

CLINICAL NEUROPSYCHOLOGY



Brain Sciences
UNSW

It has been a busy year in the lab!

Dear Reader,

This is our annual newsletter in which we detail our research activities over the past 12 months. This includes completed projects and also projects that are currently still underway or will be started in 2014. It is my pleasure to provide you with an overview of what has been happening - the kind of research we do, the people involved,

the projects we have conducted and who has assisted us, all detailed below. We hope you find our newsletters informative and welcome any feedback that you wish to provide.

Best wishes,

Professor Skye McDonald



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- Reduced brain volume and physiological responsivity explain dysregulated emotional arousal in severe TBI
- Impaired Emotional Prosody Processing in Severe Traumatic Brain Injury: An Event-Related Potential Study
- Deficits in comprehension of speech acts after TBI: The role of Theory of Mind and Executive Function
- Difficulties with communication after traumatic brain injury: Egocentrism or poor planning?
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- Impaired emotion recognition and sincerity perception after severe traumatic brain injury
- Neural correlates of dissociative memory systems activated during reinforcement learning in probabilistic association tasks.
- Empathy and Social Motivation in Autism Spectrum Disorders
- Development of the Social Disinhibition Task for people with Traumatic Brain Injury
- “What” and “How” You Say It Matters!” An ERP Investigation of Conflict in Speech Processing

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A sneak peak into our lab

CLINICAL GROUPS

The research that our team conducts is essentially concerned with disorders that arise from brain dysfunction due to structural or developmental conditions. We are interested in disorders that arise from a variety of different kinds of brain impairment including acquired brain impairment due to trauma, degenerative conditions and mild cognitive impairment. We are also interested in developmental conditions such as Parkinson's disease, autism spectrum disorders and psychiatric conditions.

TYPE OF RESEARCH

Our research has a number of streams looking at (1) communication disorders (2) emotional disorders and (3) remediation. In each case we are interested in how these disorders impact upon everyday functioning. We have a particular interest in psychophysiology. Psychophysiological techniques allow us to measure bodily reactions to external events (like changes in heart rate and skin temperature). By measuring these we have a clearer understanding of how people respond emotionally to significant events.



Chris Sufani, Research Assistant

RESEARCH TEAM

Our dedicated research team is led by Skye McDonald with the able assistance of Dr Jacqueline Rushby (NHMRC Clinical Research Fellow), Dr Cynthia Honan (NHMRC CRE Postdoctoral Research Fellow) and Dr Heather Francis (NHMRC CRE Postdoctoral Research Fellow). Dr Rushby has great expertise in psychophysiological techniques and is a sought after mentor for everyone in the lab. Dr Honan is a Clinical Neuropsychology Registrar and Registered Psychologist. She also has expertise in test development and advanced statistical procedures. Dr Heather Francis is a Clinical Neuropsychology Registrar who joined the team midyear. Her clinical work and research interests lie in emotion regulation following acquired brain injury.

We have a wonderful full-time research assistant: Alana Fisher, and an equally fabulous part-time assistant: Christopher Sufani. We were very sad to lose Rebekah Randall, Nicklas Parks and Jaimi Irediale over the past year.

Our research assistants are available to take any calls or queries about the research program (02 9385 3590).



Heather Francis, Postdoctoral Fellow

PHD SUCCESSES

Dr Danielle Mathersul successfully passed her thesis in midyear and graduate in October. Maurice Finn has recently submitted his thesis and is awaiting marker comments.

STUDENTS

There are currently 4 PhD students in the team: Emily Trimmer, Matt Gerathy, Maurice Finn, and Hannah Rosenberg. Several of our honours student recently completed their studies, and we would like to take this opportunity to congratulate Caitlin Dawes, Edwina Wong and Chris Sufani for their great efforts.

ACKNOWLEDGEMENTS

THIS NEWSLETTER

The aim of this newsletter is to inform you of how your involvement is contributing to our understanding of how the brain processes social and emotional information both before and after a brain injury as well as what treatment techniques we are trialling. This newsletter presents 14 different studies. Each study is described in terms of what it was about, what we did, and what we found. Where studies have been submitted for publication, the reference to the article has been provided in case you want to read more about the study. In most cases it takes a long time for articles to be published, so most articles are not immediately available but will be in the next year or so. We have also detailed articles and conference presentations that are accepted for publication.



ACKNOWLEDGEMENTS

Many people and agencies have been involved in coordinating and assisting in these research studies. We would especially like to acknowledge the outstanding brain injury rehabilitation teams at Ryde Royal Rehabilitation Centre, Liverpool Hospital and Westmead Hospital.

Several of these projects also represent collaborations with researchers at UNSW and other institutions, in particular, Robyn Tate at the Rehabilitation Studies Unit, University of Sydney, Leanne Togher at the Faculty of Health Sciences, Uni of Sydney, Shane Darke at the National Drug and Alcohol Research Centre, Melissa Green at the Black Dog Institute, Sydney and Marc Pell, McGill University, Montreal.

Finally, as always we must express our deepest appreciation to all the people with a brain injury and their families, as well as our control participants, who have happily given their time and energy to contribute to our research. Without your willing participation none of this research would have been possible.

Can elderly people with MCI improve their cognitive functioning by doing regular computer-based brain exercises?

What the studies were about

A series of studies were carried out looking at the impact of computerised cognitive training on cognitive functioning in older people diagnosed with Mild Cognitive Impairment. Unfortunately, there are no effective means of ameliorating cognitive decline for this group at present. Many attempts have focused on teaching older people with cognitive impairment how to improve their recall by using memory strategies. The results to date have been disappointing, possibly because the learning processes required to learn and implement these strategies in daily life are compromised. Some researchers have suggested that cognition can be improved via the use of targeted computer-based exercises to stimulate underlying brain plasticity processes. The research was designed to explore the hypothesis that completing a program of cognitive training would result in improved cognition, functioning and mood.

INVESTIGATORS:

SKYE MCDONALD, MAURICE FINN

What we did

The research was conducted as part of a PhD in the School of Psychology at UNSW in conjunction with Aged Care Services at Royal North Shore Hospital. An initial RCT pilot study was completed in 2009 with 16 participants recruited from the Memory Clinic and Geriatric specialty outpatient clinics. The results were published in the journal *Brain Impairment* in 2011. A secondary single-case study was completed in 2011 and the results were presented as a poster at the International Psychogeriatric Association International Meeting in Cairns in 2012. The results have been submitted for publication and are currently undergoing peer

review. The third study using an RCT design was carried out in late 2012 and early 2013. For this final study, participants had to complete a recognition memory program (known as repetition-lag training) over 6 sessions, each lasting an hour. This involved learning a list of words, then telling those words apart from new words. The trick was that some of the new words were repeated, making the task harder. Participants could not rely on the feeling of familiarity but had to accurately recollect if the word was either a studied word or a new word that had been repeated. The aim was to see if completing this training would improve an untrained measure of auditory memory.

What we found

The first study indicated that the sample of elderly clients with MCI who completed a program of cognitive training were able to improve on the trained tasks, with some evidence of improvement on an untrained measure of visual sustained attention. The second study was a single case study, designed to explore this finding in more depth and found that functions such as attention and reasoning may respond to training. The participants in the single case study also reported less frequent cognitive failures in daily life as well as improved mood. Results of the third and final study indicated that participants were able to complete the training program, and did improve at discriminating the studied from the repeated words. Importantly there was some evidence of transfer to an untrained task, delayed recall of unrelated word-pairs. The results have been submitted for publication and are currently undergoing peer review. The project is now completed but the research has spurred interest in developing an innovative memory treatment group which will be trialled at the Memory Clinic at Royal North Shore Hospital in 2014.

MAURICE FINN



Maurice is currently working as a clinical psychologist in Aged Care at Royal North Shore Hospital. He commenced his PhD in order to determine better treatments for people with mild cognitive impairment (MCI) and early Alzheimers Disease.

To date he has conducted three studies: (1) a pilot randomised controlled trial looking at computerised training to improve cognitive function in MCI. (2) A single case study looking at a more intensive approach to cognitive training in MCI and (3) A randomised controlled trial using repetition-lag training to improve recollection memory in older people with MCI.

This research has been presented at national conferences such as the Australasian Association of Gerontology (Hobart, 2010); APS Psychology and Ageing Interest Group (Melbourne, 2011) and the International Psychogeriatric Association meeting (Cairns, 2012) and attracted media attention (ABC Radio, Sun-Herald). While the PhD research is now completed, Maurice is now working on developing an innovative memory treatment program for clients of Aged Care at Royal North Shore Hospital.

Reduced brain volume and physiological responsiveness explain dysregulated emotional arousal in severe TBI

What the study was about

Severe traumatic brain injury (TBI) is known to lead to impairments in how people respond to emotionally-salient events, such as facial expressions. Physiological measures, such as EEG alpha power and skin conductance levels (SCL), may provide measures of these emotional arousal deficits. Moreover, problems with emotional arousal may also be due to injury-related atrophy (volume loss) in certain brain structures, such as the insula and amygdala, which have an established role in regulating arousal and emotional responses. This study aimed to investigate the relationship between brain volume loss, physiological measures, and dysregulated emotional arousal and responsiveness after severe TBI.

What was done

Nineteen adults (15 males; mean age 44.89; mean education 13.47 years) with a severe TBI and 19 matched controls (15 males; mean age 43.95; mean education 14.79 years) ($p > 0.05$)

participated. Magnetic resonance imaging (MRI) scan established bilateral insulae and amygdala volumes. Mean EEG alpha power and SCLs were recorded simultaneously across four, 2 minute conditions: eyes-closed pre-task baseline, view neutral face, happy face and angry face.

INVESTIGATORS:

ALANA C. FISHER,
JACQUELINE A. RUSHBY,
SKYE MCDONALD, NICKLAS
PARKS, OLIVER PIGUET

What we found

Alpha suppression across the scalp occurred from pre-task baseline to the face-viewing conditions ($p < .001$), however, this reduction was smaller in TBI ($p = .04$), as can be seen in Figure 1. TBI participants also showed elevated alpha power in the hemisphere means, in contrast to controls' midline dominance (all $p < .01$), together with a trend towards lower SCL ($p = .051$). Brain volume was significantly reduced

ALANA FISHER



Alana is a research assistant to Professor Skye McDonald in the clinical neuropsychology lab. Her research interests include the psychosocial and socio-affective aspects of communication and is currently working on several projects focusing on the communicative difficulties and social cognition impairments experienced by adults following a traumatic brain injury.

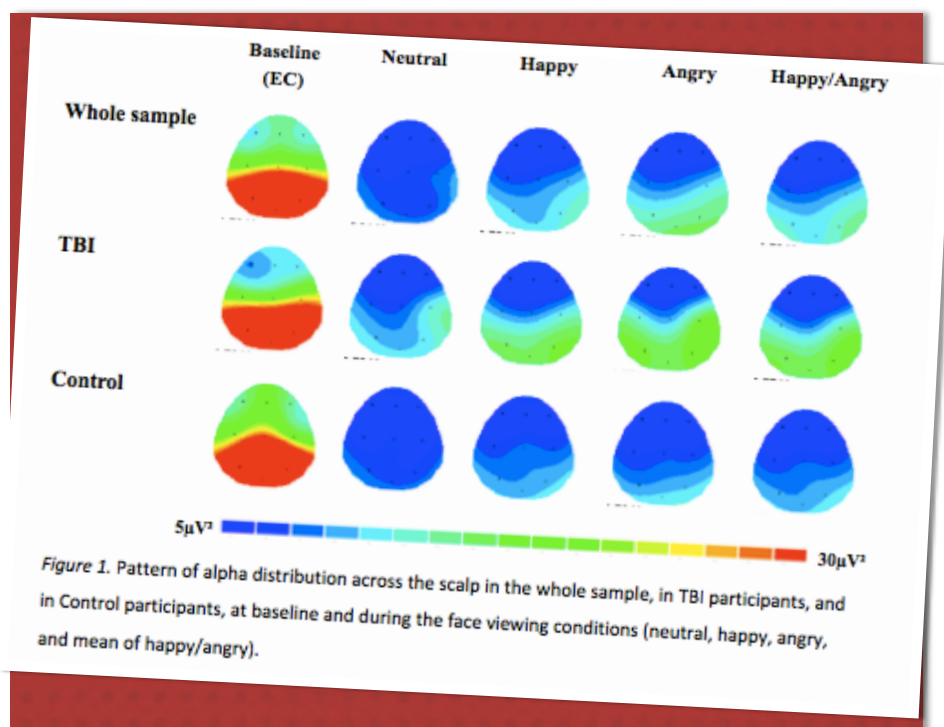
in most structures in the TBI group; larger left insula and right amygdala volumes were associated with higher alpha power, and greater alpha suppression.

What we concluded

The present findings suggest that alpha power provides a novel and sensitive measure of arousal dysregulation in TBI. Reduced grey matter volume in particular, important brain structures may contribute to these disturbances in arousal after TBI.

To read more about this study:

Fisher AC, Rushby JA, McDonald S, Parks N, Piguot O. Neurophysiological correlates of dysregulated emotional arousal in severe traumatic brain injury. *Clinical Neurophysiology* (under review).



Impaired Emotional Prosody Processing in Severe Traumatic Brain Injury: An Event-Related Potential Study

What the study is about

Recent studies have shown that severe traumatic brain injury is associated with reduced sensitivity to emotional expressions in voice (i.e. emotional prosody). This impairment can lead to difficulties in interpreting and responding appropriately to significant socio-emotional cues in everyday social interactions (i.e., recognizing someone is sad from the way they are talking and consoling them in response). The present research investigated differences in neural processing of speech in severe TBI and control participants using electroencephalography (EEG) – an instrument that measures brain electrical activity, during particular tasks.

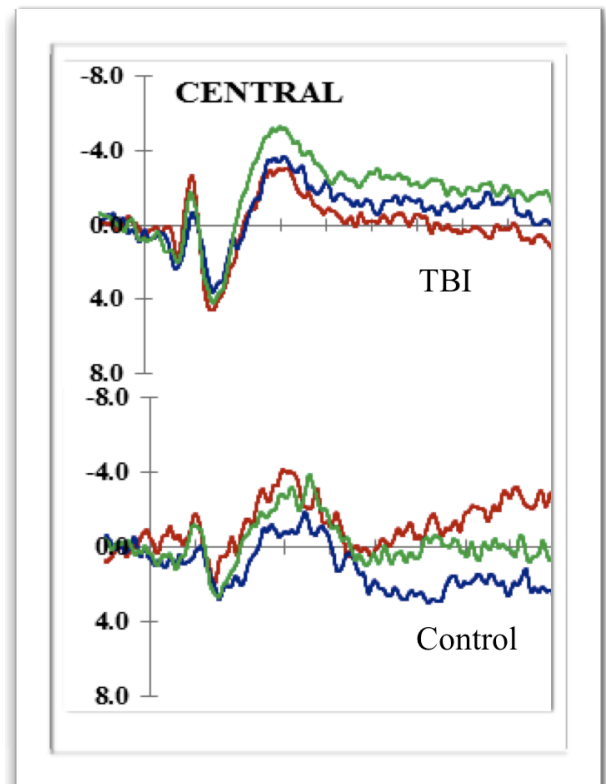
INVESTIGATORS:

JACQUELINE RUSHBY, SKYE MCDONALD, FRANCESCA FROREICH, ALANA FISHER, CHRISTOPHER SUFANI, JAIMI IREDALE & ANETA DIMOSKA

What we did

Sixteen adults with severe TBI and 21 controls participants were fitted with (EEG) equipment whilst they

performed an emotional prosody discrimination task. In the task participants were presented with 120 word pairs and were told to judge whether the word pairs were spoken in the same (i.e., happy-happy) or different (i.e., happy-angry etc.) tone of voice. Neural (or event-related potential: ERP) responses to word 1, from each of the 120 word pairs, were examined in this study.



What we found

Behavioural results showed that participants with severe TBI were less accurate in judgment of same and different emotional prosody pairs. ERP results indicated that control and severe TBI participants did not differ in the early (100ms) perceptual processing of acoustics (pitch, intensity, duration) in speech. However, participants with severe TBI

were more impaired in the late (300-800ms) attentive and cognitive processing stages of emotional prosody perception. Hence, severe TBI may result in impairments in attending to, and cognitively evaluating the emotional significance of tone of voice in speech. In the near future, we aim to investigate this further to inform social-emotional remediation programs for individuals with severe TBI.



JACQUELINE RUSHBY

Dr Jacqueline Rushby was awarded a NHMRC four year research fellowship, to investigate psychophysiological indices of recovery after severe Traumatic Brain Injury (TBI). Her research aims to examine psychophysiological processes underpinning arousal and activation, in order to inform our understanding about how and why arousal to emotional events is dysregulated after severe brain injury.

Deficits in comprehension of speech acts after TBI: The role of Theory of Mind and Executive Function

What the study is about

Theory of mind (TOM) is a term used to describe a person's ability to form inferences about another person's beliefs or intentions, and is a critical component of effective communication. TOM abilities are mediated by frontal brain structures that are also thought to mediate executive processes such as cognitive flexibility, inhibition, and working memory. Given that frontal lobe brain structures are usually compromised following traumatic brain injury (TBI) it is not surprising that both abilities are commonly affected in this population. There is much debate, however, about whether TOM is dependent on executive functioning or not. The issue is complicated by the fact that many TOM tasks use complex stories requiring a significant capacity to understand. This study aimed to determine whether TOM is dependent on executive functions or whether these abilities are, in fact, modular (i.e., are independent functions).

What we did

A group of 25 people with severe and 25 people with similar backgrounds but without any brain injury participated in the study. Videotaped vignette segments, containing a woman talking about her recent experiences or a news reader, were shown to all participants. The vignettes were specifically presented so that they contained either: minimal executive function demands, high cognitive flexibility demands, high working memory demands, or high inhibition demands. Participants completed both low and high TOM questions and tasks after viewing the vignettes in each of these varying executive conditions.

What we found

In the high working memory demand condition, individuals with TBI were more impaired on high TOM tasks. This difference in TOM performance was

INVESTIGATORS:

CYNTHIA HONAN, SKYE MCDONALD, ALANA FISHER, ALISON GOWLAND & REBEKAH RANDALL

removed after taking into account the high working memory demands of the task. There were no group differences found in high TOM tasks in the inhibition and flexibility conditions, even after controlling for the increased executive demands. This may indicate that TOM ability is independent of inhibition and cognitive flexibility demands, although further investigation is required. Overall, the results suggest that TOM does not uniquely contribute to communication comprehension ability, and that TOM ability is selectively dependent on working memory demands, in individuals with TBI.

To read more about the study

Honan, C.A., McDonald, S., Gowland, A., Fisher, A., & Randall, R. K. (Submitted) Deficits in comprehension of speech acts after TBI: The role of theory of mind and executive function.

Contact Dr Cynthia Honan:
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CYNTHIA HONAN



Dr Cynthia Honan is a postdoctoral research fellow for the Moving Ahead Centre for Research Excellence (CRE) in Brain Recovery where she has a coordinating role in the development of common outcome measures and protocols for use across a variety of rehabilitation research projects within the CRE. Her research interests include test development and the measurement of Social Cognition, and disorders of control and drive, metacognition, and functional outcomes following ABI.

Difficulties with communication after traumatic brain injury: Egocentrism or poor planning?

What this study was about

Many people with traumatic brain injury (TBI) have impaired communication skills. Whether this is because they cannot take another person's perspective (i.e. Theory of Mind: TOM) when communicating, or because they have problems regulating their output (executive dysfunction) is unclear. This study aimed to explore the relative contributions of TOM abilities and executive abilities, specifically flexibility and inhibition in language production.

What we did

Twenty-five adults with moderate to severe TBI and 28 non-injured adults of approximately the same age and education completed three communication tasks with (1) low executive (2) high flexibility and (3) high inhibition demands. Within each task there were parallel versions with either low or high TOM demands.

What we found

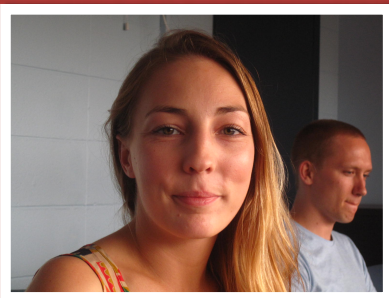
The TBI group was poorer than controls on two of the three low TOM tasks and all three high TOM tasks. For tasks (1) and (2) poor performance on the high TOM version was explained by the executive demands the parallel

tasks had in common. The high inhibition task was different. In this case speakers with TBI had differential difficulty with the high TOM version, i.e. they had specific difficulty inhibiting self-referential thoughts in order to cater for another's perspective.

INVESTIGATORS: SKYE MCDONALDS, ALISON GOWLAND, REBEKAH RANDALL, ALANA FISHER, KATIE OSBORNE-CROWLEY, CYNTHIA HONAN

Conclusion

The speakers with TBI had trouble inhibiting their own perspective when communicating. This is similar to reports that some people with TBI talk in an egocentric fashion and points to potential targets for remediation.



KATIE OSBORNE-CROWLEY

Katie is a PhD candidate working under the supervision of Professor Skye McDonald and Dr Jacqueline Rushby. Her research interests are in neuropsychological deficits underlying disinhibited social behaviour in people with traumatic brain injury.

Summary of Research:

Neuropsychological deficits underlying socially inappropriate behavior in people with traumatic brain injury

People with traumatic brain injury often exhibit socially inappropriate behaviour, which likely contributes to the difficulties they experience in maintaining social relationships. Little is known, however, about the underlying causes of such disinhibited social behavior. Damage to the orbitofrontal cortex, common among people with a traumatic brain injury, likely produces some of the socially inappropriate behaviours reported in this population. A neuropsychological hallmark of damage to the orbitofrontal cortex is a deficit in reversal learning; the ability to update behavior when reward contingencies change. An inability to flexibly update behavior when social reward contingencies change may explain some of the socially inappropriate behavior reported in the TBI population. This study aims to determine whether reversal learning deficits can predict socially inappropriate behaviour in people with a TBI. Further, electroencephalogram will be used to determine whether deficits in reversal behaviour and deficits in social inhibition are related to an inability to generate negative reward prediction errors which drive changes in behaviour to suite the environment. Testing for this study is just getting underway.

Facial emotion recognition deficits following a Traumatic Brain Injury (TBI): Re-examining the valence effect

What the study is about

Difficulties interpreting social situations and understanding the emotions portrayed by others are common following traumatic brain injury (TBI). The ability to quickly and accurately recognise how other people are feeling is crucial in a variety of everyday social situations, and improving our understanding of these difficulties is important in order to promote functioning post-injury. An issue that arises from research into emotion recognition concerns the differential difficulty in recognition of the various emotions. Research suggests that while some emotions (such as happiness) are easier to recognise, others (such as fear) are more difficult. This means, for example, that it is generally easier to recognise when someone is happy than when that person is scared.



INVESTIGATORS: HANNAH ROSENBERG, SKYE MCDONALD, MARIE DETHIER, ROY KESSELS & FRED WESTBROOK

What we are doing

The research is being conducted as part of a Ph.D in the School of Psychology at the University of New South Wales. Participants with a brain injury as well as control participants were asked to view a series of real-time interactive morphs of faces, between two endpoint facial expressions of the same identity, from 0% emotion (neutral face) to 100% emotion. The faces expressed six emotions: happiness, surprise, anger, disgust, sadness and fear, in different intensities, ranging from 20% to 100%. They were asked to select what emotion best described how the person in the picture was feeling, as well as to undergo conventional neuropsychological tests.

What we found

The TBI group was more impaired in overall emotion recognition, and less accurate in the recognition of negative, compared to positive emotions. However, examining the performance across the different intensities indicated that this difference was driven by some emotions (e.g., happiness) being much easier to recognise than others (e.g., fear and surprise). In terms of intensity, TBI participants benefited from increased intensity to the same level as controls on anger, sadness, and disgust. They benefited more than controls on happiness, and less than controls in fear and surprise.

To read more about this study:

This study is currently under review: Rosenberg, H, McDonald, S., Dethier, M., Kessels, R.P.C., & Westbrook, R.F. (under review). Facial emotion recognition deficits following a Traumatic Brain Injury: Re-examining the valence effect.

Emotion perception after a Traumatic Brain Injury: the valence effect is an artefact

What the study is about

This study is a follow-up on 'Facial emotion recognition deficits following a Traumatic Brain Injury (TBI): Re-examining the valence effect' study outlined above. The earlier study indicated that the finding that people with TBI are poorer in recognising negative (such as sadness, disgust, fear, and anger) than positive (such as happiness and surprise) emotions is confounded by differential difficulty, i.e., some facial expressions being easier than others to recognise. This is a serious confound in emotion recognition research since it limits the conclusions about specific impairments in recognition of some emotions.

What we are doing

To address this issue, we attempted to equate the six emotions on difficulty. This was done by equating the different emotions (using the ERT described in the earlier study) by selecting emotional videos that were correctly recognised by controls approximately 50-70% of the time. This resulted in a selection of emotional expressions that were more similar in terms of difficulty.

The aims of this study were threefold. First, we aimed to compare the recognition of the equated stimuli to the recognition of 100% full blown expressions (that are most commonly used in emotion recognition research). Second, we aimed to examine whether emotion recognition correlates with selected neuropsychological measures assessing working memory, processing speed and executive functioning. Third, we aimed to examine the hypotheses that the emotion recognition deficit in the TBI group is 1) a specific emotion recognition deficit due to injury or 2) the poorer performance in TBI is secondary to reduced working memory, processing speed and executive functioning.



INVESTIGATORS: HANNAH ROSENBERG, SKYE MCDONALD, MARIE DETHIER, ROY KESSELS & FRED WESTBROOK

The data analysis for this study is in progress, and some exciting results are on the way!!!

To find out more about this study

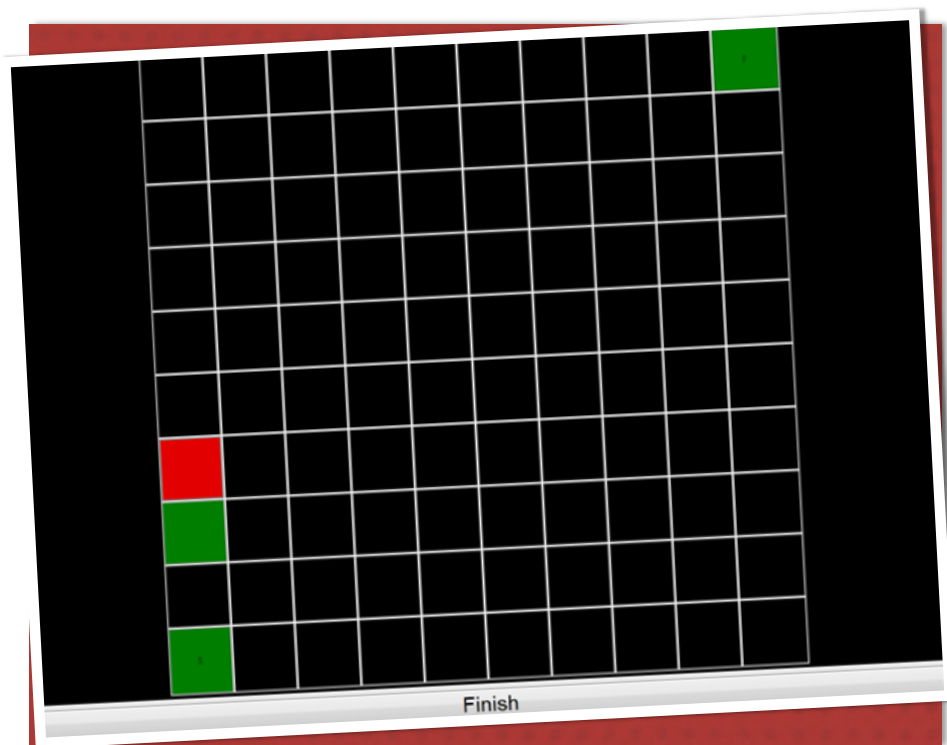
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hannah.rosenberg@unsw.edu.au



HANNAH ROSENBERG

Hannah Rosenberg is a PhD/ Master of Psychology (Clinical) Candidate. Her research area involves the study of emotion perception deficits in individuals with traumatic brain injury (TBI). She is especially interested in the differences between recognition of negative and positive facial expressions and how this recognition improves as a function of emotion intensity.

Impaired Austin Maze task performance after acquired brain injury: A failure to “learn from past mistakes”?



AUSTIN MAZE

What the study was about

Acquired brain damage can lead to problems with new learning. It can also affect problem solving making it difficult to plan ahead or make use of mistakes when they do occur to modify ongoing behaviour so that errors are reduced. While there are a large number of tests of learning available there are few that are sensitive to problems with spatial learning (such as learning a route) and also the ability to utilise errors. One such test is the Austin Maze which was originally developed as a button press maze. A new computerised adaption is now available which is cheaper, and more readily available to clinicians and researchers. This test seems to be quite reliable but we wanted to know how people with brain injuries performed in comparison to matched healthy controls.

What we did

Thirty-one adults with an acquired brain injury (28 severe TBI, and 3 stroke) and 31 gender-, education-, and age-matched adults without brain injuries participated. Participants completed the computerised version of Austin Maze, where they are required to learn the correct pathway from start to finish by pressing square blocks one-by-one within a 10 x 10 array. Participants were provided with error feedback as they did the task; a criterion of three errorless trials within 20 trials was applied. Participants then completed neuropsychological measures of: information processing speed, attentional switching, working memory, immediate and delayed verbal recall, visuospatial planning and memory.

What we found

Compared to non-brain-injured Controls, brain-injured participants made more errors (in total and to trial 10) and required more trials before reaching 3 errorless trials ($p < 0.05$). A greater proportion of brain-injured participants than Controls failed to complete 3 errorless trials, however, this was not significant ($p > 0.10$). Brain-injured participants performed significantly worse than Controls on all neuropsychological measures ($p < 0.05$) except for verbal recall and visuospatial planning. Neuropsychological performance was significantly correlated with all three measures of performance on Austin Maze ($p < 0.05$).

What we concluded

The Austin Maze appears sensitive to deficits in planning, error utilisation and regulation, which can affect adults who have an acquired brain injury. It therefore has the potential to be a useful addition to neuropsychological tests.

INVESTIGATORS: SKYE MCDONALD, ALANA FISHER & REBEKAH RANDALL

Empathy in Alexithymia: Hypoarousal and Hypermimicry

What this study was about

A leading theory in the alexithymia literature hypothesizes that the difficulties encountered by alexithymic individuals in interpersonal engagement can be attributed to an empathic deficit. This is based on the conjecture that the inability of alexithymic individuals to process their own emotions, combined with their paucity of imagination, inhibits imagining or understanding emotional states in others. Empathy is constructed of three components: the cognitive component relates to emotion perception, the autonomic component is expressed by fluctuations in skin conductance and heart rate, and the behavioural component is conveyed by facial mimicry. Currently, there is little consensus regarding the results of these individual measures in alexithymia, and few studies have incorporated measures of the three components in one design. We sought to clarify whether alexithymia is associated with (1) low emotion perception accuracy, (2) aberrant arousal, (3) aberrant facial mimicry, and finally (4) whether poor emotion recognition and atypical physiological responding are associated in alexithymia.

Alexithymia

- difficulty describing feelings to other people

What we did

Fifty-nine participants were divided into two groups based on alexithymia scores from the TAS-20. Thirty-six participants scored within the normal range, and 23 were in the moderate to high range. Physiological and mimicry responses were recorded while participants viewed happy and angry faces in static and dynamic presentations. Following this, participants completed an emotion recognition task.

What we found

The alexithymic group showed intact recognition of all emotions tested. However, this group were hypoaroused throughout the task, and this state was evident across trials, emotions and presentation conditions. Results also

CAITLIN DAWES



Caitlin has just finished her Honours Degree under the supervision of Professor Skye McDonald and Dr Jacqueline Rushby and is currently working at the Brain & Mind Research Institute, as a Multiple Sclerosis Clinical Trials Coordinator. She is hoping to undertake postgraduate study in Clinical Psychology or Clinical Neuropsychology next year.

indicated enhanced zygomaticus activity in the dynamic condition and enhanced corrugator activity to angry faces. This reflects hypermimicry in this group. These results were the first to indicate evidence of simultaneous hypoarousal and hypermimicry in alexithymia.

INVESTIGATORS: CAITLIN DAWES, SKYE MCDONALD & JACQUELINE RUSHBY

There are two possible explanations for this finding: (1) there is disruption between the physiological responses that inform empathy, or (2) alexithymic individuals engaged in hyperimitation, as a result of failed inhibitory control. Further investigation is needed to clarify this relationship.

The Effect of Perceived Similarity and Facial Feedback on Empathy: Examining Empathy from the Facial Feedback Hypothesis and the Perception-Action Model

What this study was about

The study was about examining two contrasting theories of empathy. Whilst the Facial Feedback Hypothesis suggested that we use the movements in our facial muscles, particularly facial mimicry, as feedback to inform us of our emotions, the Perception-Action model suggests that these movements are simply a by-product of perceiving an emotional event and empathy and thus do not contribute to insight into one's own emotions. Furthermore the Perception-Action model is based on the idea that empathy is driven by activated representations shared between the target and an observer. Thus this model also establishes the claim that increased similarity between the target and observer would increase the observer's empathy towards the target due to an increased number of activated representations.



What we did

We measured the facial responses of 58 female undergraduate Psychology students to thirty different facial images. The students were placed in different experimental conditions that manipulated similarity and level of facial feedback

INVESTIGATORS: EDWINA WONG, SKYE MCDONALD & JACQUELINE RUSHBY

What we found

Despite a large body of evidence that supports both the Facial Feedback hypothesis and the Perception-Action model, the current study was unable to provide evidence to suggest that an individual's empathic response is affected by their level of facial feedback or their similarity to a target. Thus this current study could not lend support to either the Facial Feedback hypothesis or the Perception-Action model. The outcome of this study may be due to other variables that were not accounted for by the two models such as observer characteristics and mental processes.



EDWINA WONG

Edwina was an honours student working with Professor Skye McDonald and Dr Jacqueline Rushby over the past year. She completed her undergraduates studies at the University of New South Wales.

Investigation of complex emotion recognition in adults with Traumatic Brain Injury (TBI) - Development of Complex Audio-Visual Emotion Assessment Task (CAVEAT)

What the study is about

People who sustained a traumatic brain injury (TBI) often experience difficulties interpreting social situations and understanding the emotions portrayed by others. The ability to accurately recognise how other people are feeling is very important in a variety of everyday social situations. Emotion research to date has mostly focussed on recognition of six emotions (termed "basic"), namely happiness, surprise, sadness, anger, fear and disgust, and has revealed that recognition deficits are more robust for negative than positive emotions. This study aims to investigate emotion recognition in adults with TBI using a new measure of emotion recognition, the Complex Audio-Visual Emotion Assessment Task (CAVEAT). This measure was developed as part of Hannah Rosenberg's PhD project and consists of video vignettes in which the observer is asked to judge what emotion is experienced by the person in the scene. It includes a wider array of emotions than are included in the conventional measures, such as contempt, amusement, pride, and relief. This allows the investigation of subtle emotion recognition deficits in clinical populations and re-evaluation of the commonly reported findings that recognition of negative emotions is more impaired

following a range of neurological conditions than positive emotions.

After extensive piloting and a year of data collection, we have finally tested 32 individuals with TBI and 32 demographically matched controls! We would like to thank all the individuals who contributed their time to take part in our research!

Data analysis is in progress, so stay tuned for some exciting results!!!

**INVESTIGATORS: HANNAH ROSENBERG,
SKYE MCDONALD & FRED WESTBROOK**

To find out more about this study

Contact Hannah Rosenberg:
hannah.rosenberg@unsw.edu.au



CAVEAT - SCREEN SHOTS

Cognitive factors underpinning poor expressive communication skills after traumatic brain injury: TOM or Executive Function?

What the study was about

People with traumatic brain injury (TBI) have impaired communication skills. It is unclear, however, whether this reflects difficulties in taking another person's perspective, i.e., impaired Theory of Mind (TOM), or problems with executive dysfunction, which impedes regulation of language production. This study aimed to explore the extent to which TOM abilities and executive abilities, specifically flexibility and inhibition, contribute to language production.

What we did

Twenty-five adults (18 males: age = 48.2 (SD = 12.0) years with moderate to severe TBI (post traumatic amnesia = 69.2 (SD = 54.6) days and 28 non brain-injured adults (19 males: age = 49.0 (SD = 12.2) years completed three communication tasks with (1) low executive (2) high flexibility and (3) high inhibition demands. Within each task, there were two parallel versions with low or high TOM demands.

What we found

The TBI group were poorer than controls on two of the three low TOM tasks (effect size (ES): 0.05- 0.64) and all three high TOM tasks (ES: 0.67-1.11), as seen in Figure 1.

INVESTIGATORS: SKYE MCDONALDS, ALISON GOWLAND, REBEKAH RANDALL, ALANA FISHER, KATIE OSBORNE-CROWLEY, CYNTHIA HONAN

For tasks (1) and (2) scores on the high TOM tasks were predicted by the low TOM scores, meaning that poor performance was explained by the executive demands the parallel tasks had in common. The exception was the high inhibition task. In this case speakers with TBI had specific difficulty inhibiting self-referential thoughts in order to cater for another's perspective.

What we concluded

People with a TBI are described as having egocentric nature of communication patterns, which may arise from problems with inhibiting one's own perspectives on a situation. Attending to these inhibition problems represents a potential target for remediation.

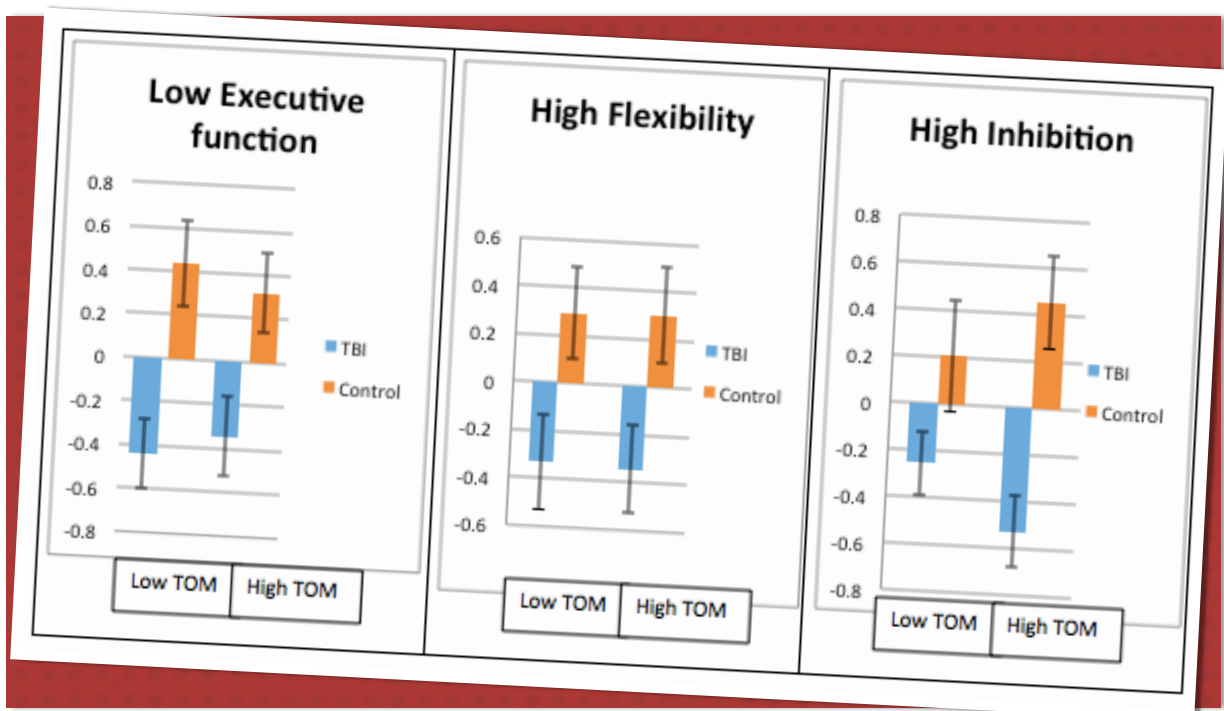


Figure 1: Standard score (z score) performances for TBI and control groups for low versus high TOM tasks under conditions of 1) low executive demands 2) high flexibility demands and 3) high inhibition demands.

Studies in Progress

Impaired emotion recognition and sincerity perception after severe traumatic brain injury

What the study is about

People with a severe traumatic brain injury (TBI) show impaired emotion recognition and have difficulties making pragmatic inferences, inferring what someone really means based on how they say something (via tone of voice, facial expression, gesture, i.e., paralinguistic cues) rather than what they are saying (i.e., linguistic information). This may cause problems in social communication when the listener needs to integrate both paralinguistic cues and linguistic information in order to understand a speaker's intended meaning, such as detecting sincerity or sarcasm. This study aimed to explore whether deficits in emotion recognition are related to poorer sincerity perception in people with a TBI.

What we are doing

We are recruiting adults with a severe traumatic brain injury and a group of non-brain-injured adults with similar backgrounds. Participants are shown to a series of purpose-designed video vignettes depicting a group of people (e.g., teachers in a staff room) being asked to volunteer for additional duties (extra playground duties). Individual protagonists in the video have limited verbal responses, each of which may literally suggest a willingness to be involved (e.g., "Of course, that's fine with me"). The intended meaning of speakers is tempered by their emotional demeanour. Participants are required to rate and rank the protagonists in terms of their sincerity. Additionally, participants complete

measures of basic emotion evaluation, self-reported empathy levels, verbal and non-verbal abstract reasoning.

What we expect to find

That adults with a TBI will have greater problems differentiating between levels of sincerity, and show diminished ratings of sincerity intensity. Poorer sincerity perception will be related to poorer emotion recognition, and lower empathetic abilities.

By Skye McDonald, Alana Fisher & Sharon Flanagan

Future volunteers needed

If you are interested in participating in this study please contact Alana:

alana.fisher@unsw.edu.au or 9385 3590

Neural correlates of dissociative memory systems activated during reinforcement learning in probabilistic association tasks.

What the studies are about

We are examining the interplay between declarative and procedural memory systems as they are activated or de-activated during the course of reinforcement learning in probabilistic association tasks, such as the heavily utilised Weather Prediction task.

What are we doing

Using electroencephalogram (EEG) methodologies we are taking the first measurements of the event-related potential (ERP) components that are related to stimulus-outcome associations in the Weather Prediction task. We are also examining response-outcome relationships to further clarify what is learnt through reinforcement. The task and associated memory systems recruited to complete the task

have been well examined using neural imaging methods (e.g. fMRI), however the relatively poor temporal resolution of such techniques limits the ability of researchers to determine what is learned by participants on a trial by trial basis. We are using ERP analyses to attempt to address gap in understanding due to methodology.

Additionally, we are attempting to recruit participants from two clinical groups; adults with ADHD and adults with schizophrenia, as they have traditionally been considered to have at the core of their symptomology opposite theories of dopamine activation (i.e. hypoactive and hyperactive signal transduction respectively). We believe that comparisons of three groups (control, ADHD 7 schizophrenic) will further

elucidate the function of declarative and procedural memory systems in reinforcement and probabilistic learning processes.

What we have found so far

Preliminary analyses in control subjects have suggested that while procedural memory systems appear to become most prominent in completing the Weather Prediction task as learning increases, even after numerous trials ERP components related to declarative memory processes remain active or are enhanced, such as N2 (related to internal template matching). The recruitment of our intended clinical groups has proceeded quite slowly and these inferences may change with further collection.

By Matthew Gerathy & Jacqueline Rushby

Studies in Progress

Empathy and Social Motivation in Autism Spectrum Disorders

What the studies are about

Little is known about how adults with Autism Spectrum Disorder (ASD) respond to social interactions or emotional stimuli. Yet, these individuals often find these interactions awkward and distressing. This study examined the psychological and physiological effects of social interactions as well as responses to emotional stimuli.

What we are doing

Individuals aged 16 or older with a diagnosis of ASD and matched controls participated in an online game of ball tossing as well as watching a series of emotional video clips. Whilst playing and watching the videos, participants' arousal level was monitored via skin conductance. Participants were also required to complete a self-report

questionnaire about their experience after both games.

What we have found so far

Preliminary analyses suggest that individuals with ASD were more engaged in the game than controls. They stayed focused and demonstrated higher level of arousal throughout the game than the controls. These findings were contrary to findings of no differences between groups for psychological responses between the ASD group and the control group. Individuals with ASD appeared to interpret negative social interactions in a similar way to the control group. We are in the process of running preliminary analyses for the emotional video clips task. Watch this space!!

By Emily Trimmer, Skye McDonald & Jacqueline Rushby

More volunteers needed!!

We are currently seeking individuals aged 16 and over to participate in these studies, either as a control (no diagnosis of ASD) or those with a diagnosis of an Autism Spectrum Disorder.

Please contact Emily Trimmer at e.trimmer@student.unsw.edu.au

Thanks!

V O L U N T E E R S N E E D E D

Our research would not be possible without the generosity of all the people with traumatic brain injuries and their families, as well as our control participants who so kindly offer their time and energy to participate in our studies.

T H A N K Y O U

If you are interested in getting involved in our research, we would love to hear from you!

At the moment we are looking for:

1. Healthy teenagers between 13-19
2. Healthy adults who would like to be involved in research into how we understand emotional and social information
3. People who have suffered a severe traumatic brain injury
4. People aged 16 and over with a diagnosis of an Autism Spectrum Disorder
5. People who have been diagnosed with an Autism Spectrum Disorder (including Asperger's Syndrome)

Our RAs are available to take any calls or queries about the research program (02 9385 3590).

Studies in Progress

Development of the Social Disinhibition Task for people with Traumatic Brain Injury

What the study is about

An important facet of social cognition that has not received adequate attention in the research literature is “social disinhibition”, the ability to inhibit socially inappropriate automatic responses in favour of more socially appropriate responses. Deficits in social disinhibition are common to many neurological conditions involving frontal lobe dysfunction (e.g., TBI), thus its measurement in clinical neuropsychology practice is highly important. Measures of inhibitory or interference control (e.g., Go No-Go tasks, Haylings Sentence Completion test) are often used in clinical practice to infer behaviour and emotion regulation difficulties in TBI populations. However, these tests may not be measuring the same type of disinhibition that might occur in social contexts. Moreover, performance in

artificial testing environments does not always translate to the types of regulation difficulties that may occur in complex social settings. Consequently, in clinical settings, the assessment of emotional and behavioural dysregulation in people with TBI continues to rely largely upon the ratings of either the patient themselves, or someone who knows them. In view of these limitations, the aim of this project is to develop a new “Social Disinhibition Task” that is suitable to screen for social disinhibition deficits in clinical (as opposed to laboratory) settings.

What we are doing

Currently in the pilot testing phase of development, the new social disinhibition task requires people with TBI to view scenes of complex social situations, and then utter the first few words that come to mind to describe a

particular character. Part A of the task is a control task that does not contain any specific instruction to inhibit any inappropriate or negative responses about the character. Part B, on the other hand, requires the person with TBI to inhibit inappropriate or negative responses. The pilot trial will compare the performance of TBI participants to matched control participants. Adjustments to the measure will be made following the trial, and a re-trial will be conducted if necessary.

What we expect to find

It is expected that this study will produce a brief 10-item measurement tool that neuropsychology clinicians can use to screen for social disinhibition deficits in TBI.

By Cynthia Honan, Skye McDonald, Alana Fisher

“What” and “How” You Say It Matters!”

An ERP Investigation of Conflict in Speech Processing

What the studies are about

In everyday social interaction, “what” we say and “how” we say things in speech often don’t match. For instance, we may say “I’m feeling great” but our tone of voice suggest otherwise. This study investigated behavioural and neural (event-related potential: ERP) correlates of speech processing when semantic and prosodic cues are either congruent (“I’m feeling great, thank you!” in a happy tone of voice) or incongruent (“I’m feeling great, thank you!” in an angry tone of voice)

What are we doing

Fifty-nine participants were fitted with EEG caps and were asked to listen to 96 spoken sentences from which they had to make a decision as to whether the sentence was a ‘match’ or ‘mismatch’ based on the emotional prosodic and semantic content. We are currently analyzing our findings. We hope that this research will help in understanding the mechanism behind reduced perception of emotional tones in voice in individuals with traumatic brain injury.

Did we mention we are looking for volunteers?

In the future we hope to carry out this research with individuals with severe traumatic brain injury. If you are interested or know someone who may be suitable for this study, please contact Christopher Sufani (christopher.sufani@gmail.com)

By Christopher Sufani, Jacqueline Rushby, Skye McDonald, Jaimi Iredale, Aneta Dimoska

Our Alumni



SUCHETA GOROLAY

SINCE FINISHING UP HONOURS LAST YEAR, SUCHETA HAS STARTED HER MASTERS OF PSYCHOLOGY (ORGANISATIONAL). SHE HAS JUST RECENTLY FINISHED HER FIRST YEAR OF THE MASTERS AND IS CURRENTLY DOING HER PLACEMENT AT DELOITTE AS A CONSULTANT IN HUMAN CAPITAL PRACTICE.



DAVID STRATON

SINCE LEAVING THE LAB, DAVID HAS CHANGED DIRECTION AND IS CURRENTLY DOING A JD (JURIS DOCTOR) WHICH IS A POSTGRAD LAW DEGREE, STILL AT UNSW. HE IS REALLY ENJOYING LAW SO FAR AND FINDS IT ALL INTERESTING, PARTICULARLY THE AREAS WHERE LAW INTERSECTS WITH PSYCHOLOGY SUCH AS THE MENTAL HEALTH PROVISIONS IN CRIMINAL LAW.



JAIMI IREDIALE

JAIMI IS CURRENTLY WORKING AS A RESEARCH OFFICER AT THE NATIONAL DRUG AND ALCOHOL RESEARCH CENTRE ON A RANDOMISED CONTROL TRIAL LOOKING AT THE EFFECTS OF A MOTIVATIONAL INTERVIEWING AND NICOTINE REPLACEMENT THERAPY INTERVENTION ON TOBACCO SMOKING CESSATION. SHE ALSO RECENTLY HAD HER FIRST FIRST-AUTHOR PUBLICATION IN THE JOURNAL OF PSYCHOPHYSIOLOGY.



Our Alumni

BRONWYN HEGARTY

BRONWYN IS CURRENTLY UNDERTAKING HER MASTER OF CLINICAL PSYCHOLOGY AT THE UNIVERSITY OF WOLLONGONG. SHE HAS JUST FINISHED HER FIRST YEAR AND WILL BE STARTING HER EXTERNAL PLACEMENTS AT THE BLACK DOG INSTITUTE AND PRINCE OF WALES HOSPITAL IN 2014, ALONGSIDE COURSEWORK AND RESEARCH.



OLIVIA SCHOLAR-ROOT

SINCE LEAVING THE LAB, OLIVIA HAS BEEN WORKING AS A RESEARCH ASSISTANT AT THE NATIONAL DRUG AND ALCOHOL RESEARCH CENTRE, COORDINATING THE WAY2HOME AND PLATFORM70 PROJECTS. SHE HAS ALSO BEEN VOLUNTEERING AT LIFELINE, WHERE SHE PROVIDES TELEPHONE COUNSELLING. IN 2014, SHE PLANS TO PURSUE A MASTER IN CLINICAL PSYCHOLOGY.



DANIELLE MATHERSUL

DANIELLE MATHERSUL COMPLETED HER PHD IN MAY 2013 AND GRADUATED IN NOVEMBER 2013. DURING HER FINAL YEAR OF PHD SHE WAS WORKING FULL-TIME AS A CLINICAL PSYCHOLOGIST AT PRINCE OF WALES HOSPITAL, ON BOTH THE MENTAL HEALTH INPATIENT AND COMMUNITY MENTAL HEALTH TEAMS. SHE CONTINUED IN THESE ROLES FOLLOWING COMPLETION OF HER PHD, AND IS CURRENTLY LOOKING FOR A POST-DOCTORAL POSITION IN THE USA, TO COMMENCE MID-LATE 2014.



MICHELLE KELLY

MICHELLE COMPLETED HER PHD RESEARCH AT THE END OF 2011 AND IS CURRENTLY WORKING AS A CLINICAL PSYCHOLOGIST WITH THE SPECIALIST MENTAL HEALTH SERVICE FOR OLDER PEOPLE (NSW HEALTH) IN NEWCASTLE. SHE IS ALSO WORKING ON A RESEARCH PROJECT FUNDED BY LIFETIME CARE AND SUPPORT LOOKING AT THE ASSESSMENT PRACTICES OF CLINICIANS WORKING IN BRAIN INJURY TEAMS.



Publications

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- McDonald, S., Gowland, A., Randall, R.K., Fisher, A., Osborne-Crowley, K. & Honan, C. Cognitive factors underpinning poor expressive communication skills after traumatic brain injury: Theory of Mind or poor executive function? (Submitted)
- Fisher, A.C., Rushby, J.A., McDonald, S., Parks, N. & Piguet, O. Neurophysiological correlates of dysregulated emotional arousal in severe traumatic brain injury (submitted)
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We are always keen to hear from people who would like to participate in our research. Please do not hesitate to contact us for future information.

Until next year,

MERRY CHRISTMAS!

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