

Psychology Honours Supervisors and Research Areas for 2018

The following is a list of supervisors and their research interests available for supervision of Honours projects in 2018. This list is intended for *current UNSW students only*.

Dr Kathryn Baker (k.baker@unsw.edu.au)

Lecturer NHMRC Early Career Fellow

The primary focus of my research is the extinction of fear in adolescent rats. Potential projects include, but are not restricted to:

1. The mechanisms of impaired or successful fear extinction in adolescent rats.

Adolescence is a period of increased vulnerability to anxiety disorders. Across species (i.e., both rodents and humans) it is noted that extinction of fear is impaired in adolescence compared to adults. But this isn't always the case. Unexpectedly adolescent rats exhibit good extinction retention for fear acquired before adolescence, but not for fear acquired the day before extinction. In examining the brains of these adolescent animals, I have found that the neural circuit involved in fear extinction (i.e., the prefrontal cortex and the basolateral amygdala) was different to that recruited in animals of other ages, regardless of whether they exhibited impaired extinction or not. Potential projects can build upon this work and investigate the neural and/or behavioural mechanisms of impaired or successful fear extinction in adolescent rats.

2. Does the development of the prefrontal cortex contribute to the recovery of extinguished fear in adolescence?

The prefrontal cortex undergoes substantial development during adolescence, with some regions not becoming fully developed until young adulthood. Other projects will investigate the maturation of excitatory and inhibitory systems in the prefrontal cortex in adolescence, and how the maturation of these systems influences fear regulation in adolescence and later in life.

3. Adverse environmental exposures in adolescence which alter fear regulation

Exposure to certain types of events/stimuli during adolescence can exacerbate adolescent-typical phenotypes and/or lead to their persistence into adulthood. Studies in rodents, including my own, have found that stress and unhealthy diet exposure during adolescence can affect fear regulation during both adolescence and into adulthood. The adolescent brain may be particularly susceptible to such environmental stimuli because of the substantial maturation of the brain during this period of development. Potential projects will build on this work and examine how adverse environmental events during adolescence alter fear regulation

Dr Denovan Begg (d.begg@unsw.edu.au)

Senior Lecturer and ARC DECRA Fellow

The primary focus of my lab is the neuroscience of ingestive behaviour. We study how the brain regulates food and fluid intake and the effects of diet composition on the brain and behaviour. Specifically, we examine the homeostatic regulation of ingestive behaviour and body weight, in order to identify the neurobiological mechanisms underlying the development of obesity. We utilise many behavioural, physiological and molecular techniques, primarily using genetically modified mouse models, our current projects include:

1. The role of central nervous system insulin on hippocampal-dependent cognitive function

The pancreatic hormone, insulin, acts as an adiposity signal that circulates proportionally to body fat. Insulin is transported to the central nervous system via the brain endothelial cells of the blood-brain barrier and it has recently emerged that insulin plays an important role in hippocampal-dependent cognitive functioning. The current project will examine the effects of chronic pharmacological infusion of insulin into the brain and the genetic knockdown of insulin transport and activity on hippocampal-dependent cognitive function in mice. This project is significant because successful completion of these experiments will increase our understanding of how circulating insulin enters the brain to influence the brain and behaviour.

2. The cyclooxygenase-eicosanoid pathway and fatty acids alter thirst in aging

Dysfunction of the systems that control thirst and fluid intake occurs with aging in mammals. Basal fluid intake remains largely unaffected by aging, however the response to stimuli that elicit thirst via hypovolemia, including dehydration, are diminished. Therefore, failure to adequately maintain body fluids in aging becomes a major problem in situations such as heatwaves, and despite the importance of thirst deficits in aging the underlying mechanism has yet to be identified. Both humans and animal models display reduced thirst in response to dehydration, however our preliminary data suggests that inhibition of the cyclooxygenase-eicosanoid pathway may prevent thirst dysfunction in aging animals. Our research aims to determine the mechanisms underpinning the failure of aging animals to maintain adequate hydration. This project first examines the effect of dietary omega-3 fatty acids on thirst and thirst-mediated neural activation in aged rats in brain regions known to generate a thirst response. We will then determine the effect of omega-3 fatty acid supply in aged rats on the expression of genes associated with the regulation of thirst and eicosanoid production in activated hypothalamic neurons and the changes of membrane phospholipid composition and lipid metabolites following omega-3 fatty acid supplementation. Finally, the effect of adeno-associated virus (AAV)-mediated inhibition or overexpression of cyclooxygenase-eicosanoid pathways in the thirst responses of rats to both osmotic and hypovolemic thirst stimuli will be examined to determine the role of the cyclooxygenase-eicosanoid in thirst deficits associated with aging. Overall, this research aims to improve understanding of mechanisms involved in the reduced thirst response with aging and may lead to dietary and pharmacological interventions to prevent dehydration in the elderly via manipulation of the cyclooxygenase-eicosanoid pathway.

3. The mechanisms of insulin transport into the central nervous system

This project aims to understand transportation of peripheral insulin into the central nervous system and how it maintains energy balance. Insulin is essential for normal physiological

functioning in the periphery and central nervous system, but some circumstances, including high-fat diets, reduce insulin signalling in the brain. This project examines the mechanisms of insulin transport into the central nervous system, and may improve our understanding of blood brain barrier insulin transport and dysfunction.

Dr Jay Bertran-Gonzalez (j.bertran@unsw.edu.au)

ARC DECRA Fellow

My research is part of the new Decision Neuroscience Laboratory (School of Psychology), and specifically seeks understanding the role of basal ganglia circuits during action. To achieve this we combine a variety of conditioning procedures in mice and rats with modern techniques in neuroscience and microscopy. These include opto-, toxico- and pharmaco-genetic manipulations of neuronal circuits in behaving rodents, as well as large-scale mapping of neuronal activity through spinning-disk confocal microscopy and digitised reconstruction.

Some of the incoming projects include:

1. Mapping of neuronal activity during early and late goal-directed action

This project seeks to determine the neuronal populations that are engaged during the initial and late phases of goal-directed learning. For this we will use confocal reconstructions of large tissue samples spanning the rostro-caudal axis of the mouse brain. We will map the position, the extent of activity and the neuronal identity of each individual cell by combining activity markers with transgenic mice that allow the identification of specific circuits in the brain. The aim is to generate detailed activity maps of each specific network engaged during these phases of goal-directed learning.

2. Study of basal ganglia networks during the refinement of action

This project aims to determine the changes occurring in specific brain circuits when behaviours become automatic. To this we will analyse the microstructure of behavior at the millisecond scale in transgenic mice bearing different manipulations of specific neuronal circuits (i.e., toxico-genetic ablation or pharmaco-genetic manipulation). We ultimately seek to identify the specific brain networks involved in rendering well-acquired behaviours automatic.

3. Neuronal bases of action selection

One key question in behavioural neuroscience is how animals and humans are able to emit one particular action whilst keeping other possible “competing” actions unexpressed. Here we seek to design behavioural paradigms that clearly engage the problem of action selection in rodents, so we can identify the specific neurons involved in this process through in vivo manipulations of brain circuits.

You are most welcome to contact me if you are interested in any of these points. You can also check out my School and UNSW profiles for more details on what we do:

<http://www.psy.unsw.edu.au/contacts-people/research-staff/dr-j-bertran-gonzalez>

<https://research.unsw.edu.au/people/dr-j-bertran>

Dr Laura Bradfield (l.bradfield@unsw.edu.au)

Group/Lab name

Decision Neuroscience

Research Area/Thesis topics

Neural and behavioural mechanisms of decision-making (in rodents).

I have 3 main projects:

1. Degeneration in the thalamo-striatal pathway and its relation to Parkinson's disease dementia-related deficits
2. Modelling obsessions in obsessive-compulsive disorder by manipulating orbitofrontal cortex activity
3. Hippocampal deficits in episodic-like memory and how they alter goal-directed action-selection. Techniques used include optogenetics, chemogenetics, standard histological procedures, and immunohistochemistry, among others.

Richard Bryant (r.bryant@unsw.edu.au)

Scientia Professor

1. Emotional Memories:

Understanding how memories for emotional and traumatic events underpins many clinical disorders. My current research investigates factors that lead to consolidation of emotional memories, including the roles of stress, gender, imagery, and other factors on consolidation and reconsolidation of both intentional and intrusive memories.

2. Attachment Processes:

One of the major means we have to cope with threats is to rely on social supports. Our research focuses on how experimentally manipulating awareness of attachment figures moderates fundamental stress responses, impacts emotional memories, and coping mechanisms. Experiments available to Honours students will examine how participants thinking of attachment figures will influence capacity to cope with negative experiences.

Dr Kelly Clemens (k.clemens@unsw.edu.au)

Senior Research Associate

My research focuses on modelling various aspects of drug addiction in rats. My current focus is on nicotine, however I have an ongoing interest in other psychostimulant drugs. I am also interested in behavioural epigenetics and how drugs of abuse can change gene expression.

Possible projects include, but are not restricted to:

1. Pre-quit treatment in nicotine dependence. Varenicline (Champix) is the most effective treatment currently available for nicotine dependence. The efficacy of treatment can be

improved considerably through commencing use approximately 2 weeks prior to a nominated quit date. Why this is the case is not clear, but may involve interruption of the contingency between smoking and nicotine effects. This translational project reflects a collaboration between myself and health psychologist A/Prof Stuart Ferguson (UTAS), and explores these questions through the use of our highly valid animal models of nicotine dependence and relapse.

2. Nationwide public health initiatives have progressively restricted when and where smoking is available. People adapt to these restrictions by adjusting their smoking patterns: they increase their rate of nicotine intake both before and after a period when they cannot smoke. We have developed an animal model of restricted access to nicotine that allows for the exploration of the multiple factors that can drive drug-seeking, but also to test possible behavioural and pharmacological interventions.
3. Estrogen is a sex hormone typically associated with the regulation of the female physiology. However, estrogen is present in the brain of both males and females. Estrogen in the brain has a range of roles, including regulation of the reward system. Although the role of estrogen is well studied in the female brain, its role in regulating reward in the male brain has been severely overlooked. This project will examine the role of estrogen in drug-seeking in both male and female rats. This project could be extended to look at how diets high in soy-derived compounds that mimic estrogen may influence reward-seeking behaviour.
4. Behavioural epigenetics is an exciting new field of research that has emerged across the past 10-15 years. It refers to changes in gene expression that are not due to alterations in the DNA itself, which may have important implications for learning and memory processes. In this project, we hypothesise that epigenetic modifications may provide an explanation for the persistence of cravings after many months or years of abstinence. We have recently demonstrated that modulation of epigenetic factors during extinction of nicotine self-administration can greatly reduce later susceptibility to relapse, most likely through enhancing the consolidation of extinction memories. This project would extend these ideas pertaining to relapse with a focus on molecular markers (using qPCR), or alternatively examine whether epigenetic changes are also important for learning about the rewarding properties of nicotine.

Prof Colin Clifford (colin.clifford@unsw.edu.au)

Professor

The primary research focus of my laboratory is vision, how context affects our perception, and how our visual awareness might be related to the underlying neural processing. Potential projects include:

1. Gaze Perception & Social Vision

To an observer, the direction of your gaze reveals where you are looking and hence what you are looking at. This might be an object of shared attention or it might be the observer him or herself. The direction of your gaze is thus a strong social signal to your intentions and future actions. This project aims to understand the processes in our brains that enable us to know where someone else is looking.

Suggested reading:

Clifford, C.W.G., Mareschal, I., Otsuka, Y. & Watson, T.L. (2015). A Bayesian approach to person perception, *Consciousness & Cognition* 36, 406-413.

2. Visual Feature Binding

The seeing part of the brain, visual cortex, can be subdivided into many regions. Breaking down vision like this leads to a problem. If different attributes of the visual scene are dealt with in different parts of visual cortex, how is it that we experience the world as coherently as we do? The question of how distributed neural processing gives rise to a unified perceptual representation of the world is often termed The Binding Problem. This project will explore the limits of perceptual binding in human vision.

Suggested reading:

Clifford, C.W.G. (2010). Dynamics of visual feature binding. In *Space & Time in Perception & Action*, R. Nijhawan & B. Khurana (eds.), Cambridge University Press, pp.199-215.

3. The Role of Spatial and Temporal Context in Perception.

Vision is a dynamic process with adaptation as a fundamental property. Our visual systems are continually recalibrating themselves to the prevailing visual environment. Considering visual processing as an adaptive system in this way emphasises that coding depends on context, and thus an understanding of contextual modulation is central to an understanding of visual coding. How any given region of an image is perceived depends strongly on the spatial and temporal context in which that region is presented. Spatial context is the structure of the surrounding image, while temporal context is represented implicitly in the adapted state of the observer's visual system. This project aims to use contextual manipulations to understand the coding of information in the human visual system.

Suggested reading:

Clifford, C.W.G. (2014) The Tilt Illusion: phenomenology and functional implications, *Vision Research* 104, 3-11.

A/Prof Jacquelyn Cranney (j.cranney@unsw.edu.au)

Associate Professor

See my webpage <http://www2.psy.unsw.edu.au/Users/JCranney/> for an overview of research interests and recent publications, or email me for further information.

- 1.** Effective learning in higher education: the testing effect, spaced learning, and metacognition. What strategies most effectively facilitate learning? What are the underlying cognitive and motivational mechanisms?

- 2.** Memory consolidation and reconsolidation. What are the underlying mechanisms of human memory consolidation and reconsolidation, in laboratory and educational settings? Are similar mechanisms involved in remembering to remember (i.e., prospective memory)? How does metacognitive processing influence our attempts to remember? What role does affect play?

3. What are the factors that facilitate or impede self-knowledge and self-management? Although this capacity is increasingly being recognised as an important attribute in professional contexts, little systematic laboratory research has been undertaken in this area.
4. Underlying mechanisms of response to and recovery from stressors. These projects will measure biological, cognitive, emotional and behavioural indices that reflect dynamic responsiveness to stressors, and which also take into account individual difference factors such as resilience, self-efficacy, mindfulness, and equanimity.

A/Prof Tom Denson (t.denson@unsw.edu.au)

Associate Professor and ARC Future Fellow

I am an experimental social-personality psychologist who is broadly interested in the causes and consequences of aggression, anger, conflict, and stress in humans.

Research projects that I am interested in conducting in 2018 include:

1. Testing Berkman, Kahn & Livingston's (2016) valuation model of self-control over aggressive impulses.
2. Examining the relationships between ovarian hormones and assertiveness and aggression in women.
3. Determining whether manipulating subjective socioeconomic status influences the relationship between testosterone and aggression.
4. Using eye tracking technology to examine the extent to which violent video games influence attention toward dominance and aggression-related cues.

A list of all of my papers can be found at: <http://www.psychexperiment.net/denson/pubs>. Many were co-authored by former Honours students. I also welcome student-initiated projects that are in line with the research activities in my lab: aggression, anger, evolutionary psychology, emotion regulation and psychoneuroendocrinology.

Dr Chris Donkin (c.donkin@unsw.edu.au)

Senior Lecturer and Postgraduate (Research) Coordinator

I am interested in human cognition. That is, the way that we remember, learn, search, decide, categorise, attend, etc. See www2.psy.unsw.edu.au/Users/CDonkin.

1. Memory

The ability to store and retrieve information using memory is one of our most remarkable qualities. Some questions worth pursuing are: 1) is the capacity of short-term memory constrained to be a fixed number of whole items, or do we distribute a mnemonic resource amongst items? 2) Do verbal and visual short-term memory systems differ in fundamental ways? 3) Do things leave memory in a rather sudden and dramatic way, or is the degradation of memory more continuous?

2. Decisions in Applied Settings

People behave differently depending on whether you ask them to respond quickly or respond accurately. Emergency rooms, for example, require fast and robust decisions, while specialist doctors can be more careful, paying attention to minor details. We want to examine the ramifications of these differences using lab-based experiments. For example, we want to explore the consequence of different training regimes, emphasising either minor exceptions to rules or broad level information, on speeded vs. careful decision-making practice.

3. Testing the Robustness of Effects in Psychology

The reliability/robustness of a number of important results in psychology is in question. In a recent paper, we proposed a method for checking the robustness of effects in psychology. This method, which relies on randomising factors in the experiment that would usually be held constant, needs to be tested with some applications.

Dr Kate Faasse (k.faasse@unsw.edu.au)

Lecturer

I am interested in the psychology of health, with a focus on mind-body interactions, health scares, and the experience and attribution of physical symptoms. My research often investigates placebo and nocebo effects – in particular the psychosocial and contextual influences on these effects, mass psychogenic illness (the social transmission of symptoms), branding and the impact of negative perceptions of generic medicines on treatment outcomes, the role and impact of the media in health scares, as well as contributors to and behavioural implications of inaccurate risk perceptions about illness including emerging infectious diseases (e.g. Ebola, H1N1).

Some research possibilities include (but are not limited to):

- 1.** The role of **social modelling** in placebo and nocebo effects: social modelling is central to our understanding of how episodes of mass psychogenic illness develop and spread. How does seeing someone else report or experience treatment benefits or unpleasant side effects influence outcomes for the viewer? Does the medium matter (e.g. viewing face-to-face, via video, through the news media, or written on a Facebook page)? Who makes an effective model (and for whom)? What role does viewer empathy play in this process (and does this differ by model and medium)?
- 2.** The way we give patients **information about treatment side effects** can influence their perceived risk of experiencing these adverse events (and willingness to take a treatment at all). Currently, patients are often bombarded with a long list of possible side effects. What impact does this have on treatment outcomes? Can we use different ways of framing this side effect information to reduce nocebo effects as well as perceived risk?
- 3.** There is an increasing drive towards patient-centered care and decision making, giving patients greater **choice and control** over aspects of their medical care. Does having a choice of treatments enhance the placebo effect and reduce the nocebo effect? Can we use these strategies to minimise nocebo effects?

- 4. Brand name versus generic treatments:** a large body of research indicates that many people hold negative perceptions of generic medicines – that they are not as effective, not as safe, and have more side effects than otherwise identical branded treatments. How does brand name or generic labelling influence placebo and nocebo effects? Do these effects occur mainly through direct comparison? Can we improve perceptions of generics (as well as responses to treatments)? What does price have to do with it?
- 5.** New evidence suggests that placebo treatments can be effective even when patients know they are taking a placebo – this is called the **open-label placebo effect**. Are the mechanisms underlying this effect the same as the ‘deceptive’ placebo effect? What is the best dose and information to give people to optimise open-label placebo effects?

Scientia Prof Joe Forgas (jp.forgas@unsw.edu.au)

Scientia Professor

The influence of affective states on various social judgments, decisions, and interpersonal behaviours

There are several projects available within this broad domain. There is some scope for negotiating individual ideas and proposals within this general area. It is expected that all projects will involve induced affective states as the main independent variable, and will measure the effects on mood states on:

1. Social judgments (liking, attributions, interpersonal preferences, stereotype judgments, etc.)
2. Social decisions (about risk, helping, eyewitness identification, self-handicapping, etc.)
3. Interpersonal behaviours (e.g., verbal and communication strategies, negotiation and bargaining behaviours, etc.).

The experiments will also investigate the role of various theoretically based mediating and moderating mechanisms that are responsible for the occurrence and extent of affective influences on these variables.

I am also interested in supervising projects that look at the way positive and negative affective states influence information processing strategies, especially studies that look at the beneficial consequences of mild negative affect on the performance of certain kinds of tasks, such as judgmental errors, social memory and strategic interpersonal behaviours (such as the production of persuasive messages, social influence strategies, etc.).

For examples of related research, see my websites and also Forgas, J.P. (Ed.) (2006). Affect in social thinking and behaviour. New York: Psychology Press, or recent articles e.g., Forgas et al. in JESP (2005, 2006, 2007, 2009).

Scientia Prof Barbara Gillam (b.gillam@unsw.edu.au)

Scientia Professor

My field is visual perception. I am able to supervise a wide variety of topics in these areas and encourage students to do projects that will with some certainty produce interpretable data within the timeframe of honours. Projects will all involve behavioural experiments.

1. Stereopsis and 3D scene perception:

A fascinating question in vision research is how we recover the third dimension (depth) from the 2 retinal images. Recent advances in 3D cinema technology make stereovision and depth perception a relevant and engaging area for research. I have a number of set-ups for stereo research. Some example topics are shown below.

- How are monocular regions (areas seen by only one eye) and binocular regions of a scene integrated to support 3-D perception? Incorporating such regions is a difficulty in “three-dimensionalising” old movies.
- How does stereopsis enhance performance of everyday tasks and locomotion?
- How good is stereopsis at large distances? How is it scaled for distance?

2. Illusory contours / phantom surfaces:

When an image contains unlikely gaps or alignments, an illusory contour or surface may be perceived. There are a number of rival theoretical explanations for the perception of these illusory surfaces that could be tested.

3. Art and figure-ground perception:

How do artists resolve the problem of depicting objects in a scene that occlude one another? An analysis of art could reveal novel aspects of human ability to process partially visible objects. I am especially interested in the way aboriginal artists depict figure and ground. Although aboriginal art is not “representational” it is clear that it manipulates figure-ground and other perceptual responses in a rich and clever way that is often novel to perceptual psychologists. Some of the insights from this art can be investigated in the laboratory.

4. Geometric illusions and scene statistics.

To what extent are the well-known geometric illusions related to the statistics of viewed scenes?

Dr Bronwyn Graham (b.graham@unsw.edu.au)

Senior Lecturer and Australian Research Council Discovery Early Career Researcher

My research investigates the basic processes underlying the acquisition and inhibition of fear in rats, and then translates these findings to human populations. In particular, I am interested in the impact of sex hormones on fear extinction, which is the laboratory model of exposure therapy for humans with anxiety disorders. Anxiety disorders are twice as prevalent in women compared to men, and this may be partly due to the impact of fluctuating hormone levels on the acquisition and/or inhibition of fear. Indeed, recent evidence suggests that oestrogen and progesterone are necessary to fear extinction, with low levels of both hormones being associated with impaired extinction ability in both female rats and women. Next year, projects in my laboratory will investigate the mechanisms underlying the hormonal modulation of emotional memory formation in both rats and humans.

Rat Projects

1. The impact of sex hormones on extinction and subsequent relapse of fear

While it is known that sex hormones are important to extinction recall, the nature of this effect is not well understood, and the consequences of sex hormones for other, clinically relevant, aspects of fear extinction are unknown. Several projects next year will further explore hormonal modulation of fear extinction in naturally cycling female rats. Potential questions include: How do oestrogen and progesterone influence the recovery of fear following extinction, in renewal and reinstatement models of relapse? What manipulations can be used to prevent extinction impairments that are associated with periods of low oestrogen and progesterone?

2. Motherhood, Sex Hormones, and Fear Extinction

All previous research on the effects of sex hormones on fear extinction has been conducted using virgin female rats. However, research indicates that motherhood causes profound neuroendocrine and cognitive changes. Recent rat and human data from my lab indicates that motherhood protects against fear extinction impairments associated with low levels of oestradiol. Projects next year will investigate the mechanisms underlying the protective effect of motherhood.

Human Projects

3. The impact of sex and sex hormones on cognitive mechanisms of emotion regulation

While impaired fear extinction is a hallmark of emotional disorders such as Posttraumatic Stress Disorder, such disorders are also associated with a range of cognitive biases. For example, people with anxiety disorders tend to display heightened attentional processing of threatening stimuli. In addition, they tend to interpret ambiguous situations in a negative way. Recent data from my lab indicates that, in healthy women, high levels of oestradiol are associated with enhanced attention to threatening stimuli, conversely, low oestradiol levels are associated with reduced efficacy of cognitive reappraisal in dampening emotional responding. Projects next year will investigate this further.

A/Prof Jessica Grisham (jessicag@unsw.edu.au)

Associate Professor and ARC Future Fellow

Honours studies under my supervision will focus broadly on obsessive-compulsive disorder (OCD) or hoarding disorder, typically recruiting undergraduate participants who report high levels of symptoms of these disorders.

Specific topics may include:

1. Cognitive bias modification in obsessive compulsive disorder

Cognitive bias modification (CBM) is an experimental procedure that modifies cognitive processes and biases via training conditions. During CBM, participants are exposed to a series of stimuli designed to manipulate processing relevant to a particular disorder. Experts have noted the potential of applying this approach to various forms of psychopathology, although there have also been important critiques of CBM. I am interested in using CBM to

manipulate specific OCD-relevant beliefs and assessing downstream effects in high and low OCD groups. We may also use a CBM paradigm to target cognitive biases and retrain automatic action tendencies in individuals with hoarding tendencies (excessive collecting and saving).

Suggested reading:

Grisham, J. R., Becker, L., Williams, A. D., Whitton, A. E., & Makkar, S. R. (2014). Using cognitive bias modification to deflate responsibility in compulsive checkers. *Cognitive Therapy and Research*, 38, 505-517

MacLeod, C., Koster, E. H.W., & Fox, E. (2009). Whither Cognitive Bias Modification Research? *Journal of Abnormal Psychology*, 118, 89-99.

2. Imagery-related processes and obsessive-compulsive disorder (OCD)

I am broadly interested in the role of the imagination in fuelling OCD symptoms and in involuntary mental images of future events. Although this type of intrusive imagery is prevalent in both clinical and non-clinical population, repetitive and distressing mental pictures are a core symptom of OCD. These intrusive obsessional images are distinguished from images present in other anxiety disorders by their distinct thematic content and by their neural circuitry with perception and may have preferential access to the emotional systems in the brain - thus producing similar responses to real life events. I am interested in examining the role that visual perspective may play a role in determining the emotional and behavioural impact of intrusive imagery and how vividness may contribute to the extent to which imagined scenarios are experienced as valid future predictions. I am also interested in the emotional and behavioural consequences of using different strategies to modify mental imagery.

Suggested reading:

Holmes, E. A., & Mathews, A. (2010). Mental imagery in emotion and emotional disorders. *Clinical psychology review*, 30, 349-362.

Rachman, S. (2007). Unwanted intrusive images in obsessive compulsive disorders. *Journal of Behavior Therapy and Experimental Psychiatry*, 38, 402-410.

3. Object attachment, the endowment effect, and hoarding disorder

Humans overvalue their possessions, which impacts upon their ability to make adaptive decisions about selling, discarding and acquiring. I am interested in expanding our understanding of psychological factors that underpin object attachment. For example, loneliness may also have a critical influence on our relationship to our possessions. Individuals who hoard are more likely to live alone and have interpersonal difficulties. Social isolation has been theorised to drive anthropomorphism (the tendency to view a possession as more human) in order to provide comfort and a sense of belonging. Accordingly, we will examine whether chronic and temporary loneliness is associated with increased anthropomorphism and object attachment. We may also examine other situational and dispositional factors that may influence object attachment, including uncertainty and low perceived control, or test cognitive strategies that may decrease attachment to objects and thus facilitate increased discarding and decreased acquiring.

Suggested reading:

Epley, N., Akalis, S., Waytz, A., & Cacioppo, J. T. (2008). Creating social connection through inferential reproduction: Loneliness and perceived agency in gadgets, gods, and greyhounds. *Psychological Science*, 19, 114-120.

Grisham, J. R., Frost, R. O., Steketee, G., Kim, H. J., Tarkoff, A., & Hood, S. (2009). Formation of attachment to possessions in compulsive hoarding. *Journal of Anxiety Disorders*, 23, 357-361

Dr Cindy Harmon-Jones (c.harmon-jones@unsw.edu.au)

Postdoctoral Fellow

I study emotions and motivation from a discrete emotions perspective. So far, I've focused on the emotions determination, sadness, desire, pride, and anger. In my past research, I've developed a new, functional model for the motivation behind cognitive dissonance. I've also developed methods to improve the accuracy of emotion measurement. In addition, I've examined individual differences in liking for basic emotions, and how preferences for emotions affect experience and behaviour.

I'm currently examining the effects of pain and physical discomfort on emotion, specifically how mild physical pain may alleviate depression and loneliness and increase psychological wellbeing. Relatedly, I'm interested in how people's beliefs about the acceptability or unacceptability of negative emotions (especially anxiety and depression) affects behaviour and subjective experience. These are some specific questions I'm currently interested in exploring:

1. In the First World, people's lives have become physically easier and more comfortable, but mood disorders such as anxiety and depression have increased. Is it possible that the reduction in physical discomfort and pain actually contributes to psychological discomfort? Although this idea is counter-intuitive, it might be predicted based on research from such diverse theoretical perspectives as sensory deprivation, opponent process theory, habituation, and toughness/resiliency. I'm examining whether short duration painful or physically uncomfortable experiences increase psychological wellbeing and reduce negative mood.
2. A variety of painful activities, from physical exercise to self-injury, provide relief from negative emotions. This may be because pain causes the release of endorphins, neuropeptides that are also released during close contact with loved ones, and which relieve pain and elevate mood. I'd like to examine whether short-term, noninjurious pain also reduces negative emotions such as anger and sadness.
3. People often fail to achieve their most valued goals because they avoid situations that hold the potential for failure (behavioural avoidance). I'd like to test the idea that people who believe that negative emotions are socially unacceptable may be particularly likely to avoid situations that risk negative emotions, even when behavioural avoidance prevents them from achieving important goals.

If this research sounds interesting and you'd like more information, please email me.

Prof Eddie Harmon-Jones (e.harmon-jones@unsw.edu.au)

Professor

I study emotions and motivation in humans. In general, I am interested in investigating the relationships between emotional and motivational states and attentional, cognitive, social, and behavioural processes. My lab uses a variety of methods. We use non-invasive human neuroscience methods (e.g., electroencephalography, event-related potentials, startle eyeblink responses, transcranial direct current stimulation), self-report methods, and behavioural methods (e.g., reaction times). Honours students can choose which type of methods to use in my lab (e.g., one does not have to use neuroscience methods).

Some research projects that I am interested in conducting soon include:

1. The influence of an open (broad) mind on anger-related responses and humility
2. The influence of expected emotional states on motivation
3. The condition under which effort increases vs. decreases the valuing of rewards (working from cognitive dissonance theory)

These are just a few of the issues currently being examined in my lab. If this research program sounds interesting, please contact me at eddiehj@gmail.com. You can also check my webpage for more information: <http://socialemotiveneuroscience.org/>.

Prof Brett Hayes (b.hayes@unsw.edu.au)

Professor

I'm a cognitive psychologist interested in the "high level" cognitive processes that make human beings so smart, such as reasoning, categorisation, and judgment. I also study how these processes develop over the early part of the lifespan. Some projects examine the fundamental cognitive processes that drive high-level cognition. Others focus on how we can apply basic research on human cognition to solve real-world problems such as helping people to better understand climate change science and improving reasoning in clinical and forensic situations. Below are examples of current projects.

1. How many types of reasoning are there?

Theories of human reasoning generally distinguish between two kinds of reasoning: intuitive/heuristic and deliberative/analytic (often referred to as Type 1 and Type 2 processing). This distinction has been applied to explain the way people behave in a wide range of reasoning, judgment and decision making tasks. It has also influenced the design of training programs in fields like education and management. But recent work in my lab suggests that the distinction is not as clear cut as is often assumed. We have shown that human reasoning is often better explained by a single process of accumulating evidence and then setting a threshold for making a decision. This project involves applying innovative new methods for comparing single-process and dual-process models to tasks in the field of human reasoning and judgment.

2. I love logic: Can people solve logical problems through intuition?

Deductive inference involves applying logical rules to work out whether a conclusion is necessarily true given some evidence. Traditionally cognitive psychologists have viewed such reasoning as requiring slow and analytic processing, making heavy demands on working memory. But recent research has challenged this – showing that when people are simply asked how much they *like* or *dislike* an argument they show a strong *emotional* preference for logically valid arguments (eg: If the US cuts carbon emissions then global warming will decrease. The US cut emissions; Therefore Global warming will decrease) over logically invalid arguments (If the US cuts carbon emissions then global warming will decrease. Global warming decreased. Therefore the US must have cut emissions). This project investigates the processes that underlie such “intuitive” forms of logical reasoning.

Suggested Reading:

Trippas, D., Handley, S. J., Verde, M. F., & Morsani, K. (2016). Logic Brightens My Day: Evidence for Implicit Sensitivity to Logical Validity. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 42, 1448-1457.

3. Generalising learning.

An important component of human learning involves generalising what we have learned to new instances. For example, after learning some new information (e.g., “that gorillas can catch human colds”) you might generalise this information to other animals (e.g., infer that it’s likely that chimps can also catch human colds). But just how we generalise depends on where the original information came from (i.e. how the information was sampled). For example, we are likely to draw stronger inferences if we heard the information from a zoologist than if we read it on a Facebook post. This project examines how different types of information samples affect how people generalise and draw inferences based on what they have learned.

Suggested Reading:

Lawson, C. A. & Kalish, C. W. (2009). Sample selection and inductive generalization, *Memory, and Cognition*, 37, 596-607.

4. How many types of memory are there and how do they develop?

A popular view is that two quite different types of memory processes influence how children remember. The first is an automatic “unconscious” feeling of familiarity (e.g., “That person looks familiar but I can’t remember where I’ve seen them before”). The second is a conscious recollection of a specific learning episode (e.g. “I remember that person from the party I went to last week”). According to this “two process” view of children’s memory, young children rely primarily on the first type of memory process whereas older children rely more on conscious episodic memory. Recent work carried out in my lab however, challenges this view. The development of memory over the primary school years may be explained by a single process of “memory strength” which develops with age. Students working on this project may be involved in constructing new tests of the single-process account and examining memory development in pre-schoolers.

Dr Nathan Holmes (n.holmes@unsw.edu.au)

ARC DECRA Fellow

My research examines basic mechanisms of learning and memory in the mammalian brain. I am specifically interested in (1) how motivational states change the way the brain processes simple learned associations, (2) the role of the amygdala in various forms of conditioning, and (3) how context and time control expression of learned associations.

1. Danger changes how the brain processes innocuous information

This project uses rats to study how the brain processes an association between neutral events. It focuses on the roles of two brain regions, the perirhinal cortex (PRh) and basolateral amygdala (BLA). Previous research suggests that, in a safe environment, processing of this association occurs in the PRh and not the BLA. However, in a dangerous environment, processing of this same association occurs in the BLA but not the PRh. These findings imply that the presence of danger shifts processing of an association between neutral events from the PRh to the BLA. They raise a number of questions, among them:

- What is the significance of this shift in processing: e.g., Is an association between neutral events encoded more strongly in a dangerous environment (hence, it is BLA-dependent) than in a safe environment (where it is PRh-dependent)?
- Do behavioural and pharmacological treatments which suppress fear shift processing of the neutral association back to the PRh?

2. The role of the amygdala in first- and second-order fear conditioning

Animals learn to fear stimuli that signal innate sources of danger, such as a tone paired with foot shock. They also learn to fear stimuli that signal learned sources of danger, such as a light paired with the already-conditioned-tone. Pavlov described the former as ‘first-order conditioning’ and the latter as ‘second-order conditioning.’

This project examines the role of the amygdala in both types of conditioning. It originates in our recent findings that, within the BLA, the mechanisms involved in the consolidation of first- and second-order conditioning critically differ: specifically, consolidation of first-order conditioned fear (tone-shock) requires protein synthesis in the BLA, whereas consolidation of second-order conditioned fear (light-tone) does not. These findings imply that, within the BLA, new learning about a novel stimulus (the light in the above example) can exploit cellular changes induced by a prior learning experience (the tone-shock pairings in the above example). The goal of this project is to determine the nature of these changes, and *how* they are exploited by a novel stimulus.

3. Context and time control expression of learned associations

Extinction of conditioned fear in rats models the processes underlying exposure therapy, one of the major forms of treatment for a number of anxiety disorders. While extinction treatments are effective in eliminating conditioned fear responses, these responses are typically ‘renewed’ when the conditioned stimulus (CS) is tested outside the context where extinction occurred, ‘reinstituted’ when the CS is tested after re-exposure to danger, and ‘spontaneously recover’ with the passage of time since extinction training.

A question of both theoretical and clinical significance is how extinction of conditioned fear can be enhanced to protect against renewal, reinstatement and recovery of fear. This project examines ways this might be achieved, and compares extinction with other methods of eliminating conditioned fear (e.g., counter-conditioning) to identify which is most effective.

A/Prof Richard Kemp (richard.kemp@unsw.edu.au)

Associate Professor

1. Matching Unfamiliar faces

Some jobs require individuals to compare images of unfamiliar faces. For example, customs officers are required to decide whether the photograph in a passport is of the person presenting the passport. I am interested in how we can improve performance in this task either by changing the way in which the images are presented, through training or by selecting the staff to undertake this role. In a series of projects I hope to investigate individual differences in this task, the role of instructions and training, and the effects of various image manipulations on performance in members of the public and experts such as customs officers.

2. Interviewing witnesses

The progress of a police investigation often depends on the ability of eyewitnesses to accurately recall what they saw. Recent research suggests that the use of a written “Self-administered interview” (SAI) can improve the accuracy of later recall. This raises a series of important questions – for example, if a detail is not mentioned in the SAI, is it more likely to be forgotten later, or more likely to be distorted by exposure to post-event information. Also, should witnesses be allowed to see their SAI report before they attempt a more detailed recall?

3. Identification from CCTV

Jurors are sometimes required to decide whether the accused is the person who was recorded on CCTV committing an offence. Research has shown that this is a difficult judgement, but is our decision influenced by other information, such as circumstantial evidence or the seriousness of the offence? Also, what is the impact of recent legal rulings about what experts can say when talking to juries about how to interpret the CCTV images?

4. What happens when people talk about something they did together?

Paterson and Kemp (2006) showed that when witnesses discuss an event, misinformation mentioned by one witness is likely to be incorporated into the other witness's recall of the event. However, studies such as these have used video material as the to-be-remembered event. We know that memory for actively experienced events is more accurate than events which were passively observed, so this procedure may be overestimating the degree of co-witness memory conformity. In a series of studies we are exploring memory conformity in participants who have actively engaged in a “treasure hunt” event where they walk around the campus following clues.

Prof Simon Killcross (s.killcross@unsw.edu.au)

Professor and Head of School

1. Mechanisms of habit learning

Previous research indicates that, with continued training, lever pressing in rats makes a transition from being goal-directed (that is, influenced by the contingency between the instrumental response and reward, and the value of that outcome) to being habitual (whereby

the response appears to be independent of current contingency and reward value). Disruptions of this transition process are thought to be, in part, contributors to drug addiction, and disorders of cognitive control such obsessive compulsive disorder and Tourette's syndrome. The proposed project will examine the psychological and neurochemical processes that dictate this transition.

Nelson A & Killcross AS (2006) Amphetamine exposure enhances habit formation. *Journal of Neuroscience*, 26, 3805-3812.

2. Control of behavioural flexibility by the prefrontal cortex

A number of lines of evidence suggest that different subregions of the medial prefrontal cortex (mPFC) in the rat subserve distinct but complementary cognitive functions that attempt to achieve a trade-off between the control of behaviour by prior experience and the need to adapt to novel situations in a changing world. More formally, we have suggested that the prelimbic region of the mPFC acts to bring both simple cue-outcome associations and more complex behavioural patterns under the modulatory influence of contextual or other task relevant information; by contrast, the infralimbic mPFC exerts an inhibitory influence over the prelimbic region, biasing animals towards simple, prepotent or innate behavioural patterns. This project will examine tests of this hypothesis using a variety of behavioural procedures designed to assess the role of modulatory information in governing task performance.

Rhodes SEV and Killcross AS (2007) Lesions of rat infralimbic cortex enhance renewal of extinguished appetitive Pavlovian responding. *European Journal of Neuroscience*, 25(8), 2498-2503.

3. The role of behavioural chains in goal-directed action

When animals produce an instrumental response for food, they do not produce a discrete action that leads to the immediate ingestion of food, but rather initiate a sequence of closely linked behaviours that ultimately result in the delivery of food. At a minimum, this chain might be leverpress -> magazine entry -> consumption. A variety of theorists have suggested that the nature of behavioural control that is present at different points in this chain varies as a function of, for example, proximity to final reward. This project will examine the development of such chains over the course of training and will attempt to establish the role of behavioural chains in performance and sensitivity to outcome value.

Balleine, Bernard W.; Garner, Claire; Gonzalez, Felisa; Dickinson, Anthony (1995) Motivational control of heterogeneous instrumental chains. *Journal of Experimental Psychology: Animal Behavior Processes*, 21(3), 203-217.

4. Assessment of cognitive processing in high schizotypy and schizophrenia

A good deal of evidence suggests that there are cognitive deficits in schizophrenia that are key to the long-term outcomes in this disorder. Changes in cognitive processing are also observed in individuals who are rated high on questionnaire-based assessments of schizotypy, reflecting a systematic difference in cognitive processing style. At a simple level, it appears that these changes reflect alterations in the manner in which multiple cues interact during learning and/or performance of cognitive tasks – those with high ratings on schizotypy scales seem to process individual cues in isolation, whereas those with lower ratings process cues in a competitive, interactive manner. The nature of these variations in processing style will be investigated.

5. Assessment of probabilistic feedback learning in high schizotypy

Although people with schizophrenia have been shown to display probabilistic feedback learning deficits, it is not clear whether these deficits are primarily an effect of the disease process or whether they are secondary to medication effects and/or chronic illness. Demonstration of probabilistic feedback learning deficits in healthy adults displaying schizotypal personality traits would provide evidence supporting a relationship between probabilistic feedback learning impairment and schizophrenia-like behaviour. The aim of the project will be to determine the extent to which otherwise healthy young adults displaying a high degree of schizotypal personality traits also display impaired probabilistic feedback learning deficits. Healthy young adults displaying high and low schizotypal personality traits will be administered a probabilistic feedback learning test and learning and performance between the high and low schizotypal personality groups will be compared. This project will be based with Dr Thomas Weickert in conjunction with Neuroscience Research Australia (NeuRA – just off Botany Street) and co-supervised by Prof Killcross.

A/Prof Eva Kimonis (e.kimonis@unsw.edu.au)

Associate Professor

Associate Professor Eva Kimonis' research focuses broadly on the development of antisocial and aggressive behaviour. Within this broad area there is a specialised focus on atypical development of moral emotions, which at its extremes manifests as callous-unemotional traits (i.e., lack of empathy, lack of guilt, uncaring attitudes, lack of concern about school/work performance). Children and adolescents with callous-unemotional traits are at heightened risk for antisocial, aggressive, and criminal behaviour across the lifespan, and these traits are thought to precede adult psychopathy and to be preceded by a fearless temperament in early childhood. Current projects include examining emotional deficits in individuals with callous-unemotional and psychopathic traits across the lifespan; refining the measurement of callous-unemotional traits; and testing whether early intervention improves emotional deficits and the antisocial and aggressive outcomes they are thought to mediate.

Dr Roger Koenig (a.koenig-robert@unsw.edu.au)

Research Fellow

We usually define ourselves by the content of our thoughts and by our choices. However, it is still unclear how much of what we think and decide is under our control and how much is biased by non-conscious processes, far beyond our control.

We study how we generate thoughts, how thoughts are biased non-consciously and how these processes in turn affect our decisions. We track thoughts to investigate how they evolve over time from non-conscious representations to conscious ones. We also investigate how similar non-conscious representations are compared to conscious perception. We employ different experimental approaches including behavioural measures, brain imaging (fMRI), decoding and modelling. We test participants in different visual perception and imagination tasks, combining both subjective and objective measures of perception, thought strength and decision making.

Honours projects consist in conceiving and modifying experimental paradigms, testing participants and generating computer code used in the experiments as well as in the data analysis. This allows students conducting original research through all its stages. Previous experience in programming is not required but desirable.

At the basic research level, these studies will help to understand how our thoughts and decisions are generated. At the societal level, the outcome of this research has implications in virtually all fields associated with decision making (e.g., politics, morals and economics) and in the treatment of pathological conditions where unwanted thoughts and images generate distress and anxiety.

Dr Vincent Laurent (v.laurent@unsw.edu.au)

ARC DECRA Fellow

I am a behavioural neuroscientist interested in understanding the psychological processes and neural mechanisms underlying learning and memory. To do so, I combine the use of sophisticated behavioural models in rodents and modern genetic tools.

Potential projects include:

1. Influence of predictive stimuli on choice between actions.

Successful decision-making requires the ability to extract predictive information from the environment to guide future actions. This ability is commonly modelled in the laboratory through specific Pavlovian-Instrumental transfer. This phenomenon shows that a stimulus predicting a particular food outcome biases choice towards actions earning that same outcome. This bias is present in many species including humans, monkeys, horses, rats and mice but its psychological processes remain largely unknown. This project will explore the conditions under which Pavlovian-Instrumental transfer is expressed and will evaluate how it can be removed.

Suggested reading:

Balleine, B. W., & Ostlund, S. B. (2007). Still at the choice-point: action selection and initiation in instrumental conditioning. *Ann N Y Acad Sci*, 1104(1), 147–171.
<http://doi.org/10.1196/annals.1390.006>

Holmes, N. M., Marchand, A. R., & Coutureau, E. (2010). Pavlovian to instrumental transfer: a neurobehavioural perspective. *Neurosci Biobehav Rev*, 34(8), 1277–1295.
<http://doi.org/10.1016/j.neubiorev.2010.03.007>

Holland, P. C. (2004). Relations between Pavlovian-instrumental transfer and reinforcer devaluation. *J Exp Psychol Anim Behav Process*, 30(2), 104–117.
<http://doi.org/10.1037/0097-7403.30.2.104>

Delamater, A. R. (1996). Effects of several extinction treatments upon the integrity of Pavlovian stimulus-outcome associations. *Animal Learning & Behavior*, 24(4), 437–449.

2. Appetitive-aversive interactions.

It is widely agreed that learning is driven by two opposite motivational systems: an appetitive system that deals with positive events and an aversive system that processes negative events. Interactions between the two systems are implied in most learning theories, but their study has received little attention. This project will use Pavlovian conditioning in rodents to describe the psychological and neural processes underlying appetitive-aversive interactions and their influence on learning and decision-making. Understanding these processes is

critical as we live in a complex world in which positive and negative events co-exist and interact to influence behaviour.

Suggested reading:

Dickinson, A., & Dearing, M. F. (1979). Appetitive-aversive interactions and inhibitory processes. *Mechanisms of Learning and Motivation*, 203–231.

3. Neuronal ensembles and memory formation

A major goal in neuroscience is to understand how memories are formed and stored in the brain. Popular theory holds that these memories are established and retrieved in defined populations of neurons, or neuronal ensembles. Evidence for the existence of these ensembles is sparse, as neuroscientists have been lacking the appropriate tools. However, recent advances in genetics now enables us to directly test the hypothesis that neuronal ensembles encode, store and retrieve memories. The present project will therefore use modern genetic tools to explore how predictive relationships between important events are instantiated in the mammalian brain.

Suggested reading:

Garner, A. R., Rowland, D. C., Hwang, S. Y., Baumgaertel, K., Roth, B. L., Kentros, C., & Mayford, M. (2012). Generation of a synthetic memory trace. *Science*, 335(6075), 1513–1516. <http://doi.org/10.1126/science.1214985>

Ramirez, S., Liu, X., Lin, P.-A., Suh, J., Pignatelli, M., Redondo, R. L., et al. (2013). Creating a false memory in the hippocampus. *Science*, 341(6144), 387–391. <http://doi.org/10.1126/science.1239073>

Ramirez, S., Tonegawa, S., & Liu, X. (2014). Identification and optogenetic manipulation of memory engrams in the hippocampus. *Frontiers in Behavioral Neuroscience*, 7. <http://doi.org/10.3389/fnbeh.2013.00226>

A/Prof Mike Le Pelley (m.lepelley@unsw.edu.au)

Associate Professor

I'm a cognitive psychologist, and my main research focus is on topics relating to learning and attention. I'm interested in these issues at a cognitive level (i.e., trying to understand how the basic underlying mechanisms work), and also in how dysfunctions of these processes might be implicated in clinical disorders such as schizophrenia, addiction and obesity.

Attention and learning about rewards

Stimuli that have previously been associated with rewards are more likely to grab our attention and control our behaviour, even if paying attention to these stimuli is not in our best interests (for example if we are trying to cut down on the amount we eat or drink). Projects in this stream will look more closely at how learning about rewards influences how stimuli capture our attention. Questions that could be asked include:

1. How is the relationship between learning and attention influenced by clinical and personality traits? Abnormal patterns of attention have been implicated in schizophrenia, autism,

addiction, obesity, and normal ageing, and in people who are highly impulsive, or who score low on measures of “attentional control”. Do measures of these traits in the healthy population predict the extent to which people’s attention is influenced by learning about value?

2. Can we use ‘cognitive control’ processes to inhibit attention to reward-related stimuli, or are we doomed to have our attention captured by them regardless of our goals or intentions?
3. At what level does learning affect attention? Does learning influence the extent to which we are likely to move our attention to the spatial location of stimuli? Or does it change the detectability of stimuli in the world around us? For example, does pairing a red circle with a \$1 reward result in the circle seeming brighter or more red?
4. Is the influence of reward learning on attention restricted to visual stimuli, or does it extend to other sensory modalities? Might it even cross modalities? For example, does a visual signal of reward attract auditory attention?

Eye gaze and decision-making

People tend to spend more time looking at things they like than things they dislike. But is the reverse true? More specifically, can we change the extent to which people like things by controlling how long they look at them for?

It’s recently been claimed that people’s decision-making can indeed be influenced by their eye-gaze: e.g., when making a moral decision (Is murder ever justifiable?), people’s choices ('Sometimes' versus 'Never') can be influenced by waiting until they are looking at a particular option before asking them to make a decision. Projects in this area will look at whether these sorts of high-level decisions can really be influenced by eye-gaze, and whether this depends on how ambiguous the decisions are. This is ongoing work with Prof Ben Newell, and projects in this area could be supervised either by me or Prof Newell.

Dr Belinda Liddell (b.liddell@unsw.edu.au)

Research Fellow

My research focuses on the neurobiological mechanisms of traumatic stress in refugees. I am interested in how such experiences impact on the mechanisms underpinning emotion, attachment, and social regulation. Relatedly, I am investigating how cultural factors affect emotion perception, attention and memory processes, and how these might influence the perception of aversive cues under stress. Undertaking an Honours project with me would entail examining these mechanisms in a student population using multimodal cognitive neuroscience methods including eye tracking, psychophysiological, behavioural or other biological measures.

Below are some examples of possible projects in these areas:

1. Cultural differences in emotion and contextual processing

Research has demonstrated that culture modulates visual perception: cultural groups that value independence and individualism are oriented towards salient local and target object

information; other culture groups that are more collectivistic and interdependent are biased towards processing global attributes, background and contextual information. A project could ask the question how cultural biases moderate the perception of the visual environment, and how this may influence active decision making regarding emotional cues.

2. How does self-construal modulate automatic emotion processes?

There is substantial evidence indicating that self-construal differences in individualism – collectivism play an important role in the emotional lives of people. What is unclear is the mechanisms by which self-construal influences emotion. This project will test whether self-construal impacts on automatic emotion processes.

3. Cultural differences in attachment

Research demonstrates cultural differences in formation and maintenance of attachment connections. This project will investigate cultural differences in the benefit attachment figures can provide when coping with stressful experiences.

Prof Peter Lovibond (p.lovibond@unsw.edu.au)

Professor and Deputy Dean (Faculty of Science)

1. Cognitive processes in human associative learning

This project examines the role of implicit and explicit processes, including episodic memory and deductive reasoning, in associative learning in people. Students can investigate learning using anticipatory measures such as skin conductance and eyeblink conditioning in the psychophysiological laboratory on the 9th floor, using causal judgment or expectancy ratings, or using behavioural priming/ reaction time tasks. Current streams in this research include dual route models of learning, comparison between memory accessibility and causal judgment, and the role of awareness in learning.

2. Do humans learn like animals?

Although humans and animals show similar effects in classical conditioning, it is often questioned whether humans learn in a similar way to animals. In this project you will explore whether a particular learning phenomenon is better explained by low-level associative mechanisms (like those presumed to operate in animals) or higher-order reasoning processes by examining what types of manipulations influence learning (e.g. rules, time-pressure, learning scenario). This project can be carried out using a causal judgment paradigm or a classical conditioning paradigm (e.g. fear conditioning, eyeblink conditioning).

3. Role of reward cues in reward-seeking behaviour

This project investigates the cognitive and motivational mechanisms by which external cues associated with reward influence goal-directed instrumental action to achieve that reward. We use chocolate reward to study these mechanisms in the laboratory but we hope the results will also be relevant to appetitive disorders such as food craving and drug addiction.

Prof Skye McDonald (s.mcdonald@unsw.edu.au)

Professor

I am a clinical neuropsychologist with a specific interest in emotional and social processing. My main stream of research focuses upon adults with significant brain damage.

See my homepage for more information: <http://www2.psy.unsw.edu.au/Users/Smcdonald/>.

In parallel, I work with Honours students to examine some of the basic mechanisms underpinning emotion perception, empathy and emotional experience focusing upon normal adults. There are several possible areas within which an Honours student might like to work with me. These revolve around understanding how we process emotions in others.

There are two dominant theories. One suggests that we first mimic the expressions of others and this mimicry triggers physiological processes that help us understand what they are feeling (facial feedback hypothesis). An alternative position is that we process numerous aspects of information about others simultaneously, including cognitive and affective cues. According to this model mimicry is a side effect rather than an initial stage of processing (perception-action model).

There are a number of ways we can test which of these theories is more likely and so there are several possible Honours projects:

1. Measuring the effects of semantic processes on facial mimicry using an Emotional stroop task that combines emotional words superimposed on emotional faces
2. Measuring the effects of visual and contextual familiarity on facial mimicry
3. Measuring the effects of facial and body postures on arousal and mood.

Prof Gavan McNally (g.mcnnally@unsw.edu.au)

Professor

We study the behavioural and brain mechanisms for learning and motivation in animal models. Our primary interest is understanding the specific circuits that contribute to learning and motivation and which act to make behaviours more persistent (and so relapse prone, such as drug seeking) or which act to regulate how much learning actually occurs. These circuits are dysregulated in disorders such as anxiety, depression, and addiction, so a related interest is restoring normal activity in these circuits using state of the art techniques to create new treatments for these disorders. We use a variety of techniques from contemporary neuroscience. Students will have the opportunity to use any of these techniques as they see fit as well as present their work at national conferences.

- 1. Defining and manipulating the brain circuits for relapse and extinction of drug seeking**

Relapse to drug-taking is the fundamental problem facing any treatment of drug addiction. 70-80% of drug-users seeking treatment will relapse to drug taking within 12 months of treatment. This project studies the neural and behavioural mechanisms for relapse to drug taking using animal models of cocaine addiction, methamphetamine addiction, and alcoholism. It also studies the brain mechanisms for extinction of drug seeking and attempts

to use the knowledge gained from this research to identify new ways of treating human drug users.

Suggested reading:

Millan, E.Z., Marchant, N.J., & McNally G.P. (2011). .Extinction of drug seeking. Behavioural Brain Research, **217**, 454-462.

Conklin, C.A., & Tiffany, S.T. (2002). Applying extinction research and theory to cue-exposure addiction treatments. *Addiction*, 97, 155-67. 25 8 September 2016

2. Defining and manipulating the brain circuits for Pavlovian conditioning

Pavlovian fear conditioning has served as a useful model for studying the brain mechanisms of learning. Contemporary neural models characterise Pavlovian conditioning as detecting CS-US contiguity. By contrast, contemporary psychological models characterise Pavlovian conditioning, at least in part, as the learning of predictive relations. In other words, neuroscientists have largely failed to incorporate a role for the learning of predictive relations in their analyses of the brain mechanisms for fear conditioning. This project studies the brain mechanisms for predictive learning in Pavlovian fear conditioning.

Suggested reading:

McNally, G.P., Johansen, J., & Blair, H.T. (2011). Placing prediction into the fear circuit. *Trends in Neurosciences*, 34, 283 - 292.

3. Brain mechanisms of motivation

A group of projects are concerned with how rewards and punishers interact behaviourally and neurally. These interactions are essential to normal behaviour and abnormal interactions are a hallmark of several psychopathologies including addiction, depression, psychopathy, and eating disorders. For example, drug users tend to be less sensitive to the adverse consequences of their behavior whereas depressed individuals are hypersensitive to these adverse consequences. We study these interactions using a variety of behavioural tasks (punishment, appetitive – aversive interactions).

Suggested reading:

Jean-Richard-dit-Bressel, P., Killcross, S., & McNally, G.P. (2017). Punishment: a primer. *Neuropsychopharmacology*, in press.

Jean-Richard-dit-Bressel, P., & McNally, G.P. (2018). Multiple brain mechanisms balancing danger versus reward. *The Neuroscientist*, in press.
(copies available upon request)

Dr Fiona MacCallum (fmaccallum@unsw.edu.au)

NHMRC Neil Hamilton Fairley Clinical Fellow

My research investigates mechanisms underlying psychopathology, with an emphasis on understanding the cognitive and emotional processes that facilitate adjustment to loss and traumatic events.

Potential projects focus on examining these mechanisms within student samples, and include:

1. Understanding how individuals are able to flexibly regulate their emotions across different contexts. This includes investigating relationships between emotion regulation ability and a) cognitive processes such as attention and memory, b) motivational factors and c) situational appraisals.
2. Understanding the mechanisms underlying clinical dysfunctions in autobiographical remembering and future-related imaginings. This research investigates how manipulating memory recall, future imaginings, and self-identity constructs impact on mood and decision making behavior.

Dr Damien Mannion (d.mannion@unsw.edu.au)

Senior Research Fellow

I'm interested in perception, and honours projects under my supervision will involve behavioural experiments relating to how human participants perceive the world. Perception is well-suited to honours research, as it offers projects that are highly feasible within the time constraints of honours but which also provide the opportunity to investigate real and fundamental questions and to yield new knowledge.

Two potential topic areas for honours in 2018 are:

1. What are the effects of illumination on scene and object recognition? We have recently provided evidence that scene recognition can generalise across variations in illumination caused by different times of day. This project will probe the basis of this apparent tolerance to illumination variation in human vision.
2. What is the functional role of loudness perception? A limited body of research has suggested that we are capable of dissociating the intrinsic capacity of an object to produce sound (its 'loudness'; e.g. a volume setting) from the change in the intensity of auditory signals at the ear caused by the object's distance. This project will investigate the possibility that loudness can aid in object recognition by providing us with access to an object property that is constant across different environmental conditions

Dr Kristy Martire (k.martire@unsw.edu.au)

Senior Research Fellow; Director, Master of Psychology (Forensic) Program

I supervise projects related to forensic science evidence and the law. This generally involves students conducting one or two online experiments where decision makers evaluate complex probabilistic evidence. Students will generally learn how to program in Qualtrics and will recruit through Amazon Mechanical Turk or SONA.

1. How can we optimise the communication of forensic risk assessments?

Forensic (and clinical) psychologists are often asked to complete and report actuarial risk assessments for convicted offenders. These risk assessments can be used to inform bail, sentencing and parole decisions. The risk assessments provided by psychologists are probabilistic in nature – communicating that an individual is a member of a group with a

particular level of reoffending risk. However there are questions regarding the extent to which courts properly comprehend what these probabilistic expressions actually mean. Research suggests that when faced with a series of choices to be made, probabilistic information is often used to ‘probability match’ when ‘maximising’ is the optimal decision making strategy. In this research we will explore how risk assessments can be communicated in order to facilitate ‘maximising’ decision styles.

Newell, B. R., Koehler, D. J., James, G., Rakow, T., & Van Ravenzwaaij, D. (2013). Probability matching in risky choice: The interplay of feedback and strategy availability. *Memory & Cognition*, 41(3), 329-338.

2. How does learning experience and environment influence the prediction of conditional probabilities?

Forensic scientists are increasingly being asked to present their opinions about whether the crime scene evidence (e.g., fingerprint) can be linked to the suspect (i.e., their finger) in the format of a likelihood ratio. Likelihood ratios require the estimation of two conditional probabilities, for example the probability of the similarity between the two prints if they came from the *same person*, and the probability of the similarity between the two prints if they came from *different people*. Very little research has focused on how people learn and estimate these conditional probabilities in the world, and what factors might influence the accuracy of their estimation. Understanding this is critical to ensure the evidence being presented in trials is sufficiently reliable.

Fiedler, K., & Juslin, P. (2006). Taking the interface between mind and environment seriously. In K. Fiedler & P. Juslin (Eds.), *Information sampling and adaptive cognition*. New York: Cambridge University Press, pp. 3-29

Dr Steven Most (s.most@unsw.edu.au)

Senior Lecturer and ARC Future Fellow

An old adage holds that “we see things not as they are, but as we are ourselves.” Grounded in cognitive psychology and perception research, my lab investigates how attention, motivation, and emotion shape what we see and remember, as well as the consequences of such interactions for psychological and physical health. As such, our work often seeks to connect cognitive psychology and perception research with other areas of the field, such as clinical- and social-psychology.

Examples of some overarching topics that we address include:

1. How Emotion Shapes Attention and Perception

Most aspects of the environment resonate with emotional meaning, so an understanding of perception in the real world often necessitates understanding how it is impacted by emotion. Projects in my lab investigate the nature of – and mechanisms underlying – emotion’s impact on attention and perception, with particular focus on emotion-induced blindness (e.g., Most et al., 2005, *Psychonomic Bulletin & Review*; Most & Wang, 2011, *Psychological Science*). This refers to a temporary but robust failure of perception following brief exposures to emotionally relevant stimuli. In addition to providing insight into mechanisms of conscious perception, such phenomena – as well as differences in how robustly people experience them – have important implications for understanding of clinically-relevant individual

differences. In pursuing a deeper understanding of the various perceptual mechanisms impacted by emotion (as well as the impact of different aspects of emotional experience), we aim to reconcile discrepancies in the literature such as why emotion sometimes impairs attention and perception but sometimes facilitates them.

2. How Expectation, Motivation, and Cognitive Control Shape Perception

Despite common intuitions that seeing is simply a matter of directing one's eyes, much of what we consciously perceive is driven by the manner in which we "tune" attention to prioritise certain perceptual or semantic features over others – that is, by our attentional set (Most, 2011, *Psychological Research*; Most et al., 2005, *Psychological Review*; Most et al., 2001, *Psychological Science*). When unexpected stimuli do not match our attentional set, we often fail to notice them even when looking directly at them, a phenomenon known as inattentional blindness (Most, 2010, *Consciousness & Cognition*). Related projects in my lab investigate the degree to which attentional set governs conscious perception, how individual differences in cognitive control moderate this effect, and the degree to which mechanisms such as working memory underlie the relationship between cognitive control, attention, and perception.

3. How physiological and emotional arousal impact memory

What if there were things that you could do after you study that would improve your ability to remember what you learned? It turns out that when you learn something, your memory for it continues to solidify even after you've turned your attention to other things (a process known as memory "consolidation"). Evidence suggests that bursts of emotional arousal that occur during this consolidation period can enhance the strength of such memories, and we have recently found evidence that short periods of physical exercise after studying can also enhance memory. We continue to be interested in understanding how both emotional and physiological arousal can affect our ability to remember.

A/Prof Dani Navarro (d.navarro@unsw.edu.au)

Associate Professor

I am broadly interested in higher order cognition, with a side interest in statistics and data analysis in psychology. Most of my research is focused on how people solve inductive problems: How do people learn new ideas and concepts? How do we make decisions quickly in a complicated and often changing world? How do we make sense of facts when the person presenting them may have an agenda? Do children learn differently from adults, and in what way? What happens when people have to reason in a rich social environment – and whose ideas tend to win out in these worlds?

My lab webpage is www.compcogscisydney.com, and you can find examples of recent projects, papers and experimental tasks posted there. Previous honours projects in my lab have looked at tasks as diverse as children's decision making, human reasoning in social worlds, decision making in changing environments, and a variety of other areas. Methodologically, possible projects might be purely experimental (either with adults or children) or might also involve a quantitative component, including computational modelling or Bayesian data analysis.

Dr Jill Newby (j.newby@unsw.edu.au)

Senior Lecturer

My research focuses on developing and evaluating new technology-based psychological interventions (e.g., online CBT and mindfulness training) to improve outcomes for individuals with depression and anxiety disorders, and related chronic health conditions such as chronic pain. I also conduct research to explore the cognitive and behavioural mechanisms underlying anxiety disorders (e.g., checking, reassurance seeking, imagery and memory biases), with a main focus on health anxiety and medically unexplained symptoms. Please feel free to contact me if you are interested in finding out more about my research: j.newby@unsw.edu.au, and see more info at: <http://www.psy.unsw.edu.au/contacts-people/academic-staff/dr-jill-newby>

Some examples of research questions/projects include:

1. Cyberchondria, self-diagnosis, and health anxiety

'Cyberchondria' is a new term used to describe both excessive searching about medical information, and distress in response to search results and self-diagnosis from internet information. This study seeks to examine the cognitive, and emotional factors that cause and perpetuate cyberchondria, its link to health anxiety, and the role of online self-diagnosis tools in exacerbating anxiety about health.

2. E-health/online interventions for the treatment of depression, anxiety and stress

There are often barriers to accessing evidence-based psychological treatment for mental health problems, particularly for people in rural areas. Examples of projects include (1) a randomised trial to compare self-help mindfulness and CBT-based stress management program for the promotion of mental health in individuals with high stress, (2) evaluation of self-guided online CBT for depression and anxiety, and (3) the impact of internet-delivered computerised bias modification for changing fear-based thoughts and beliefs about physical symptoms in health anxious individuals.

3. The impact of virtual reality exposure therapy for medical-related fears and specific phobias

People with medical phobias typically fear blood, injections, needles and other medical settings and procedures. The gold-standard treatment for these phobias is exposure therapy, and applied tension. We want to explore whether exposure therapy can be successfully delivered via virtual reality (VR) environments, how individual's respond to exposure to fear-provoking virtual worlds and whether these responses are similar or different to real-life scenarios, and the mechanisms underlying these fear responses and recovery in treatment. As part of the broader project on VR exposure therapy, we will also be evaluating a low-cost accessible version of VR using mobile devices, to explore the utility of accessible VR in the treatment of anxiety disorders.

Prof Ben Newell (ben.newell@unsw.edu.au)

Professor and Deputy Head of School

Research in my lab covers various aspects of higher level cognition. I am interested in the fundamental cognitive processes underlying judgment and decision making, and in applying what we know to improve decision making in applied contexts (e.g., environmental, financial, medical, forensic). For details of some current work and pdfs of recent publications please see my website <http://www2.psy.unsw.edu.au/Users/BNewell/Index.htm>.

Examples of the general areas in which projects will be available, include:

1. Judgment, Heuristics and Biases: Are we rational?

A wealth of research details how our judgments and decisions deviate from 'rational' standards, but debate continues on what constitutes an adequate characterisation of human judgment. Should we "nudge" people to make better choices, or should existing capacities for judgment be "boosted" via appropriate framing of information? Do people have insight into the bases of their decisions or are they guided by factors outside of awareness? Projects will be available that seek answers to these fundamental questions about decision making.

2. Risk, Uncertainty and Choice

What do you prefer an 80% chance of winning \$400 or a 100% chance of winning \$300? Simple problems of this type have been used to determine the mechanisms underlying decisions under risk and uncertainty. Projects will be available that adopt this basic paradigm and examine how factors such as the way in which information is presented ('experience' vs. 'description'), the nature of feedback on choices, and the context in which those choices are made affect what people do. We are also using experimental and computational approaches to understand seemingly paradoxical situations in which people's judgments about the probability of given risks and their behaviour towards those risks diverge – for example smokers who *over-estimate* their chance of contracting lung cancer but appear to *underweight* the risk by continuing to smoke.

3. The Psychology of Climate Change

Many of the topics covered in (1) and (2) are applicable to understanding how we deal with one of the most challenging problems currently facing society: global climate change. Projects will be available examining the application of basic research on judgment and decision making to questions like: how do people understand probabilistic forecasts and climate projections? What are the cognitive barriers to taking action on climate change? What role can analogical reasoning play in helping to understand climate change? How can we improve communication of the risks and uncertainties associated with climate change? Can we 'contract' psychological distance and make the future 'loom larger'?

4. Eye gaze and decision-making

This is current on-going work with A/Prof Le Pelley and projects could be available supervised either by me or A/Prof Le Pelley – **please see the project description in A/Prof Le Pelley's section for more details**

Dr Zhi Yi Ong (zhiyi.ong@unsw.edu.au)

ARC DECRA Research Fellow

My research focuses on the neurobiological mechanisms of food intake control. It is clear that overeating is a key contributor to increased obesity rates and while a variety of surgical, behavioural, dietary and pharmacotherapeutic strategies have been implemented to treat obesity, there is still no effective long term treatment for obese patients. Sadly, those who lose weight under the current available treatments tend to ‘relapse’ to their old unhealthy eating habits and thus regain their lost body weight. I am thus interested in exploring the neural circuits, neuropeptide function, gut-brain interaction and downstream signaling pathways that contribute to the control of feeding behaviours, to better understand how the brain regulates food intake and to guide the development of treatments that can promote long-term body weight loss.

The neural systems that govern feeding behaviours are believed to be shared by other addictive behaviours such as alcohol-seeking. Therefore I am also interested in examining the common neural mechanisms underlying excessive food intake and drug/alcohol overuse.

Below are some potential honours projects. Students will utilise multi-level approaches/techniques in rodent models, including but not limited to behaviour pharmacology, chemogenetics, histology, microscopy and molecular tools, to address research questions raised in these projects.

1. Characterisation of neural circuits that contribute to food intake, food motivated- and food seeking- behaviours

It has become increasingly clear that food intake control is neuroanatomically distributed and is not dependent on one single brain region. In this project, students will chemogenetically target specific neural pathways (2 or more brain regions) to understand the functional connectivity of these brain sites in the control of feeding behaviours, specifically on the motivation to work for palatable foods and reinstatement (or ‘relapse’) of sugar-seeking behaviours.

2. Why is there always room for dessert? Identifying the brain mechanisms involved in anticipatory negative contrast

This project will examine the brain sites and neuropeptides involved in anticipatory negative contrast – the ability to suppress the desire to eat in anticipation of a subsequent more palatable food choice. This behaviour is reported to be more pronounced in rodent strains that are obesity-prone. Identification of the brain regions that are recruited during this behaviour will help explain the differences in eating behaviours between obese and lean subjects.

3. The role of glucagon-like peptide-1 receptor signaling on alcohol intake and alcohol-seeking

Glucagon-like peptide-1 (GLP-1) is a peptide that controls blood glucose levels and energy balance. The long acting analogue is currently FDA approved for type 2 diabetes and obesity treatments. Interestingly, there is emerging evidence showing that GLP-1 administration is also effective at reducing alcohol and drug taking. This project will investigate the neural mechanisms by which GLP-1 receptor signaling contributes to the suppression of alcohol intake and seeking behaviours.

A/Prof Joel Pearson (jpearson@unsw.edu.au)

Senior Lecturer and NHMRC Career Fellow

The lab studies many different exciting and cutting-edge topics from new methods to map the human brain, human intuition, how we make decisions, the neural basis of hallucinations to how imagination works.

Lab projects include:

1. The scientific study of intuition.

We devised the first scientific technique to measure intuition. Using this method, we found evidence that people can use intuition to make faster, more accurate and more confident decisions. This ground-breaking discovery is the first to show scientific evidence that intuition actually exists and a new method to objectively measure it. We have ongoing projects using novel empirical paradigms, physiological measures and computational decision models to show that unconscious emotional information can boost accuracy in concurrent emotion-free decision tasks. New projects are available using these techniques to study intuition, its genetic and brain basis and its application e.g., can we train the military, sports stars or entrepreneurs to be more intuitive or more productive with their intuition?

2. The neural dynamics and treatment of visual hallucinations

Using novel, objective and reliable techniques to figure out what causes visual hallucinations and how to control them e.g., Developing new treatments. Utilising controllable visual hallucinations to study consciousness in the normal population.

3. Fighting mental disorders with Mental Imagery

Many mental disorders are associated with uncontrollable mental imagery. We are working with new cutting-edge methods to measure the sensory strength of mental imagery and developing new methods to control its strength and vividness. We have developed the first objective and reliable scientific method to test the strength of imagery. We aim to map out the brain dynamics of the imagination and reduce the strength of mental images as a clinical symptom.

4. Is your mind blind? Do you know what aphantasia is?

Aphantasia is a new word coined to describe someone who has no mental imagery. People with aphantasia cannot use images in their mind's eye to remember loved ones, the route home etc. they have to use other strategies. As this is a new condition very little is known about it. Thus far aphantasia only exists based on subjective self-report data. We are using the lab's objective perceptual methods to measure the sensory strength of mental imagery, or lack of it, in individuals with aphantasia. How do aphantasics perform short-term memory without imagery? Are they immune to traumatic flashbacks from trauma? These and many more questions are waiting.

5. Thought Inception: can we put in idea into your head and make you think it's yours?

There are projects available using objective methods to control and measure thought production. Think of this research as the free will of thoughts. How well can you control your own thoughts? We are using perceptual methods to probe these once philosophical Sci-fi questions.

Dr Asheeta Prasad (asheeta.prasad@unsw.edu.au)

ARC Early Career Fellow

<http://www.psy.unsw.edu.au/contacts-people/research-staff/dr-asheeta-prasad>

I have two main research themes, Parkinson's disease and Drug addiction. In both projects, I apply optogenetics, chemogenetics, molecular biology and behavioural neuroscience to better understand these neurological disorders and to provide improved treatments.

1. Neural circuitry underlying drug addiction

Drug addiction is a relapsing disorder, where users lose the ability to inhibit drug seeking behaviour. This project explores that are active during relapse to drugs. This project aims to identify the neural connectivity and molecular profile of brain circuits that control relapse to alcohol seeking.

Suggested reading:

Prasad AA, McNally GP. Ventral Pallidum Output Pathways in Context-Induced Reinforcement of Alcohol Seeking. *Journal of Neuroscience*. 2016 Nov 16; 36(46):11716-11726.

2. Optogenetic manipulation in Parkinson's disease to rescue motor and non-motor symptoms

Parkinson's disease (PD) is a neurodegenerative disorder that affects approximately 10 million people globally with 32 Australians being diagnosed daily. Deep brain stimulation (DBS) of subthalamic nucleus (STN) and Globus pallidum (GP) are current therapeutic surgical procedures for patients with Parkinson's disease (PD). Yet little is known about the non-motor effects of DBS on behaviours, such as motivation, learning and memory. This project applies optogenetic technology in the rodent PD model to better understand the motor and non-motor effects of STN and GP manipulation. Optogenetics technology allows neural manipulation with millisecond control in freely moving animals. Overall outcomes from this project will assist in strategies to alleviate disabling motor and non-motor symptoms of PD.

Prof Rick Richardson (r.richardson@unsw.edu.au)

Professor

We examine a variety of issues related to learning and memory of fear in rats. The motivation for focusing on the study of fear memory is that anxiety disorders, which are characterised by the inability to appropriately regulate fear, are among the most prevalent psychological disturbances in industrialised countries, with between 10-30% of the population suffering from one at some point in their life. Undoubtedly, exposure-based therapies, which are based on the process of extinction, have dramatically improved treatment outcomes for patients suffering from an anxiety disorder. However, it was recently suggested that we have reached a "therapeutic impasse", and that future improvements to exposure-based therapies require a better understanding of the neurobiological mechanisms of fear regulation. This is one of the main issues we focus on in the laboratory.

It will also be very important to gain a better understanding of the neurobiological mechanisms underlying fear regulation in the developing animal, given that the vast majority of anxiety disorders emerge in childhood or early adolescence. Therefore, much of the research we do takes a developmental perspective. For example, extinction of learned fear is relapse-prone in adults but

relapse-resistant in infants. This finding suggests that it may be possible to more effectively “erase” fear memories than was once thought.

Another broad issue we examine in the lab is infantile amnesia, which is the more rapid rate of forgetting in the young animal compared to the adult.

We have recently found that early-life stress (e.g., induced by repeated separations from the mother) leads to a faster transition between the infant memory and extinction systems to the adult memory and extinction systems. That is, maternally separated infants exhibit longer-lasting fear memories than do standard-reared infants, and these memories are relapse-prone following extinction.

We will be doing projects in these, as well as several other areas, in 2018. Further, I am open to developing other research projects with interested students as long as they fit within my broad interests (i.e., to study the emotion of fear and basic memory processes from both a developmental and a neural perspective).

Dr Jenny Richmond (j.richmond@unsw.edu.au)

Senior Lecturer

My research focuses on memory and emotional development in infants and children. Projects in my lab use behavioural measures, eye tracking, psychophysiology and event-related potentials to understand the mechanisms underlying developmental change.

1. I like that one better: Evaluative conditioning

Advertisers use evaluative conditioning to shift our preferences for products. For example, Nespresso manufacturers know that by pairing their product with George Clooney some of the positive feelings toward the actor will rub off on the product and we will like the product better than if they paired it with an unattractive/unliked actor.

Recent work in our lab has shown that much like adults, infants’ preferences for initially neutral objects can also be shifted by pairing them with either positively-valenced or negatively-valenced stimuli. In these studies, we have paired one object with happy facial expressions (or pictures of the infant’s mum) and another object with angry facial expressions (or pictures of a stranger).

We recorded where babies were looking during conditioning using an eye tracker and recorded which object the infant chose during a behavioural test. During this behavioural test, most infants chose the object that had been paired with the happy (or their mum’s) face, suggesting that their preference for the objects had been shifted as a result of conditioning. Of interest, this shift in behavioural preferences only occurred in infants who spent more time looking at the face than the object during learning. Infants who did not show a “face bias” during learning did not pick the positively-valenced stimulus at test.

Our current work is looking at whether this evaluative conditioning effect generalises to other affective stimuli (i.e. happy vs. neutral; neutral vs. angry) and using gaze-contingent learning paradigms to test whether the face preference is a causal mechanism in this kind of learning. We also want to test whether the face biases place constraints on learning in pre-schoolers and adults.

2. Back to the future: Episodic future thinking

Episodic memory allows us recollect past events, however, we can also draw on experience to imagine how future events might play out (Schacter & Addis, 2007). Recent work in our

lab has used both narrative-based methods and behavioural methods to study the component processes that contribute to future thinking development in early childhood. Our work asking children to talk about future events has shown that the ability to construct future event narratives is related to children's ability to use relational memory flexibly (Richmond & Pan, 2013). Most recently we have shown that the ability to make decisions with the future in mind depends on executive function abilities (Michael & Richmond, in press).

Our current work is exploring the extent to which children understand that their preferences will change in the future and whether inhibitory processes are also involved in this kind future thinking. We are testing whether narrative and behavioural tasks tap the same kind of future thinking abilities and whether it is possible to improve pre-schoolers ability to make decisions for the future by manipulating their memory and/or executive processes.

3. I know how you feel: Rapid facial mimicry

Young infants very quickly become experts in processing faces; with relatively little experience they learn to discriminate between faces of different people and different emotional states. With experience, children learn to read how other people are feeling and understand others' emotional states. These processes are impaired in autism spectrum disorders (ASD) and cause major issues in social functioning.

Work in our lab uses EMG technology to measure the tiny changes in facial muscles that are produced when we see others express emotion. We have shown that infants as young as 7 months of age rapidly mimic happy faces but not angry faces. We have shown that pre-schoolers are more likely to mimic dynamic faces than static faces.

Our current projects are looking at how these low-level affective reactions are related to empathy development and the kinds of social responsiveness abilities that are impaired in ASD during the preschool period. We are also looking at whether infants are more likely to mimic expressions displayed by familiar people (i.e. their mum or dad) than emotions displayed by strangers.

A/Prof Branka Spehar (b.spehar@unsw.edu.au)

Associate Professor, Director of Undergraduate Programs

I am interested in a broad range of topics in perception and visual cognition ranging from colour perception and aesthetic preferences to visual attention. Below are some ideas for more specific thesis projects but I am open to suggestions from students regarding different ideas and projects within this domain.

1. Seeing the forest before the trees: Perception of local and global scene properties

One of the visual system's most remarkable achievements is its ability to organise complex visual input into coherent and meaningful entities. The view that global or wholistic aspects of a display precede the processing of local detail is usually pitted against the more structuralist viewpoint according to which the analysis of local features must occur before the global structure can be acquired. Although some ability to aggregate local elements into global forms seems to be present at birth and in infancy, mature global shape perception follows a long developmental trajectory and, surprisingly, does not reach adult-like levels until adolescence. The perceptual mechanisms mediating the dominance of local information in children and adolescents are not yet known. The same dominance of local information is present in developmental disorders such as autism. These projects consider

both basic visual system sensitivities to local detail at various spatial scales, as well as mechanisms that integrate spatially segmented visual information into a more global percept as contributing factors to differential weighting of either local or global information at different stages of development or in different disorders.

2. The pleasure of seeing: The role of image structure in visual preference

Extending to a wide range of both artistic and everyday objects, beauty can be considered as one of the most pervasive and rewarding qualities of our experience of the world. The general aim of this project is to enhance our understanding both of the physical properties of external stimuli and the internal mechanisms that mediate and contribute to aesthetic appreciation in the visual domain. Specifically, we aim to establish to what extent visual preference in a wide range of visual patterns is determined by the visual system's sensitivity to precisely defined spatial characteristics of these patterns. In order to further assess the universal, and automatic, contribution of early visual processes to visual preference, the projects in this area aim to investigate developmental trends in exhibited visual preferences for patterns with a precise characterisation of spatial structure.

3. Attentional capture by irrelevant salient objects

The visual stimulation presents too much information to be perceived, remembered, and acted upon, and only a subset of relevant information is selected by attentional processes. Two classes of attentional mechanisms accomplish this selection: one is the set of top-down mechanisms that control attention in favour of current goals and task demands, and the other is the set of bottom-up attentional mechanisms that control attention on the basis of the properties of stimuli themselves. A considerable debate concerns the degree to which top-down mechanisms can attenuate capture of attention by salient but irrelevant stimuli. I am interested in investigating the resistance of different types of salient visual information to top-down control by using different behavioural (visual search) and electrophysiological (EEG) measures.

4. The Perception of Colour and Contrast in Complex Configurations

One of my major research projects focuses on the effects of the spatial structure of visual scenes on the appearance of parts of such scenes. The appearance of a surface as white, grey, or green is determined not only by the light reflected from that surface but also by the light reflected from surrounding regions. The change in the appearance of a surface caused by its juxtaposition with other surfaces is referred to as an induction. Although much studied, many colour induction phenomena still await a satisfactory explanation. I have been investigating the perception of colour and contrast in complex scenes with special emphasis on the possible mechanisms by which cues that are used to perceive three-dimensional organisation influence perceived contrast and colour. Such cues have to be factored into any adequate explanation of colour and contrast induction. Understanding the mechanisms by which these perceptual cues modify and affect the output of low-level mechanisms as well as their involvement in processes such as surface segmentation and figure ground segregation will eventually lead to mechanistic models that can explain surface perception in natural settings.

Prof Marcus Taft (m.taft@unsw.edu.au)

Professor

I am broadly interested in the cognitive processes involved in language use, as well as episodic memory, and am open to developing a project with you on any topic along those lines.

The areas of research that I am best set up for are:

1. Cognitive mechanisms in reading

How do readers get from the letters that make up a written word to an understanding of the meaning of that word? That is, how is a word stored in long-term memory (i.e., lexical memory) and retrieved when its visual representation is presented? This is the general question of how we are able to read. Specific questions include how the internal structure of a word is used in its identification, what role the pronunciation of a word plays in silent reading, how better readers might differ from poorer readers in their processing strategies, and how the cognitive mechanisms required for reading different orthographic scripts might differ (e.g., Chinese vs. English).

2. Bilingual word recognition and production

When a bilingual person either reads or listens to speech in their second language, what impact does their first language have on their performance? Are the two vocabularies stored together or separately? What is the impact on second language processing of the structural differences between the first and second language? Is a bilingual who has grown up and been educated in Australia indistinguishable in their English ability from a monolingual English speaker?

3. Relationship between lexical and episodic memory

It is easier to remember verbal information when it is meaningful than when it is not. This implies that episodic memory draws upon lexical memory. So, what is the relationship between episodic and lexical memory in terms of the way information is represented and retrieved?

Note that it is unnecessary to have completed PSYC3311 Language and Cognition to undertake a project under my supervision.

A/Prof Lenny Vartanian (l.vartanian@unsw.edu.au)

My work generally focuses on the psychology of eating and weight, and particular areas of interest include body dissatisfaction, dieting and eating behaviours, and obesity stigma. I am happy to supervise students in these broadly-defined research areas.

Please visit my website for more information and for PDFs of my papers:
<http://www2.psy.unsw.edu.au/Users/lvartanian/default.html>.

Some specific topics for the coming year will include:

1. Body dissatisfaction

Body image concerns are increasingly prevalent among women and men. One of the key predictors of body dissatisfaction is the extent to which individuals internalise societal

standards of attractiveness (thinness for women, and muscularity for men). I am interested in identifying factors that predict who is likely to internalise the societal standards of attractiveness, as well as determining whether those factors can be modified as a means of reducing or preventing body dissatisfaction.

2. Eating behaviour

Unhealthy eating is a key public health issue, particularly because it can contribute to poor nutrition and weight gain. Although people's food intake is in part driven by how hungry they are and by how much they like the food they are eating, there are other powerful influences on the amount of food that people eat. These include social factors (e.g., what other people are eating) and environmental factors (e.g., how much food is available), which might influence people's food intake without their awareness. Projects in this area will examine to what extent people are aware of the social and environmental influences on their food intake, and whether they can be made aware of these influences as a means of helping them improve their eating habits.

Projects that will be jointly supervised with Dr Lydia Hayward

3. Intergroup contact as a predictor of prejudice

One of the most well evidenced methods for reducing prejudice is encouraging positive contact/interactions between groups. Recently, however, research has begun to investigate how *negative* contact between people of different groups may increase prejudice, potentially at a stronger rate than positive contact reduces prejudice (i.e., bad is stronger than good). Dr Hayward's research has examined intergroup contact in the context of prejudice based on race and on weight. Recently, she has begun to examine how positive and negative interracial contact predict perceptions of police violence against Black Americans in the US, and we are interested in following up this work further.

4. Consequences of weight stigma

People who are overweight or obese face substantial stigma and discrimination because of their weight. Experiencing such stigma is detrimental to both mental and physical well-being, and is associated with reduced motivation to engage in healthy eating and exercise behaviours. Our research focuses on identifying the personal and situational factors that exacerbate or buffer against the negative effects of weight stigma on health motivation and well-being. For example, we have found that when people cope with weight stigma by using negative self-talk and avoidance strategies, they are more likely to report symptoms of depression, anxiety, and stress. However, when they respond to stigma with positive self-talk and self-love strategies, they report less depressive symptoms. The overarching aim of this research is to identify strategies to help people who are overweight and obese cope with everyday experiences of weight stigma.

Scientia Prof Fred Westbrook (f.westbrook@unsw.edu.au)

Scientia Professor

I am interested in how organisms learn about relations among events, the contents of this learning and how it is expressed in their behaviour. I use Pavlovian conditioning procedures with animal subjects (rats) to study these questions. The general aims of this study are to provide a characterisation of this elementary form of learning and identify its neural substrates.

I am also interested in the role of hedonics in eating and its potential involvement in overeating and obesity. A related issue is the effects of the modern, so-called Western diet on cognition, particularly on tasks which are or are not dependent on the hippocampus, such as place and object recognition tasks, respectively.

Dr David White (david.white@unsw.edu.au)

Research Fellow

My research focuses on face perception, person perception and visual expertise, although I have broad interests in visual processes. A key theoretical motivation for my work is to understand the relationship between abstractive representations and our visual environment.

My list of publications can be found here:

https://scholar.google.com.au/citations?user=C5q_wBAAAAAJ&hl=en

Below, I have listed some current research interests and ongoing studies that have good potential for honours projects, although I am certainly open to other suggestions.

1. Improving identification of children in passport photos

In forensic and security procedures, facial examiners must verify the identity of an unfamiliar person by comparing face photographs (e.g. at border control). Surprisingly, this is a rather difficult and error-prone task. Research in this field has focussed almost exclusively on the identification of adult faces – identification of children has received almost no attention in the literature. Recent work in our lab indicates that performance on child identification tasks is much worse than on adult identification tasks. This is concerning because facial recognition is increasingly being used to identify children in child exploitation cases. On this project, we will investigate whether feedback training can improve identification accuracy for children in passport photos. This project will make use of a large database of genuine passport images supplied by our collaborators at the Australian Passport Office.

Background reading:

White, D., Kemp, R.I., Jenkins, R., Burton, A.M. (2014) Feedback training for facial image comparison. *Psychonomic Bulletin and Review* 21(1), 100-106.

2. Effects of profile image selection on person perception

Do the images we select to represent ourselves in online environments produce desirable social impressions? In recent work we have shown that people are surprisingly poor at selecting images that are faithful representations of their current appearance (White, Burton & Kemp 2016) or that portray themselves in a flattering light (White, Sutherland & Burton, under review). This work has resulted in a large stimulus database with 12 images each of 100 identities, and an associated self-rating data, including likelihood that these images would be used as profile images in three social networking sites (Facebook, Dating, Professional). There is significant scope to use this database to design studies that examine the role of self-perception in producing facial first impressions.

Background reading:

White, D., Sutherland, C.A.M, Burton, A.L. (2017). Choosing face: The curse of self in profile image selection. *Cognitive Research: Principles and Implications*. <https://cognitiveresearchjournal.springeropen.com/articles/10.1186/s41235-017-0058-3>

White, D., Burton, A. L., & Kemp, R. I. (2016). Not looking yourself: the cost of self selecting photographs for face identification. *British Journal of Psychology*, 107, 359-373.

3. Navigation and mirror-image discrimination

Mirror discrimination tasks require participants to identify the correct (i.e. left-to-right) mirror orientation of two simultaneously presented images that are mirror reversals of one another. Studies have shown that memory for mirror orientation of common objects can be surprisingly poor. This is because mirror orientation is largely irrelevant for identification of individual objects, and so is not encoded in memory. However, it is very important that we encode the left-right orientation of the world when finding our way from one place to the next. My recent work suggests that navigation through our visual world enhances memory for the mirror orientation of familiar scenes. Interested students would be invited to follow up this result to examine the relationship between mirror discrimination ability, navigation ability and left-right confusion errors.

Background reading:

Dilks, D. D., Julian, J. B., Kubilius, J., Spelke, E. S., & Kanwisher, N. (2011). Mirror-image sensitivity and invariance in object and scene processing pathways. *Journal of Neuroscience*, 31(31), 11305–11312.

Dr Thomas Whitford (t.whitford@unsw.edu.au)

Associate Professor

1. **Self vs. World.** I am interested in the mental processes by which healthy people distinguish between self-generated actions and externally-generated events. I am also very interested in investigating how abnormalities in these processes could underlie some of the cardinal features of schizophrenia. While working with this clinical population is beyond the scope of an Honours thesis, it would be feasible for students who go on to undertake a PhD or Masters degree.

The kind of questions I am interested in exploring in an Honours project include:

- Why do self-generated sensations feel different - and typically less salient - than externally-generated sensations? For example, why is it difficult to tickle yourself? Are self-generated sensations more difficult to detect than identical, externally-generated sensations?
- Do self-generated sensations evoke less activity in the electroencephalogram (EEG) than do identical sensations that are externally-produced? Is this sensory suppression specific to certain sensory modalities (e.g., auditory, visual, tactile) or is it true of all sensory modalities?
- Do healthy people (i.e., 1st year psychology students) who are high on the personality trait of schizotypy have more trouble distinguishing between self-generated and

externally-generated sensations than do healthy people low on schizotypy? (Note: schizotypy is a personality trait which describes a continuum of experiences related to psychosis. Schizotypy has been conceptualised as ranging from mildly eccentric or odd beliefs to more extreme states related to florid psychosis).

2. **Inner Speech.** I am also interested in developing an objective marker for inner speech. On the face of it, inner speech – that is, the silent production of words in one's mind – seems as though it is a completely private endeavour, beyond the reach of any objective measurement. However, recent work, including from my own laboratory, suggests that it is possible to determine, on the basis of objective, physiological measurements, when a person is engaging in inner speech, and even – within limits! – *what they are saying internally*. I am extremely interested in following up this line of research.

Suggested reading:

Whitford TJ, Mitchell AM, Mannion DJ. (2017). The ability to tickle oneself is associated with level of psychometric schizotypy in non-clinical individuals. *Consciousness and Cognition*, 52, 93-103.

Oestreich LKL, Mifsud NG, Ford JM, Roach BJ, Mathalon DH, Whitford TJ. (2015). Subnormal sensory attenuation to self-generated speech in schizotypy: electrophysiological evidence for a 'continuum of psychosis'. *International Journal of Psychophysiology*, 97, 131-138.

Hughes G, Desantis A, Waszak F. (2013). Mechanisms of intentional binding and sensory attenuation: the role of temporal prediction, temporal control, identity prediction, and motor prediction. *Psychological Bulletin*, 139, 133-151.

Alderson-Day B & Fernyhough C. (2015). Inner speech: development, cognitive functions, phenomenology and neurobiology. *Psychological Bulletin*, 141, 931-965.

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My research takes a social psychological approach to studying the relationship between emotions and social behaviour. In particular, I focus on emotions that uniquely arise in social contexts, or social emotions (e.g., pride and gratitude). Whether it's after a mate helps you move house, or a friend loans you some money to cover your phone bill; after doing well on an exam, or playing on a rugby team that won the local tournament; these emotions arise frequently in everyday life. Despite this, relatively little is known about how these emotions shape social interactions, how they are expressed, and how they influence future behaviour. If you would like to chat with me about my research and/or ideas you have for your theses, feel free to contact me (lwilliams@unsw.edu.au).

Some potential research questions to be considered in 2018 appear below.

- 1. The role of social emotions in blood donor motivation.**

Blood donation is a unique type of prosocial behaviour. Donors literally give a part of themselves to others, who are never identified. The process of donating blood can involve physical discomfort and often instils a sense of fear, especially amongst those who have

never donated. Despite these negative aspects of donation, many individuals still engage in this prosocial act. Recent research on the psychology of blood donors has suggested that many donors derive positive emotions from donating. This project would involve examining the specific nature of the influence of positive emotions (happiness, pride, gratitude, appreciation, compassion) on donation intention and behaviour.

2. Contextual effects of positive emotion expression.

We see smiling people as friendly; individuals showing a pride expression as high in status; someone saying “thank you” as trustworthy. Relatively little work has examined how different social contexts (intergroup situations; competitive situations; computer-mediated contexts) might shape these outcomes. This project will explore which social contexts shape the way expressions guide impression formation and further examine the specific nature of those effects.

3. The interplay between loneliness and emotional experience.

Loneliness is the subjective sense of lacking the social connections one needs — this is not the same as solitude (in fact, some people thrive with long spans of solitude!). Loneliness has a number of severe negative outcomes for physical and mental health alike. This project will explore the dynamic interplay between emotional experience and loneliness — establishing the directional links amongst these constructs. Do lonely people experience a constricted range of emotions? Or does a constricted range of emotions contribute to loneliness? Could it be both? Does the type of emotion matter (e.g., social vs. non-social emotions; positive vs. negative emotions)?