Session 9: Keynote Presentation

Probing the neural and physiological basis of emotion using dynamic naturalistic paradigms.

Christine Guo
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The study of cognition and perception during realistic, natural conditions has attracted increasing attention in neuroimaging, benefitting from rapid developments in analytical methodology. Using inter-subject correlation (ISC) analysis, a series of innovative neuroimaging studies have recently shown that naturalistic stimuli, such as free viewing of films, evoke highly consistent responses in many cortical regions across subjects, despite the seemingly uncontrolled nature of such paradigms. Our group is exploring the application of naturalistic stimuli to the study of the neural circuit of emotion and its dysfunction in neuropsychiatric disorders. I will discuss our recent findings that distinct functional subdivisions of the cerebellum are robustly engaged in real-life cognitive and affective processes, playing specific roles through a dynamic interaction with higher order regions in the cerebral cortex. I will also introduce the use of thermal imaging, a contact-free technique, to study psychophysics in a natural setting and discuss its potential in clinical research.

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Session 10: Platform Presentations

The effects of a 16-week combination aerobic exercise and mindfulness-based intervention on indices of stress its psychological, cardiovascular, and neurobiological mechanisms: A pilot study.

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Background and aims: Evidence for combination interventions involving exercise and mindfulness components is showing promise for reducing psychosocial stress. The aim of this pilot was to examine a high-dosage combination intervention on stress indices and its theoretical mechanisms. We focus on changes in use of emotion regulation strategies, improvements in cardiorespiratory fitness, and functional and structural adaptations of the brain. Method: 17 healthy participants (males = 8; age: M = 22.88 years) were subjected to 16 weeks of combination training. The aerobic component comprised half-marathon training conducted three days/week, while the mindfulness component comprised daily formal meditation and weekly group psychoeducation. Self-report indices were assessed through questionnaires. Cardiorespiratory fitness was assessed through incremental exercise testing. Functional plasticity of focused-attention meditation was assessed through fMRI in a blocked design. Structural plasticity was assessed using VBM analysis. Results: The intervention yielded significant reductions in stress, repetitive negative thinking, and improvements in use of cognitive reappraisal. There was no change in VO¬2max, but significant improvements in submaximal aerobic capacity. During focused-attention meditation, there was significant BOLD changes in regions associated with inhibitory control and selective attention (dorsal anterior cingulate) and introspective awareness (bilateral insula). There was a trend-level increase in hippocampal grey matter volume. Conclusion: These results provide preliminary support for high-dosage combination training for reducing stress. Potential emotion regulation, cardiovascular, and functional and structural mechanisms were identified. Unbiased effect size estimates derived from this study will allow for efficient sample size determination to assess these mechanisms in full-scale research.

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Positive and negative dimensions of schizotypy are associated with differential prefrontal and mesolimbic alterations during reward anticipation and consummation.

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Anhedonia, the inability to experience happiness, is one of the major dysfunctions in schizotypy. Positive and negative schizotypy are associated with cognitive and emotional difficulties. However, the underlying neural substrates of reward processing in these two dimensions of schizotypy remain unclear. In the present study, we aimed to measure neural responses to reward anticipated and received in individuals with positive and negative schizotypy. The Monetary Incentive Delay Task was administrated to 33 individuals with schizotypy (18 positive schizotypy [PS] and 15 negative schizotypy [NS]) and 22 healthy controls during fMRI scanning. A series of independent-sample t-tests were conducted to compare the groups by contrasting images involving reward versus non-reward anticipation and reward received versus non-reward received conditions. Results showed NS individuals exhibited attenuated left ventral striatal activity compared with controls during reward anticipation. PS individuals, however, showed hyper-activity in the right ventral lateral prefrontal cortex when contrasting reward anticipation and non-reward anticipation. During reward consummation, NS but not PS individuals showed weaker left amygdala and left putamen activities compared to controls. These findings suggest that the two dimensions of schizotypy may exhibit differential prefrontal and mesolimbic dysfunctions during reward anticipation and consummation.

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Interactive effects of music and prefrontal cortex stimulation in modulating response inhibition.

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Influential hypotheses propose that alterations in emotional state influence decision processes and executive control of behavior. Both music and transcranial direct current stimulation (tDCS) of prefrontal cortex affect emotional state, however interactive effects of music and tDCS on executive functions remain unknown. Learning to inhibit inappropriate responses is an important aspect of executive control which is guided by assessing the decision outcomes such as errors. We found that high-tempo music, but not low-tempo music or low-level noise, significantly influenced learning and implementation of inhibitory control. In addition, a brief period of tDCS over prefrontal cortex specifically interacted with high-tempo music and altered its effects on executive functions. Measuring event-related autonomic and arousal response of participants indicated that exposure to task demands and practice led to a decline in arousal response to the decision outcome and high-tempo music enhanced such practice-related processes. However, tDCS specifically moderated the high-tempo music effect on the arousal response to errors and concomitantly restored learning and improvement in executive functions. Here, we show that tDCS and music interactively influence the learning and implementation of inhibitory control. Our findings indicate that alterations in the arousal-emotional response to the decision outcome might underlie these interactive effects.

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Neural correlates of practicing self-control: The domain of anger provocation.

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Self-control is fundamental to adaptive functioning. Although self-control can be increased through training (self-control training; SCT), the underlying mechanisms have remained elusive. Our fMRI study examined whether SCT changes activity in neural networks related to self-control following anger provocation. Forty-five healthy young men and women completed two-weeks of SCT or active monitoring and were then insulted during scanning. Activation in the middle frontal gyrus (MFG), insula, and hippocampus increased from pre- to post-provocation in the control. Trait aggression positively correlated with prefrontal and subcortical regions relevant to anger in both conditions, whereas negatively correlated with the MFG in the control. Amygdala-prefrontal functional connectivity was stronger in the SCT condition than the control condition following provocation. Our results suggest that SCT reduces the cognitive effort needed to exert control over angry impulses, and has beneficial effects for anger-prone individuals. They also support neurological and psychological theories suggesting that anger is a product of poor self-control.

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Integration of morally relevant context in a novel moral judgement updating task.

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Hearing a story about Heinz who robbed a pharmacy, one may initially condemn Heinz's transgression, but many change their minds if they are told that he did it to save his wife's life. Moral psychology, however, typically neglects such dynamic changes, which are important for the moral decision process. We developed a novel EEG/fMRI-compatible paradigm to investigate updating of moral judgements of fairness violations upon receiving contextual information. Participants (n=128) observed a variant of the dictator game and made two subsequent judgements about the dictator's action: a) the initial, context-free judgement, based on information regarding how generous the dictator was towards a receiver; b) the second judgement, after the presentation of contextual information regarding how generous the receiver had previously been to another person. This sequence was repeated for varying combinations of dictator and receiver offers. Principle Component Analyses revealed three moral judgment styles in response to context-free dictator actions: endorsement of excessive generosity, hesitance to judge selfishness, and endorsement of equality. These styles related to the way participants integrated context. Most participants who initially endorsed context-free generosity also endorsed relative generosity, whilst those who initially endorsed context-free equality adjusted to endorse indirect reciprocity. Hesitance to judge selfishness reflected anticipation of relevant context information: it predicted endorsement of punishing selfishness as well as a stronger judgement adjustment. These findings show for the first time how norms play out in a moral online adjustment task and provide the basis to investigate the neural processes of updating moral judgements in the future.

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Thursday 'Poster Only' Abstracts

Neural substrates of time perspective: A resting-state functional connectivity study.

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Time perspective refers to the process whereby the continual flow of personal experiences is assigned to temporal categories or time frames. It helps to give coherence, meaning, and order to these experiences. Results from previous studies indicated that time perspective could predict many behaviours, such as decision making, substance abuse

and risky driving. However, few studies have examined the neural substrates of multidimensional time perspective. To address this question, we examined the relationships between different dimensions of time perspective (viz., Past-Positive, Past-Negative, Present-Hedonistic, Present-Fatalistic, and Future) as measured by the Zimbardo Time Perspective Inventory (ZTPI) and resting-state functional connectivity. Seventy-eight university students (18-24 years old; 45 females, 33 males) participated in the study. Each participant spent 8 min in an MRI scanner doing the resting scan. We defined nine regions of interest (ROIs) which have been reported to be related to time perceptive. Correlations between the whole brain analysis of nine ROIs and the ZTPI subscale scores revealed that Past-Negative time perspective correlated positively with connectivity between inferior frontal gyrus seed region and superior frontal gyrus, medial frontal gyrus and cingulate gyrus. Present-Hedonistic time perspective correlated positively with connectivity between medial frontal gyrus seed region and ventral precuneus, superior parietal gyrus, inferior frontal gyrus and middle frontal gyrus. Correlation analyses between each ROI pair and the ZTPI subscale scores showed that Past-Positive time perspective was positively correlated with connectivity between cingulate gyrus and superior frontal gyrus, thalamus. Finally, Future time perspective correlated negatively with the connectivity between inferior frontal gyrus and superior temporal gyrus. Overall, our findings suggest that multidimensional time perspectives have different neural substrates as measured by resting state functional connectivity.

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Differential trajectories of non-progressive behavioural variant frontotemporal dementia: Diagnostic implications and insights into social cognition.

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Behavioural-variant frontotemporal dementia (bvFTD) is characterised by changes in personality, social skills, and behaviours due to progressive frontal and temporal lobe degeneration. Differential diagnosis is challenged by a rare subset of non-progressing bvFTD (np-bvFTD) patients who present with hallmark bvFTD symptoms but remain relatively stable over time. This study aimed at identifying the disease trajectories in bvFTD, np-bvFTD, and healthy controls using linear mixed effects models to map cognitive, social, behavioural, and structural neuroimaging changes for up to 7 years. Baseline cognitive assessments revealed greater impairment in bvFTD than np-bvFTD. Over time, bvFTD showed greater decline than np-bvFTD in attention, memory, and language, but not in verbal fluency and visuospatial skills. On face and emotion processing assessments, only bvFTD were impaired at baseline, with no differences in progression between groups. Baseline behavioural deficits were similar between both patient groups. Interestingly, np-bvFTD showed greater increase in false beliefs, abnormal behaviours, and stereotypical behaviours than bvFTD over time. Baseline neuroimaging findings revealed atrophy in frontal and temporal regions, caudate, putamen, hippocampus, amygdala and nucleus accumbens in bvFTD, but only in the prefrontal and insula cortices in np-bvFTD. Over time, bvFTD demonstrated progressive frontal and temporal atrophy. Conversely, np-bvFTD showed progressive thinning in the temporoparietal junction, a region implicated in social cognition, and other posterior regions. These divergent changes have significant diagnostic implications, suggesting that np-bvFTD may not lie within a neurodegenerative continuum with frontotemporal dementia, but may be instead associated with a late-onset psychiatric or neurodevelopmental disorder, such as schizophrenia or autism.

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Adolescent oxytocin treatment alters anxiety-like behaviour elicited by early life stress differently depending on sex.

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Exposure to early life stress (ELS) increases vulnerability for mental health disorders. ELS alters the oxytocin and corticotropin-releasing factor (CRF) systems, which contributes to the development of anxiety-like and depressive-like behaviours that endure into adulthood. Recently, oxytocin administration in adulthood reduced depressive-like behaviours caused by ELS. However, oxytocin administration during adolescence, one of the system's critical developmental periods, has not been investigated. Our aim was to determine whether adolescent oxytocin administration reverses the anxiety-like effects and cellular changes in hypothalamic oxytocin and CRF neurons that are produced by ELS. Long Evans pups underwent maternal separation for either 15 or 360 mins on postnatal days (PND) 1 to 21. During adolescence (PNDs 28-42), rats received a daily injection of either oxytocin or saline and in adulthood (PND 60-65) were exposed to the open field. Brains were collected two hours later for immunofluorescence, which was conducted on hypothalamic coronal sections. Our results showed that ELS in both sexes increased frequency of low leaning behaviour, which correlated with decreased time spent in the centre of the apparatus. This is indicative of increased anxiety. Additionally, oxytocin treatment in stressed males reduced low leaning, and increased high leaning, which correlated with more time spent in the outer central area, suggesting a reduction in anxiety. In stressed and non-stressed females, oxytocin treatment increased high leaning. Immunofluorescence results will be discussed. These findings suggest a role for adolescent oxytocin treatment in reducing the impact of ELS on novel ethological measures of anxiety, which differs depending on sex.

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A scoping review of the use of NIRS for measuring haemodynamic changes during emotion processing tasks.

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Research suggests that cognitive impairments are the primary determinant of community functioning outcomes in patients with psychological conditions. Recent studies have found that cognitive remediation can help to build social cognitive capacity and subsequently improve functional outcomes and quality of life. Interventions have the greatest success when tailored to the patient's deficits and provided early in illness progression. Nonetheless, current diagnostic/assessment methods of social cognition impairments are not entirely reliable, can be impractical, and often depend upon the progression of symptoms to ensure accuracy. Near infrared spectroscopy (NIRS) has been proposed as a potential diagnostic/assessment tool for social cognitive impairment in the early stages of illness progression. By emitting near-infrared light into cortical tissue and detecting the amount of light deflected back towards the skull, NIRS has the capacity to measure haemodynamic changes as an indication of the location and strength of neural activities during cognitive task performance. NIRS has several benefits compared to other neuroimaging techniques, including high ecological validity, relatively low cost, and non-invasive and low burden nature. The proposed project will present a scoping review of 19 studies investigating the capacity of NIRS to detect neural changes during emotion processing tasks. Three domains of emotion processing will be considered: perception, experience, and regulation. Nine of the reviewed studies examine healthy adult population and 10 focused on patient populations, including schizophrenia, PTSD, bipolar, depression, and anxiety disorders. Findings regarding activated brain regions, cognitive tasks, and group differences will be collated and directions for future research will be explored.

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