

OUR LAB



OUR LAB

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PUBLICATIONS

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# CLINICAL NEUROPSYCHOLOGY 2014 Newsletter

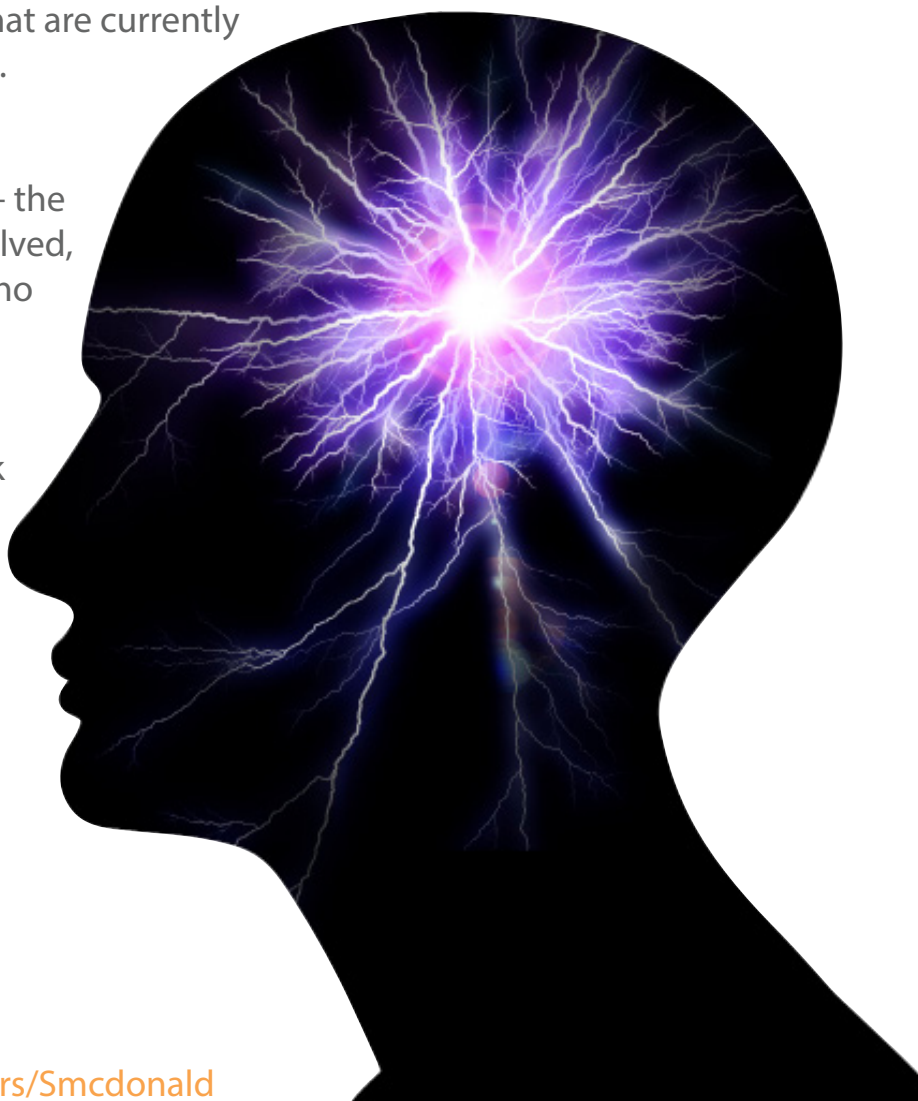
This is our annual newsletter in which we detail our research activities over the past 12 months. This includes completed projects and also projects that are currently still underway or will be started in 2015.

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 newsletter informative and welcome and feedback that you wish to provide.

Best wishes,

Skye McDonald



Visit us on [www.2.psy.unsw.edu.au/Users/Smcdonald](http://www.2.psy.unsw.edu.au/Users/Smcdonald)

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“ THANK YOU!!

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.

# THANK YOU

## ACKNOWLEDGEMENTS

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 20 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.

## ACKNOWLEDGMENTS

Many people and agencies have been involved in 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.

We would especially like to acknowledge the outstanding brain rehabilitation teams at Ryde Royal Rehabilitation Centre, Liverpool Hospital and Westmead Hospital.

As always, we must also 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.

# A SNEAK PEAK INTO OUR LAB

## FACTS

### 1 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 injury due to trauma, degenerative conditions (e.g. Parkinson's disease) and mild cognitive impairment. We are also interested in developmental conditions such as Autism Spectrum Disorders, and psychiatric conditions.

### 2 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. Psychophysiology 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.

### 3 Successes

Dr Maurice Finn successfully passed his thesis midyear and graduated in November. Hannah Rosenberg has recently submitted her thesis and is awaiting marker comments.



Chris Sufani  
PhD Candidate



### 4 Research Team

Our dedicated research team is led by Prof 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 experience in psychophysiological techniques and is a sought-after mentor for everyone in the lab. Dr Honan is a Clinical Neuropsychologist with expertise in test development and advanced statistical procedures. Dr Heather Francis is a Clinical Neuropsychologist. Her clinical work and research interests lie in emotion regulation anfollowing acquired brain injury.

We have a wonderful full-time research assistant: Samantha Allen. We were very sad to lose our senior research assistant Alana Fisher and part-time research assistants Christopher Sufani and Nicklas Parks over the past year. Samantha is available to take any calls or queries about the research program (02 9385 3590).

### 5 Students

There are currently 4 PhD students in the team: Emily Trimmer, Matt Gerathy, Katie Osborne-Crowley, and Christopher Sufani. Our honours students recently completed their studies, and we would like to take this opportunity to congratulate Martha Tsakalos, Novelle Poon, Meryem Joseph, Katie Dalton, and Kathryn Penglis.

## ABOUT OUR LAB



# ANXIETY IN ASD

BY EMILY TRIMMER



Emily Trimmer  
PhD Candidate

## What the study was about:

Individuals with Autism Spectrum Disorder (ASD) have been shown to have increased anxiety. This anxiety is especially heightened in social situations. It is therefore likely that these individuals have difficulties with empathy, specifically perspective taking, or being able to view the world from another's perspective.

## What we are doing:

Individuals aged 16 or older with a diagnosis of ASD and matched controls completed two self-report questionnaires. The Interpersonal Reactivity Index is a measure of cognitive and emotional empathy, whereas the State Trait Anxiety Index is a measure of one's underlying anxiety.

## What we found:

Individuals with ASD scored much higher on the anxiety questionnaire. However, these individuals also scored significantly lower on all measures of empathy, with the exception of one subscale, measuring personal distress. When we examined the relationship between the measures, we found that high anxiety was associated with difficulties with perspective taking. This suggests that individuals with ASD experience greater trait anxiety and higher personal distress, which together may be barriers in taking on board another person's thoughts or feelings.

# EMPATHY IN ASD

BY EMILY TRIMMER

## What the study was about:

Empathy involves both a cognitive component (understanding other's intentions and meaning) and an emotional component (feeling what another person is feeling). Individuals with Autism Spectrum Disorder (ASD) have been shown to have difficulties with cognitive empathy and perspective taking. Less is known about emotional empathy in these individuals and the present literature is inconsistent. This study examines the emotional empathy of individuals with ASD whilst watching emotional-video clips.

## What we are doing:

Individuals aged 16 or older with a diagnosis of ASD and matched controls watched a series of emotionally-driven video clips. Whilst watching the videos, participants' arousal level and facial expression

response were measured. Participants were also required to rate their level of mood and arousal after each clip.

## What we found:

Those with ASD experienced similar levels of arousal in response to the emotional clips as controls. This indicates that these individuals do experience emotionally empathic responses to emotional situations. However, the group with ASD showed reduced facial expression (frown) response to the emotional scenes. This suggests that individuals with ASD experience emotional reactions on the inside, but do not visibly express these reactions. This has serious implications for the way we interpret and respond to these individuals in distressing social situations.



# ARE PROBLEMS IN EMPATHY AND AROUSAL FOLLOWING SEVERE TRAUMATIC BRAIN INJURY LINKED TO LOSS OF SPECIFIC BRAIN STRUCTURES?

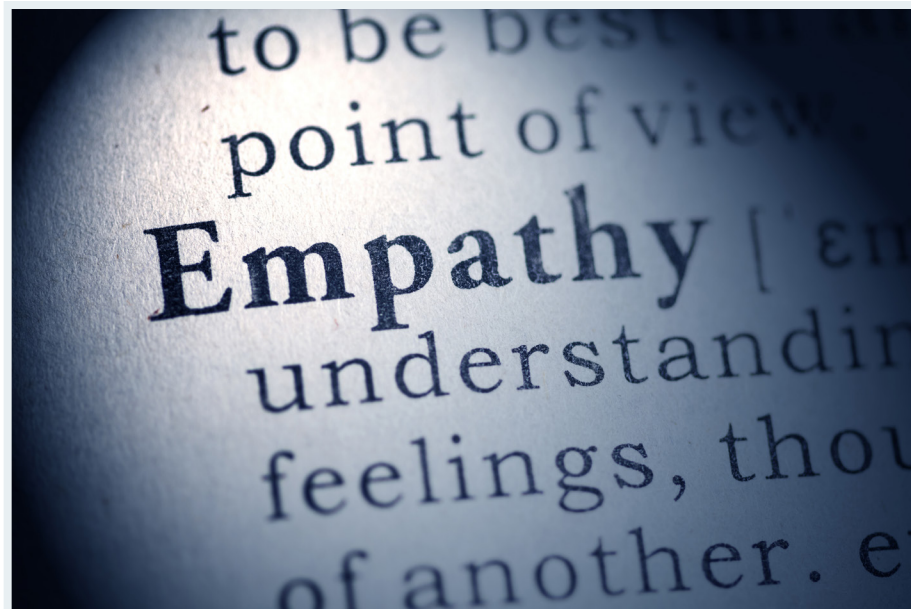
BY JACQUELINE RUSHBY

**Investigators:** Jacqueline Rushby, Alana Fisher, Skye McDonald, Nicklas Parks, & Olivier Piguet



Our findings suggest that

traumatic brain injury can lead to reduced brain volume and abnormal patterns of brain wave activity. These injury-related changes to neurophysiology may then make it more difficult to empathise with another's thoughts and feelings.



## What the study was about:

We know that severe traumatic brain injury (TBI) leads to problems in empathy and physiological arousal (or how reactive people are to other people and events around them), and these two things are thought to be linked. Certain “deeper” brain structures, which make up the limbic system, help to regulate arousal and emotion processing and are vulnerable to damage after a TBI. In this study we aimed to find out whether brain volume loss after TBI plays a role in these problems.

## What we did:

We tested 28 adults with a severe TBI and 28 Controls matched on age, gender and level of education. Participants had a magnetic resonance imaging (MRI) scan so we could measure grey and white matter volume in the brain structures we were interested in. We then used electroencephalography (EEG) to record participants' brain wave activity while relaxed (a measure of resting physiological arousal), and used questionnaires to ask participants about their levels of empathy.

## What we found:

We found that people with a TBI had reduced brain volumes both across the overall brain and in the individual brain structures of interest. We also found that the people with a TBI reported lower emotional empathy compared to Controls, as well as a different pattern of brain wave activity in both sides of the brain and along the midline (from the front to the rear of the scalp). Both brain volume and brain wave activity were associated with people's empathy levels.

## What our findings mean:

Our findings suggest that TBI can lead to reduced brain volume and abnormal patterns of brain wave activity. These injury-related changes to neurophysiology may then make it more difficult to empathise with another's thoughts and feelings.



# COULD BIOFEEDBACK BE USEFUL TO IMPROVE EMOTION REGULATION AFTER SEVERE TRAUMATIC BRAIN INJURY?

BY HEATHER FRANCIS

## What the study was about:

Heart rate variability (HRV) is thought to reflect a person's capacity for functioning well in social situations. HRV can be improved by biofeedback. People with traumatic brain injury (TBI) can have both reduced HRV and poorer social functioning. The present study aimed to determine whether

- 1) lower HRV in TBI is associated with poor social functioning and
- 2) whether HRV biofeedback might be a useful remediation technique.

## What we did:

HRV during a resting period and measures of social and emotional processing were collected in 30 individuals with severe TBI (3-34 years post-injury) and 30 controls. This was followed by a single session of HRV biofeedback where participants were

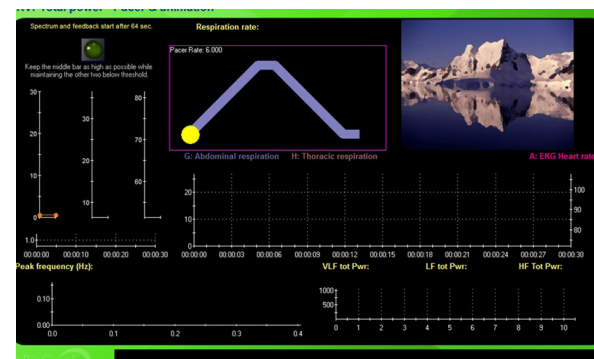


Figure 1. Screenshot: of the breathing pacer participants viewed during HRV biofeedback

asked to breath in time with a visual pacer (see Figure 1) timed at 6 breaths per minute.

## What we found:

Among TBI participants, higher (better) HRV was associated with better ability to understand social cues and empathise with another's thoughts and feelings. Higher (better) HRV was also associated with less difficulties identifying and describing one's own feelings and emotions in the TBI group. After one session of biofeedback both TBI and control groups showed significantly increased (better) HRV compared to the initial rest period.

## What our findings mean:

These results suggest that decreased HRV is linked to poorer social and emotional function following severe TBI. HRV biofeedback techniques may also be used to target problems with HRV and social functioning.

## Investigators:

Heather Francis, Alana Fisher, Jacqueline Rushby, Skye McDonald

# DO PEOPLE WITH POOR EMOTION PROCESSES (ALEXITHYMIA) HAVE PROBLEMS DETECTING NEGATIVE EMOTIONS IN OTHERS?

BY NOVELLE

## What the study was about:

Many people in the community are poor at recognising and processing their own emotions. This is known as alexithymia. There is also reason to believe that people with alexithymia are poor at recognising emotions in other people. The exact reason for this is unclear but one possibility is that people with alexithymia have particular problems with certain types of emotions due to abnormal brain pathways. This study was designed to see whether people with alexithymia have particular problems detecting negative emotions in others.



Novelle, Honours student under the supervision of Skye McDonald

## What we did:

We gave university students a questionnaire to determine if they had high alexithymia. We then showed them pictures of facial expressions in rapid succession. Some of the faces were repeated. Normally, people do not see the repeated face because it is too fast to attend to (known as repetition blindness). However, if it is a negative face, they are more likely to see both instances (Study 1). We also paired neutral faces with a painful shock (only to the extent our participants were happy to tolerate!) and then showed these faces in rapid succession (Study 2). This was to see whether repetition blindness was reduced when the face was

not inherently negative but was associated with a negative experience.

## What we found:

We were surprised to find that accuracy was greater to the non-threatening faces compared to threatening faces in both studies, suggesting that threatening facial expressions were not attended to as well as the non-threat. Repetition did not reduce detection rates. In fact, in Study 2 we got the opposite, that is, it increased detection rates! Nor did we find any particular differences with our participants who were highly alexithymic. So overall, we did not find results that are consistent with published work and our questions remain unanswered. That's science for you!

## VISUOSPATIAL LEARNING IN TRAUMATIC BRAIN INJURY: AN EXAMINATION OF IMPAIRMENTS USING THE COMPUTERISED AUSTIN MAZE TASK

BY CYNTHIA HONAN

### What the study was about:

Traumatic brain injury (TBI) often leads to problems with visuospatial learning and memory. The Austin Maze task is a measure of visuospatial learning that has a long history in both clinical neuropsychological practice and research, particularly in individuals with TBI. The task requires a person to learn a hidden pathway across a 10 x 10 array of buttons. The task continues until the person has reached a criterion of three correct error-free trials. The conventional form of the task was a small electronic device with buttons and accompanying circuitry. It has never been widely available commercially leading to its declining use in research and clinical settings over the past 20 years. However, a new computerised adaptation of the Austin Maze task is now available making the task more accessible to both clinicians and researchers alike. The primary purpose

of this study was to evaluate spatial learning deficits in an adult TBI sample using the recently developed computerised version of the Austin Maze task and to validate the measure with other cognitive tests.

### What we did:

A group of 28 people with severe TBI and 28 people with similar backgrounds but without a history of brain injury participated in the study. Participants were tested on the Computerised Austin Maze task as well as other cognitive tests assessing processing speed, working memory, verbal memory, cognitive flexibility, visuospatial copying and perceptual organisation and planning.

### What we found:

TBI individuals performed significantly more poorly on all Austin Maze task performance indicators (including total errors made, the number of errors made in the first 10 trials, number of

trials taken to reach criterion, and total completion time) than control participants. They were also less likely to complete the task. Austin Maze task performance was moderately correlated with processing speed and working memory tasks, and highly correlated with flexibility and organisation and planning tasks. No Austin Maze task measure was related to verbal memory or a visuospatial copying task. Thus, the computerised version of the Austin Maze appears to be a sensitive measure that can detect visuospatial learning impairments in TBI individuals. It is also a measure that demonstrates good convergent and divergent validity.

An article for publication is currently under review.

Honan, C. A., McDonald, S., & Fisher, A. (submitted). Visuospatial learning in traumatic brain injury: An examination of impairments using the computerised Austin Maze task.

## BIOFEEDBACK TO REGULATE HEART RATE VARIABILITY CAN IMPROVE EMOTION REGULATION

BY KATHRYN MARGARET PENGLIS

### What the study was about:

One of life's great challenges is successfully regulating emotions. When individuals can successfully regulate their own emotions when confronted by emotionally evoking stimuli, this can lead to a better sense of well-being both emotionally, psychologically and physically. HRV Biofeedback is a method that teaches individuals how to control their physiological functions with breathing techniques, by providing feedback as to the nature of their own physiological activity (heart rate and arousal). This study aimed to examine whether a single session of HRV biofeedback can alter responses to angry events.

### What we did:

We recruited 60 participants from the student (n = 39) and general community (n =

21). 30 participants received HRV biofeedback in which they watched a screen which gave them feedback about their breathing, heart rate etc and were trained to match their breathing to a ball on-screen which helped them pace breathing to be slow and regular. The other 30 participants watched a screen but did not receive biofeedback. After 5 minutes, all participants were asked to do a stressful number counting exercise and then to watch a film about human rights injustice. We did this to induce feelings of anger. This design was further repeated to look at high (n = 12) versus normal trait aggression (n = 48).

### What we found:

All participants reported feeling more angry after watching the film. There was no difference in anger



Kathryn, Honours student under the supervision of Heather

ratings between those who received feedback and those who did not.

On the other hand, there were clear changes in heart rate in those participants who underwent biofeedback suggesting this was successful in regulating physiological function. It may be that longer biofeedback sessions may lead to clearer changes in anger regulation.



# ADOLESCENT PERFORMANCE ON THE AWARENESS OF SOCIAL INFERENCE TEST: T A S I T

BY SKYE MCDONALD, ALANA FISHER, LEANNE TOGHER AND COLLEAGUES

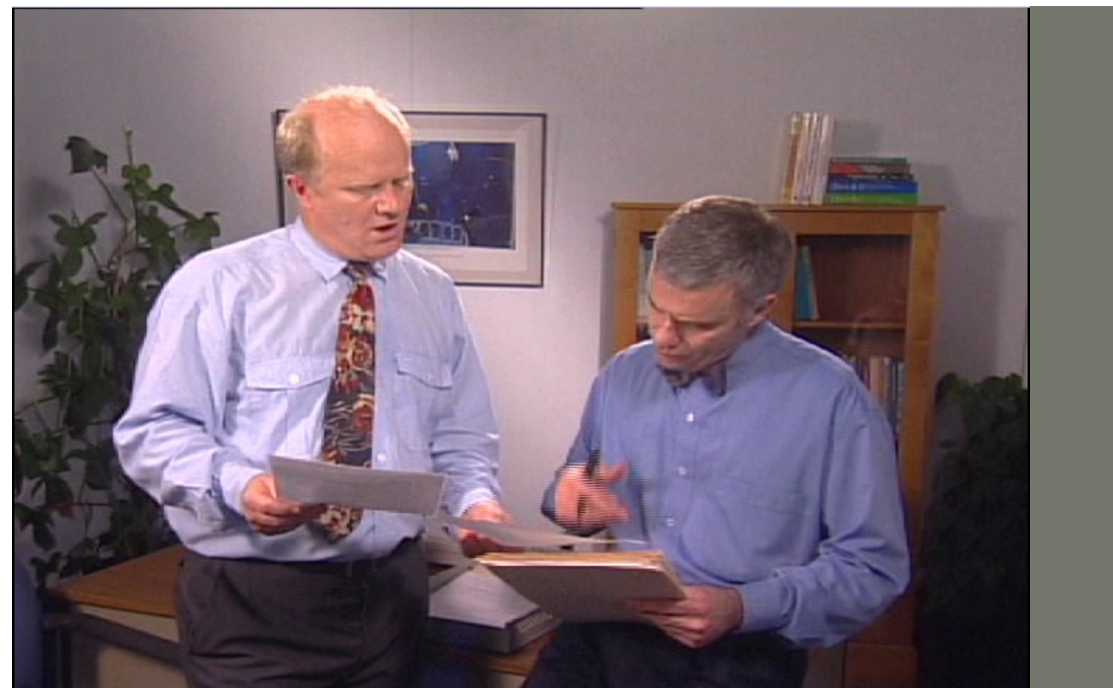


Figure 1.  
Screen shots of  
example scenes  
from TASIT.

## What is this about?

The ability to understand social cues (e.g., facial expression, tone of voice, gestures, body language) is an important part of social interactions. Social cognition can be disrupted in numerous developmental and acquired brain disorders during childhood and adolescence. Despite this, there are few tools to assess social cognition clinically in this age group. This study examined adolescent performance on The Awareness of Social Inference Test (TASIT), which is known to be a valid measure of social cognition in adults.

## What we did:

We tested 665 school children from private and government schools on parts of TASIT. TASIT involved showing students a series of short video-clips involving actors in everyday social situations (see Figure 1). In these situations the characters are either genuine/sincere, sarcastic, or telling a lie. After viewing each of the clips, the students answered questions about what a particular character was thinking, feeling, wanting another character to do, or really meaning to say. Of all the

participating students, 464 students aged 13-15 were selected to provide data on average performance. Scores from a further 97 students provided information on how lower levels of English familiarity impact on performance.

## What we found:

Adolescents did not perform as well on TASIT as adults although the differences were not large. Older adolescents were somewhat better than younger adolescents but there was a great deal of overlap. Female students performed better than male students overall. Adolescents who did not speak English at home had scores that were 6-13% lower than adolescents who spoken English as a first language.

## What these findings mean:

TASIT appears to be a suitable measure of social cognition for adolescents. When determining levels of average performance, the adolescent's age, gender, and English language familiarity needs to be considered.



# AUTOMATIC EMOTIONAL RESPONSES TO FACIAL EXPRESSIONS AND EMOTIONAL SCENES

BY MARTHA TSAKALOS

## What the study was about:

Emotion processing has been widely studied using facial expression and emotional scene stimuli. Although their investigations have typically remained separate, the literature suggests differences may be evident at the early and automatic stages of emotion processing. The aim of this study was to determine whether facial expressions elicit greater psychophysiological responses than emotional scenes at the level of automaticity.

## What we did:

A backward-masking paradigm was employed to block visual awareness of the emotional stimuli. The emotional images i.e. faces or scenes, were presented for 30 ms and immediately overlaid with a 5 s pattern mask. During the task, participants rated the patterned (masking) images on pleasantness. Facial electromyography (EMG), skin conductance and evoked cardiac deceleration (ECD) responses were continuously measured as indices of automatic emotional responding.

## What we found:

At the level of automaticity, the emotional output to emotional faces and scenes was comparable in magnitude, however, more elaborated, valence-specific patterns were evident in the zygomaticus EMG and skin conductance responses (SCRs) to emotional faces.

Interestingly, ratings of the pattern masks were modulated by the valence of the emotional scenes, however, this was not in line with the psychophysiological responses evoked. Overall, these findings highlight the importance of the stimuli set in the emotional responses evoked in backward-masking paradigms.

# THE IMPACT OF BINGE DRINKING ON EMOTIONAL AROUSAL IN YOUNG ADULTS

BY MERYEM JOSEPH

## What the study was about:

Alcohol abuse and dependence is associated with poor emotional arousal and empathy. Chronic alcohol users show increased sensitivity to negative content (negativity bias) and reduced empathy. However, most studies focus on older, alcohol-dependent individuals. Less is known about the effects of binge drinking, particularly on the non-mature brain. Further, it is not clear whether abnormalities occur before or after the commencement of alcohol use. This study examined the effect of initiating binge drinking on emotional arousal in young adults by measuring their brain activity using electroencephalogram (EEG), namely EEG alpha power.

## What we did:

18 young adults (aged 17-25) who had never previously had a drinking binge (defined as consuming at least 4 standard drinks on one occasion) came into our laboratory to have their brain activity (EEG alpha) monitored as they sat quietly for two minutes with their eyes closed followed by their eyes open. They then viewed film clips containing pleasant, unpleasant and neutral content and were asked to rate how pleasant/unpleasant they found these. They also filled in questionnaires about how impulsive and empathic they felt they were.

They returned for a follow-up session held 3 months later. Eight participants had initiated binge drinking and 10 continued to abstain. They were tested in the same manner as the baseline session.



## What we found:

The participants who went on to start bingeing had higher arousal and increased sensitivity (greater alpha suppression) to unpleasant content compared to the non-bingers even before they had started drinking. The two groups did not differ in other ways, either in how they rated the films or in how they reported their psychological state. There were no major changes from baseline to follow-up, although some subtle patterns were observed.

## Conclusions:

This study indicated that brain activity especially in relation to emotional material, is different in people who have not yet started drinking but who go on to do so. This has important implications for improving prevention programs targeting at risk individuals.

## Investigators:

Meryem Joseph, Jacqueline Rushby, Katie Dalton and Janette Smith.

# FACIAL EMOTION RECOGNITION DEFICITS FOLLOWING MODERATE-SEVERE TRAUMATIC BRAIN INJURY (TBI): RE-EXAMINING THE VALENCE EFFECT AND THE ROLE OF EMOTION INTENSITY

BY HANNAH ROSENBERG



## What the study is about:

A common difficulty with research investigating emotion recognition, is that negative emotions (such as sadness, disgust, fear and anger) are more difficult to recognise from the face than positive emotions (such as happiness and surprise). This is a confound in emotion recognition research since it limits the conclusions about specific impairments in recognition of some emotions in clinical populations.

## 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 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, it aimed to compare the recognition of the equated videos to the recognition of 100% full blown expressions (that are most commonly used in emotion recognition research). Second, it aimed to examine whether emotion recognition is associated with selected neuropsychological measures assessing working memory, processing speed and executive functioning. Third, it 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.

## What we found:

On stimuli of full-blown 100% intensity: the TBI group was impaired in recognising anger, fear and disgust, but not happiness, surprise or sadness, and performed worse on negative than positive emotions. On stimuli of 'equated intensity': the

TBI group was poorer than controls overall, but not differentially poorer for negative emotions. Although processing speed and non-verbal reasoning were associated with emotion accuracy, injury severity by itself was a unique predictor. These results indicated that when task difficulty is taken into account, individuals with TBI show impairment in recognising all facial emotions. There was no evidence for a specific impairment for negative emotions or any particular emotion. Impairment was accounted for by injury severity, rather than being a secondary effect of reduced neuropsychological functioning.

## To read more about this study:

Rosenberg, Dethier, Kessels, Westbrook, & McDonald (in press). Emotion perception after moderate-severe Traumatic Brain Injury: The valence effect and the role of working memory, processing speed and non-verbal reasoning. Neuropsychology



# WHAT CAUSES SOCIAL INAPPROPRIATE BEHAVIOUR IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY?

BY KATIE OSBORNE-CROWLEY

## What the study is about:

Many people with severe traumatic brain injury (TBI) have socially inappropriate behaviour. This is one of the most distressing outcomes of TBI for the individual, their family and the community. Yet exactly what causes this problem is unclear. One theory is that people with TBI cannot learn to change tack when their behaviour is no longer useful or appropriate. We know that this failure to learn to change tack is associated with damage to the frontal lobes of the brain.

Our study aimed to determine whether failure to learn to change tack in this way is associated with socially inappropriate behaviour in adults with severe TBI.

## What we are doing:

Twenty-one participants with a TBI and 21 participants from the general community completed a task in which they were shown two geometric shapes on a screen and were told "YOU WIN!" if they chose one of these and "YOU LOSE" if they chose the other. Half way through the rule swapped over so the "lose" shape became the "win" shape and vice versa. They were also given a "social" version of this task where they were shown two photographs of faces. If they chose the correct face a new photo of the same actor with a "happy" expression showed up. If they chose the incorrect face, the same actor with an "angry" expression showed up. Once again, half way through the rule swapped over so the "happy" actor became the "angry" actor and vice versa.

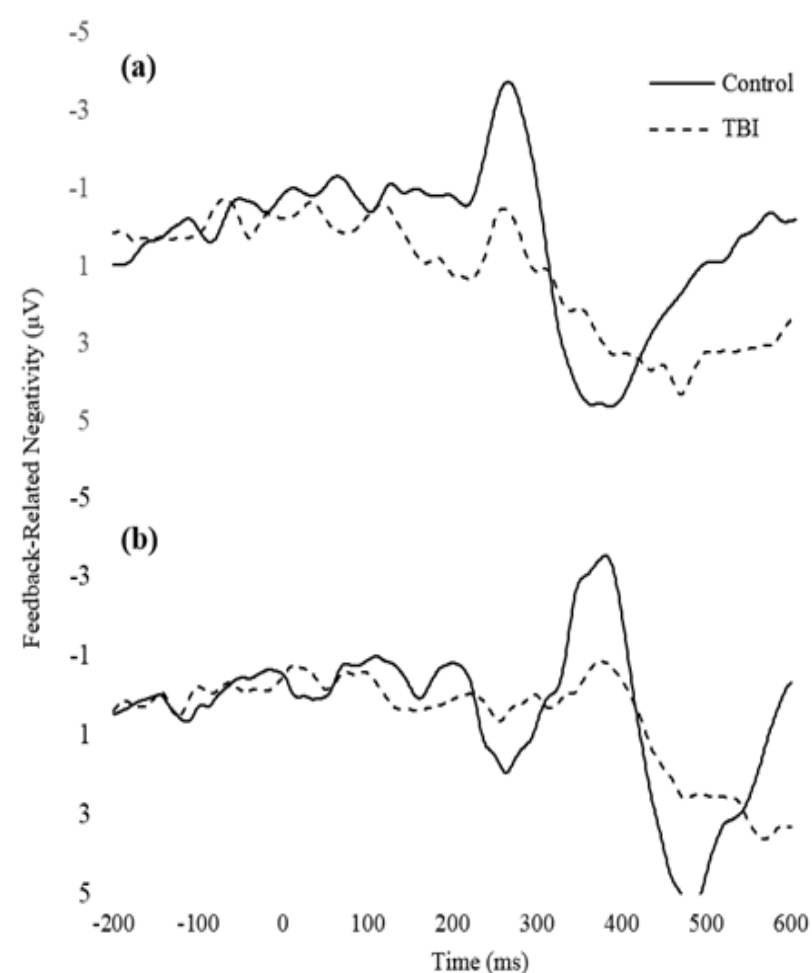


Figure 1. Average feedback-related negativity for TBI and control group for (a) the non-social and (b) the social reversal learning task.

We measured performance in two ways. We looked at how many wrong choices people made on the two tasks. We also looked at brain activity (EEG). In particular we looked at a specialised part of the brain wave that shows a peak (ERP) when people are just learning that their response is incorrect.

We also interviewed participants and videotaped the conversation. We later asked two judges who did not know anything about the participants to rate how appropriate their conversation was.

## What we found:

The participants with TBI group made more errors on both tasks than the participants without brain injuries. Their brain waves also showed lower "peaks" when they were given feedback during the tasks. We also found that those participants with TBI who were rated as having highly inappropriate behaviour had more errors when learning to change tack than did the participants with TBI who were rated as having normal behaviour.

These results suggest that being unable to change tack may play a role in causing socially inappropriate behaviour after TBI. Further, the pattern of reduced brain wave activity when processing mistakes might be a marker of a problem with this kind of learning.

# CAN'T YOU SEE HOW I FEEL? EXAMINING EMOTION RECOGNITION DIFFICULTIES FOLLOWING MODERATE-SEVERE TRAUMATIC BRAIN INJURY, USING COMPLEX AUDIO VISUAL EMOTION ASSESSMENT TASK (CAVEAT), A NOVEL TASK OF EMOTION RECOGNITION

BY HANNAH ROSENBERG

## What the study is about:

People who have 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.

## What we are doing:

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 reevaluation of the commonly reported findings that recognition of negative emotions is more impaired following a range of neurological conditions than positive emotions. Thirty two people with moderate-severe TBI and 32 demographically matched controls completed CAVEAT as well as some neuropsychological measures.



## What we found:

The TBI group performed more poorly in recognising all emotions, rather than displaying a selective impairment in recognising some emotions compared to others. Although processing speed, non-verbal reasoning, and working memory were associated with emotion recognition, injury severity and non-verbal reasoning were the sole predictors of CAVEAT performance. Emotion recognition performance in the TBI group was associated with self-reported disinhibition and self-reported number of friends. These findings reveal that emotion recognition deficits have a direct effect on the social dysfunction that is associated with TBI, strengthening the need for targeted remediation of these difficulties alongside carer training to reduce frustration.

## To find out more about this study:

Contact Hannah Rosenberg:  
[hannah.rosenberg@unsw.edu.au](mailto:hannah.rosenberg@unsw.edu.au)



# BEGINNING TO BINGE DRINK: ITS EFFECT ON BEHAVIOURAL INHIBITION IN ADOLESCENTS AND YOUNG ADULTS

BY KATIE DALTON, JANETTE SMITH, MERYEM JOSEPH & JACQUELINE RUSHBY

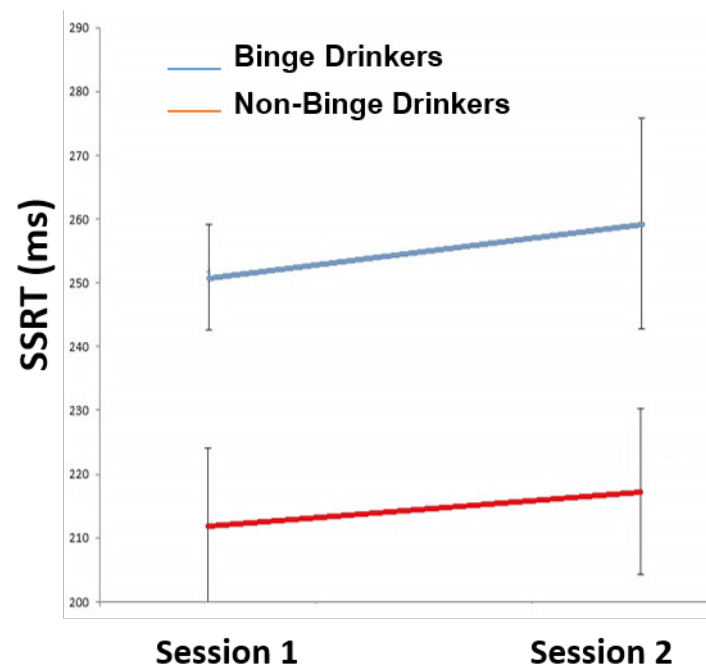


Figure 1. Average reaction time on the stop signal task for Binge drinkers and Non-binge drinkers at session one and two.

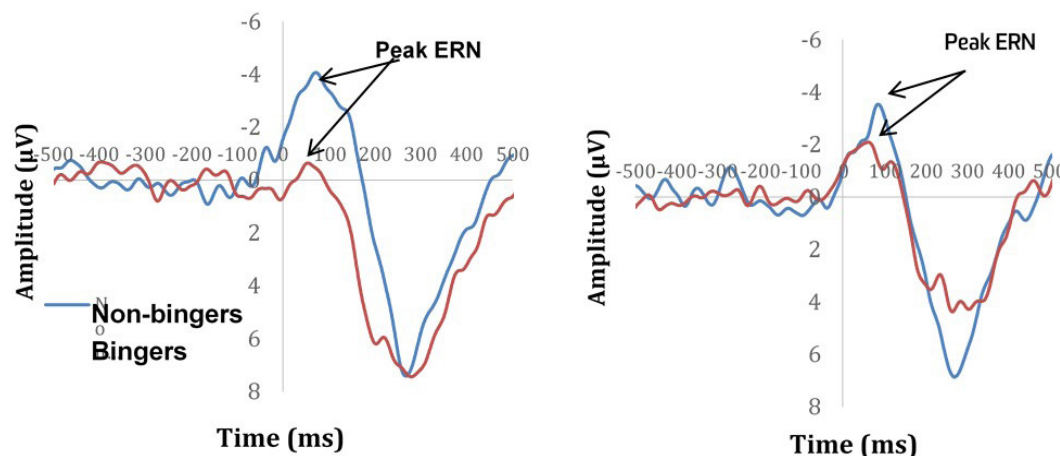


Figure 2. Peak in brain wave activation (Error-related Negativity: ERN) indicated by arrows for Non-bingers (blue) and Bingers (red) at session one and session two.

### What is this about?

Binge drinking (consuming four or more standard drinks on one occasion), is prevalent amongst Australian teenagers and young adults. Risky drinking habits in this population is concerning because, at this age, brain development has not yet reached full maturation. The effects of high-level alcohol consumption on brain development is not yet understood. Worryingly, such consumption may affect future brain function and lead to disorders like alcohol abuse and dependence.

An aspect of brain function that may be relevant to alcohol consumption is the ability to inhibit behaviour. This can be measured in “the laboratory” by the stop-signal task. In this task participants are trained to respond routinely to simple signals (such as pressing a button if they see a particular shape on a screen) but to inhibit their button press if an auditory tone is heard as well. We know this ability is hindered in alcoholics and intoxicated individuals.

The present study examined a group of university students on this task in conjunction with measures of brain activity (brain electrical activity measured using EEG). All participants had no history of binge drinking at the first session of testing. By session two half had commenced binge drinking.

### What we found:

Those students who had commenced binge drinking were slower to react on the stop signal task than those who had not commenced binge drinking. Importantly, this slow reaction time was present before they had started binge drinking. It did not change after they had commenced binge drinking (Figure 1).

We also found differences when we examined a specific feature of brain activity, that is a peak in brain waves that occurs when participants are unconsciously monitoring their errors (known as ERN). This indicated that there were differences in inhibition abilities even before the participants began to binge drink (Figure 2).

### What these findings mean:

Taken together, evidence suggests that there are pre-existing problems with behavioural inhibition in those who later commence binge drinking. Presently, there is not enough information available to determine the extent of damage being caused by binge drinking in this age population; therefore more research is needed in the future.

# ASSESSMENT OF SOCIAL SKILLS IN INDIVIDUALS WITH TRAUMATIC BRAIN INJURY

BY HEATHER FRANCIS & SKYE MCDONALD

## What the study was about:

Reductions in social functioning are common following traumatic brain injury (TBI) and include violation of social customs, poor emotion recognition, irritability, poor communicative ability and repetition in conversations. These problems are often rated by relatives as the most difficult to come to terms with. They result in poor reintegration, difficulty returning to work and relationship stress. Finding a good measure of these social skills is important so deficits can be detected early and targeted for remediation. A good social skills measure is also important as a means to evaluate the success of social skills training programs.

One potential measure is the Social Performance Survey Schedule (SPSS). Unfortunately, two previous studies showed that it is not sensitive to TBI. Analysis of the items suggested that many were not suitable for a TBI population.

The aim of this project is to develop a new tool for measuring social skills, using some of the appropriate items from the SPSS, as well as some additional items.



Finding a good measure of these social skills is important so deficits can be detected early and targeted for remediation. A good social skills measure is also important as a means to evaluate the success of social skills training programs.

## What we did:

We developed a shortened version of the SPSS consisting of 35 statements, which a relative or close other of an individual with TBI is asked to rate on a five point likert scale. We are analysing how well this questionnaire works in two different studies.

Firstly we re-analysed data we already had on the full SPSS and other social measures given to 40 people with TBI and their families. Secondly, we are in the process of distributing the questionnaire via online survey advertised via social media of Brain Injury Australia, as well as via participants in our laboratory. Family members/significant others of an individual with TBI completed the questionnaire, in conjunction with behavioural measures and other questionnaires related to social functioning for comparison.

## What we found:

According to our retrospective analysis of from the 40 individuals with TBI, our questionnaire divides neatly into two subscales, negative and positive social skills. These are internally consistent ( $\alpha=.93$  and  $\alpha=.90$  respectively). Ratings on the scale correlated significantly with social perception (TASIT parts 1, 2 and 3:  $r=.360-.449$ ). The scale also correlated with other measures of social performance; Katz Adjustment Schedule-R1 ( $r = .734$ ) and the Sydney Psychosocial Reintegration Scale ( $r = .501$ ). Twenty-three individuals completed the items on repeated occasions, demonstrating good test-retest reliability ( $r = .89, p < .001$ ). Analysis of the online survey data is ongoing and we hope to publish the findings in early 2015.





# CAN PEOPLE WITH TRAUMATIC BRAIN INJURY DETECT SINCERITY IN OTHERS?

BY SKYE MCDONALD, ALANA FISHER, & SHARON FLANAGAN

## What the study was about:

Many people with severe traumatic brain injury (TBI) are perfectly able to understand straight-forward conversations. Unfortunately, conversations are not always straight forward and speakers often do not mean what they say. This is where problems can emerge for some people with TBI. Quite a lot of research has shown that some people with TBI have difficulty understanding sarcasm where the speaker means the opposite to what they say. But there are many shades of grey between being totally sincere (such as enthusiastically taking on additional work: "Yeah, always happy to help!") and blatantly insincere ("Yeah, always happy to help!" as a sarcastic response). Speakers may choose to use the same words while communicating a lack of sincerity that falls

somewhere between the two extremes.

This study aimed to explore whether people with TBI have difficulty detecting insincerity. We also wanted to know whether this is because they have poor cognitive abilities (attention, processing speed, etc) or poor ability to interpret social cues (emotional expression, mental states).

## What we did:

For our study, 30 adults with severe TBI and 30 matched controls watched short video-clips showing everyday scenarios in which people were asked to volunteer for additional duties (e.g., cat-sitting, covering shift at work, helping move house). In each vignette four actors responded that they were willing to take part. However, each of the four actors differed in how sincerely they said this. After viewing each



Figure 1. Example screen-shots of four responding actors with four verbal responses used.

clip, participants rated how sincere they thought each actor was. We also tested participants on their basic emotion and social perception, attention, processing speed and abstract reasoning.

## What we found:

As others have found, we found that the TBI participants were as good as those without injuries in detecting the very sincere speakers. Also, as found before, they were not as sensitive to sarcasm as the controls, rating sarcastic comments as relatively sincere. We also found that TBI participants were relatively poor at differentiating between differing levels of sincerity. These difficulties were specifically associated with poor social perception.

## What our findings mean:

Communication is fundamental to interpersonal success. It is common for speakers to say something but to not be entirely sincere in doing so. This enables them to communicate, at another level, a different set of meanings. If people with TBI cannot detect these subtleties they are very disadvantaged in social situations. Our

Our findings suggest that problems detecting these subtle differences are related to poor social cognition which is an important remediation target.

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## THE MULTIDIMENSIONALITY OF SOCIAL INFERENCE: FACTOR STRUCTURE OF THE AWARENESS OF SOCIAL INFERENCE TEST (TASIT)

BY CYNTHIA HONAN, SKYE MCDONALD AND CHRIS SUFANI

### What the study is about:

The Awareness of Social Inference Test – Revised (TASIT-R) is sensitive and reliable tool that assesses social perception deficits. Unlike traditional emotion recognition measures that use static displays (such as photographs) of emotional expressions, TASIT assesses understanding of complex spontaneous displays of emotion encountered in everyday social interaction. TASIT contains three parts; Part 1 measures emotion perception focusing on speakers engaged in ambiguous conversation; Parts 2 and 3, on the other hand, measure the ability to identify the thoughts, intentions and feelings of speakers, and the ability to interpret conversational meanings as sincere, sarcastic, or deceptive. Despite its relevance as an assessment tool for people with brain injuries, we do not know whether the subtests are actually measuring separate abilities.

### What we are doing:

In this study we are examining the structure of TASIT using complex statistical techniques (such as confirmatory factor analysis and structural equation modelling) in a large group of people with acquired brain injury (from trauma, stroke etc). We are also looking at whether their performance on TASIT is similar to their performance on other cognitive tests (e.g. processing speed, working memory, cognitive flexibility) and social cognitive tests (e.g. face recognition, theory of mind, self-reported empathy). Data is currently being analysed and an article is being prepared for publication.

### What we expect to find:

We expect that the subtests of TASIT will be generally valid measures of different types of abilities with some differences. For example, it may be that emotion recognition is better represented as recognition of positive versus negative rather recognition of individual emotions. In Part 2 we expect that ability to understand sincere exchanges will be different to the ability to understand sarcasm, and in Part 3 we expect that ability to recognise lies will differ to recognition of sarcasm. We also expect that TASIT performance will correlate to other social cognition measures and (to a lesser extent) with other cognitive tests.

For more information about the study: Please contact Cynthia on [c.honan@unsw.edu.au](mailto:c.honan@unsw.edu.au).

## SOCIAL DISINHIBITION: A FAILURE TO INHIBIT AND/OR A FAILURE TO PRODUCE SOCIALLY ACCEPTABLE RESPONSES?

BY CYNTHIA HONAN

### What is this about?

Problems inhibiting inappropriate social behaviour are common to many neurological conditions involving frontal lobe dysfunction (e.g., TBI). Formal tests 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 inhibition difficulties that occur in social contexts.

It is unclear for instance, if a person with TBI has difficulty with adjusting their responding to be more socially acceptable or has difficulty with inhibiting automatic behaviours and verbal responses.

This study addressed two questions:

- 1) Are individuals with TBI impaired in inhibiting automatic verbal responses to complex social information?
- 2) Are they impaired in their ability to produce socially acceptable positive responses?

This study also aims to develop a new "Social Disinhibition Task" that is suitable to detect social disinhibition deficits in clinical (as opposed to laboratory) settings.

### What we are doing:

The new social disinhibition task requires



people with TBI to view scenes of complex social situations, and then describe a character in them (Part A), describe a character while inhibiting inappropriate or negative remarks about them (Part B), and describe a character while not only inhibiting negative remarks, but also providing positive remarks (Part C). To date, 19 individuals with TBI and 14 healthy controls have participated.

### What we have found so far:

TBI participants and healthy control participants responded similarly to Part A. Individuals with TBI were significantly impaired on Part B with a trend towards impairment on Part C. However, further participants are required to confirm the significance of this effect. The data collected will be used to also assess the psychometric properties of the test items so that a clinical measure of social disinhibition can be constructed.

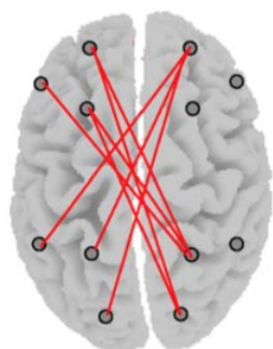
For more information about the study:

Please contact Cynthia on [c.honan@unsw.edu](mailto:c.honan@unsw.edu).



# LINKING THE SIGNIFICANCE OF BRAIN CONNECTIVITY IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

BY CHRISTOPHER SUFANI



## What is this about?

Autism Spectrum Disorder is a neurodevelopmental disorder, which affects 1 in 68 individuals around the world causing lifelong impairments in social interaction/communication and behavioural flexibility. With no cost-effective treatment available, it has been estimated that the total societal cost associated with dependence on health care, family coordinated services, special education and therapy amounted to \$9 billion per year.

Recently, a number of studies have suggested that autism

is associated with abnormal functional connectivity or “communication” between distant regions of the brain. However, at present the relationship between brain functioning/connectivity and autism symptom severity has not been established. Bridging this gap in research will help us understand the mechanism underlying ASD and aid in the development of effective treatment, remediation and educational programs.

## What will we be doing?

We can measure brain connectivity by measuring brain waves (electrical

activity) using EEG. Using a wireless EEG device (see image) we aim to investigate whether measures of brain functioning can inform us about differences in autism symptom severity and cognitive functioning across 6-11 year old children WITH and WITHOUT autism spectrum disorders.

To find out more about this OR if you OR someone you know is interested in participating, please contact Christopher Sufani on email ([c.sufani@student.unsw.edu.au](mailto:c.sufani@student.unsw.edu.au)) or mobile (+61 475 247 303).

# THE AWARENESS OF SOCIAL INFERENCE TEST (TASIT) – A SHORTENED VERSION

BY CYNTHIA HONAN & SKYE MCDONALD

## What the study is about:

It is becoming more and more apparent that people with all kinds of brain disorders have problems reading social cues and we need to be able to assess these. The Awareness of Social Inference Test (TASIT) is an ecologically valid and reliable tool that assesses higher-level social perception deficits. The measure is sensitive to deficits in various patient groups including traumatic brain injury, schizophrenia, frontotemporal dementia, Alzheimer’s disease, and stroke. However, its administration time is lengthy (60-75 mins). As such, routine use of this tool in clinical settings is often difficult to achieve.

## What we are doing:

The aim of this study is to develop a shortened version of the TASIT to screen for higher-order social perception deficits. The shortened version will be created by sophisticated statistical techniques (confirmatory factor analysis and Rasch analysis methods) to look at each individual item in TASIT to see how much extra information it provides and whether it is necessary or useful. This study will also validate the new shortened version TASIT by seeing whether performance on the short version predicts performance on cognitive (processing speed, working memory, cognitive flexibility, etc) and social cognitive (facial recognition, theory of mind, and self-reported empathy) domains. Participants include 160 individuals with a history of acquired brain injury (e.g. traumatic brain injury, stroke, and tumour). Data is currently being analysed and an article is being prepared for publication.

## What we expect to find:

We expect that the shortened TASIT will be a useful screening tool for higher-order social cognition deficits in those with acquired brain injury which can easily be administered in clinical settings. We also expect that the TASIT will show moderate correlations with alternative social cognition measures and small to moderate correlations with most alternative cognitive tests.

For more information about the study: Please contact Cynthia on [c.honan@unsw.edu.au](mailto:c.honan@unsw.edu.au).

# PUBLICATIONS

## BOOKS AND BOOK CHAPTERS

2014

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- McDonald, S., Fisher, A., Flanagan, S. and Honan, C. *Impaired perception of sincerity after severe traumatic brain injury* (Submitted).
- Kangas, M., McDonald, S., Williams, R.J. and Smees, R.I., *Acceptance and Commitment Therapy (ACT) for Distressed Brain Tumor Patients* (Submitted).
- Honan, C.A., McDonald, S., Gowland, A., Fisher, A., and Randall, R. (Submitted) *Deficits in comprehension of speech acts after TBI: The role of Theory of Mind and Executive Function* (Submitted).
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