Inter-trial adaptation to fast translating dots reveals direction and orientation effects: evidence for motion streaks

David Alais, Johahn Leung, Erik Van der Burg
University of Sydney
david.alais@sydney.edu.au

Using a long series of rapid motion trials, we investigated short-term adaptation using inter-trial analysis. Observers viewed 200 ms of translating dots with directions jittered around vertical and indicated whether the direction appeared leftwards or rightwards. Responses showed subjective vertical was very accurate with a tight bandwidth. In an inter-trial analysis, response distributions for current trial (t) were re-compiled based on the preceding trial’s (t-1) direction. This revealed clear inter-trial adaptation: for small negative directions (1.5° & 3°) on trial t-1, distributions shifted positively, and small positive directions on t-1 shifted distributions negatively. This is the classical repulsive aftereffect pattern. For larger t-1 directions, the adaptation effect was attractive. We then interleaved upward and downward motions, each jittered around vertical. The inter-trial analysis revealed much stronger adaptation, and all effects were attractive. Because direction-selective neurons have a preferred direction and a null response to motion 180° opposite (whereas orientation is constant for 180° shifts), interleaving up/down motion cannot produce inter-trial motion adaptation. Instead, we attribute the strong attractive effects to motion streaks, the oriented ‘trails’ produced by neural temporal integration which activate orientation units. We conclude fast motion contains motion and orientation components, and that up/down interleaving isolated the orientation component.

Cannabis Use, Schizotypy, and Attentional Inhibition

Lucy Albertella, Mike Le Pelley, and Jan Copeland
UNSW
l.albertella@unsw.edu.au

The present study examined the effects of frequency of cannabis use, schizotypy, and age on attentional inhibition, as measured using a location-based negative priming task. The sample included 124 Australians aged 15-24 who had ever used cannabis. The schizotypy dimension of Impulsive Nonconformity was found to have a significant effect on negative priming such that participants with higher scores on this dimension showed reduced negative priming. Further, there was a significant age by cannabis use interaction indicating that younger, frequent users of cannabis may be more susceptible to its effects on attentional inhibition and perhaps at greater risk of developing a disorder on the psychosis dimension.

Subset sandwiches: Letter coding and competition in lexical retrieval

Sally Andrews & Colin J. Davis
University of Sydney and University of Bristol
sally.andrews@sydney.edu.au

We used the masked priming paradigm to investigate how sublexical facilitation and lexical competition interact during early lexical retrieval, and whether they are modulated by individual differences in written language proficiency. 117 participants, assessed on Reading Comprehension and Spelling ability, classified 7-letter target stimuli as words or nonwords. Counterbalanced blocks compared a standard 50 ms masked orthographic subset prime with a ‘sandwich priming’ variant in which a 33 ms presentation of the target word preceded the orthographic prime. This has been claimed to boost activation of the target word, increasing its resilience to lexical competition and enhancing sensitivity to early sublexical activation. To assess sensitivity to the identity and sequence of letters we compared Initial primes - the first three and final target letters (1237 primes eg couy COUNTRY) with Transposed Letter primes (1327eg cuoy) and Non-adjacent primes (1357, eg cury). The averaged data replicated evidence that pre-activating the target enhances subset priming. Linear mixed analyses revealed that better spelling was associated with increased sensitivity to letter order. Better readers benefited more from target pre-activation than poorer readers but showed minimal sensitivity to letter order. Simulations of the Spatial Coding Model were used to assess possible mechanisms underlying these effects.
The role of working memory availability in resolving differences among talkers

Mark Antoniou, Patrick C. M. Wong, Suiping Wang
The MARCS Institute, University of Western Sydney
m.antoniou@uws.edu.au

Spoken language processing becomes less efficient when we encounter the voices of multiple talkers. Theories of speech perception accurately account for how humans recognise speech, but the cognitive mechanisms responsible for accommodating different talkers are not well understood. This is somewhat surprising because individual differences in cognitive abilities affect speech perception (e.g., phoneme identification, phonological awareness, and phonetic learning). A potentially useful theoretical account is provided by the active control model, a cognitive approach to speech perception delineating a set of computational principles to address how listeners accommodate talker variability. According to the active control model, multiple-talker speech requires listeners to test hypotheses concerning the talker’s intended message, and this depends critically on cognitive resources. We presented a word-monitoring task involving single- versus multiple-talker presentations to older adults, a population known to be variable in their working memory availability. As expected, performance decreased in the multiple-talker condition relative to the single-talker. Importantly, older adults’ Auditory Working Memory scores correlated with the difference in single- versus multiple-talker recognition times and detection sensitivity. The findings lend support to the active control model, and suggest that working memory may play a crucial role in speech perception, and specifically in resolving talker variability.

Symmetrical patterns appear less numerous

Deborah Apthorp and Jason Bell
Australian National University
deborah.apthorp@anu.edu.au

Symmetry is common in the natural world, and both human and animal observers are highly sensitive to it. But can its presence also bias basic estimates of scene content? We consider this question in the context of numerosity judgments. Observers judged the relative number of elements in symmetrical and asymmetrical dot displays. Reference displays contained 50, 100 or 200 dots; comparison displays were adjusted to obtain the point of subjective equality (PSE). To assess whether the effect was due to perceived global structure within the symmetric displays, we also tested with concentric Glass patterns (which had global structure but not symmetry) compared to randomly orientated Glass patterns. Symmetrical displays were consistently judged as less numerous than asymmetrical displays, and this effect persisted across different dot numbers, dot densities and axes of symmetry. Symmetrical displays required approximately 10% more elements to appear as numerous as asymmetrical displays. For Glass patterns, the effect was greatly reduced or eliminated, despite equivalent levels of perceived structure, suggesting the bias could not be attributed to the perceived structure in a symmetric pattern. We propose that the reported numerical distortion is due to the visual system’s tendency to reduce processing for redundant information in displays.

Measuring cognitive confusion during problem solving: an experimental methodology

Amael ARGUEL, Mariya PACHMAN, Lori LOCKYER
School of Education, Macquarie University and ARC-SRI Science of Learning Research Centre
amael.arguel@mq.edu.au

Learner’s cognitive confusion is a frequent phenomenon that occurs in complex learning. Confusion can be beneficial in engaging learners in a deeper process of understanding. However, confusion can also be detrimental when it lasts for too long, leading to frustration or boredom. Non-constructive confusion is likely to happen in digital environments, without a teacher present to detect confusion and help learners. With the development of online courses, it is crucial for educators and educational designers to possess techniques able to predict confusion in digital environments. Recently, we have developed an innovative methodology to measure confusion. While solving visuo-spatial insight problems on a computer, on-screen gaze trajectories of participants were recorded with an eye tracker. Then, individual gaze trajectories were shown to participants who rated confusion on a scale for each 1-minute interval of the problem-solving phase. Data from the reporting of confusion were triangulated with problem solving steps and trajectories obtained from eye tracker. The aim of the study was to better understand the dynamics of confusion in relation with the process of resolution of problems, to determine indicators that could be used for prediction of confusion during learning tasks in digital environments. Results from this study will be presented.
Cross-modal encoding facilitation driven by metacognition
Derek H. Arnold, Cailem Murray Boyle & Alan Johnston
The University of Queensland
d.arnold@psy.uq.edu.au

When making decisions humans are often aware of mistakes without feedback. These feelings of confidence correlate with objective sensitivity - a form of metacognition as this involves the brain generating a reportable code concerning encoding precision. It has also been established that decisions based on two, as opposed to just one, sensory modalities are more accurate. We reasoned this might involve metacognition. To investigate we examined rate judgments. People were presented two sequential, unimodal or multimodal, stimuli and asked to judge which had changed more rapidly before reporting high or low confidence in that judgment. Overall there was a clear multimodal advantage. This, however, was lost for data split according to confidence. The advantage was lost for comparisons of low-confidence trials, as evidently on these neither unimodal nor multimodal presentations had resulted in an accurate confidence-inducing encoding. The multimodal advantage was lost for high-confidence trials, as on these the provision of an additional source of information was not advantageous relative to unimodal trials, which had individually elicited a confidence-inducing encoding. We conclude that cross-modal performance benefits can result from metacognition, allowing the selection of more accurate information when there is a cognisant discrepancy in the precision of unimodal encodings.

Intelligibility of temporally modified speech: Effects of masker and rhythmicty
Vincent Aubanel and Lauren Smith and Martin Cooke and Jeesun Kim and Chris Davis
The MARCS Institute, University of Western Sydney
v.aubanel@uws.edu.au

In noisy environments, it is common for talkers to elongate their speech in an apparent effort to improve information transmission. However, studies on speech intelligibility have seldom observed benefits associated solely with temporal elongation. We present data for linearly and nonlinearly retimed speech mixed with two types of maskers. The nonlinear retiming was aimed at minimising energetic masking from fluctuating background noise. In comparison to unmodified speech, nonlinear retiming lead to intelligibility benefit in the presence of the fluctuating masker, but was disruptive when applied to speech in stationary background noise. Linear elongation was found to be beneficial for a fluctuating masker but not with a stationary one. This last result can be interpreted in terms of the modification increasing glimpsing opportunities in comparison to the original speech. Other data will be presented that explored the effect of retiming the rhythmicty of the target speech as a contributing factor to speech intelligibility in noise.

Near or Far: The Effect of Distance and Vocabulary Knowledge on Word Learning
Emma L. Axelsson, Lynn K. Perry, Jessica S. Horst
The Australian National University; University of Wisconsin-Madison; University of Sussex
emma.axelsson@anu.edu.au

The current study investigated the role of spatial distance in word learning. Two-year-old children saw novel objects named while they were either in close proximity to each other or spatially separated. At test, children’s retention for the name-object associations was assessed. Keeping the objects spatially separated during naming was associated with increased retention for children with larger vocabularies. However, there was no relationship between retention and vocabulary size for children who saw objects named while in close proximity. This demonstrates that keeping clear, uncluttered views of objects during naming improves word learning, but largely for children who have already learned many words. Children with larger vocabularies might have a better capacity to maximize on the clear encoding that distance provides. When objects are in close proximity during naming there might be greater interference during encoding and an increase in cognitive load.
Heads versus bodies: a comparison of infants and adults looking behaviour to human figures

Emma L. Axelsson; Elizabeth M. Murphy
The Australian National University
emma.axelsson@anu.edu.au

Infants look preferentially to faces from birth and develop adult-like expertise with faces in the first year of life. In contrast, infants’ representations of bodies appear to develop more slowly and evidence of expertise does not appear until the second year of life. Therefore, it can be assumed that when presented with human figures, infants would focus largely on faces before they visually explore bodies and adults would demonstrate more extensive visual exploration. The current study compared 7-month-old infants and adults visual exploration of human figures using an eye-tracker. Significantly more adults looked first to the heads than the infants and were faster to shift their focus to heads than the infants. Infants engaged in significantly more looks than adults before fixating on the heads, suggesting that adults were more expectant of the heads and prioritised looking to the heads. For both infants and adults, the first look to the heads were significantly longer than the first look to the bodies, suggesting that faces held attention more than bodies. In sum, head information does appear to take attentional precedence from early in life, but infants do not prioritise their focus of attention to heads to the same degree as adults.

Local and Global Contributions to Detection of Radial Frequency Patterns across Development

Cribb, S. J., Badcock, J.C., Maybery, M., & Badcock D. R.
University of Western Australia
serena.cribb@research.uwa.edu.au

Primary school aged children are less sensitive to deformation in Radial Frequency (RF) patterns than adults. Previous studies have looked at sensitivity to fully modulated RF patterns, but not assessed the extent of contour integration, meaning this difference could arise from either changes in the extent of global pooling of information or sensitivity to local curvature information, or both. In the present study, psychophysical methods were used to reassess changes in sensitivity to RF patterns across development, separating changes in sensitivity to local curvature information from changes in contour integration. Typically developing observers were tested (aged 6-22, N = 105, normal acuity) on a 2AFC RF3 discrimination task with one, two and three cycles of modulation. Younger observers were less sensitive to RF3 patterns in all conditions. However, their strength of integration did not change with age, suggesting contour integration is adult-like in primary school aged children. Results suggest changes in sensitivity to RF patterns across age are, instead, due to increased sensitivity to local curvature information rather than increased effectiveness of contour integration.

Using Visual Search to assess cues for Object shape.

David R. Badcock, Krystle Haley, J. Edwin Dickinson
University of Western Australia
David.Badcock@uwa.edu.au

The visual system determines the shape of closed contours and can find an object among a set of distractors very rapidly if it contains a unique cue. We use visual search speed and asymmetries in performance to determine elements of the basic code for shape in human vision. Kristjansson and Tse (2001) argued curvature discontinuities (CDs) are critical local cues to shape, supporting rapid visual search with minimal distractor interference when present in the target but absent in the distractors. However, studies using Radial Frequency contours, without CDs, have suggested the polar angle between two points of maximum curvature plays an elementary role. This series of experiments investigates the critical features supporting shape coding and efficient detection. Performance is contrasted for patterns differing in curvature, CD, corner numerosity and internal polar angle. The results show that patterns without CDs were rapidly discriminable, but patterns with the same internal polar angles and extreme differences in curvature and/or corner numerosity were not, leading to the conclusion that internal polar angle is a primary discriminable shape feature. The results support the conclusion that polar angles are labelled cues to shape and potentially a critical element in the code for object shape.
Slower or delayed engagement of temporal features of task-set reduces dual-target accuracy in developmental dyslexia: evidence from a meta-analysis
Nicholas A Badcock, Julia Miserksy, Sieu Khuu, Joanna C Kidd

ARC Centre of Excellence in Cognition and its Disorders, Department of Cognitive Science, Macquarie University

nicholas.badcock@mq.edu.au

We conducted a meta-analysis of the attentional blink (AB) research focussed on developmental dyslexia. The AB effect relates to a limitation in the allocation of attention over time and is examined in a dual-target rapid serial visual presentation (RSVP). When the second target appears within 500 ms of the first target, target accuracy is lower. The most common pattern of results is lower overall accuracy in dyslexia relative to typically reading peers; that is, a between-group main effect. This meta-analysis examined the size of the between-group effect (-0.74, [95% CI: -.96, -.52]), p < .001, in relation to physical presentation characteristics, which differed between and within experiments. Meta-regression indicated that the time before onset of the RSVP (including the fixation cross) and the temporal variability of the second target were predictive of the between group difference: The longer the interval before RSVP onset, the larger the group difference; and the greater the variability in second target position, the smaller the group difference (follow up experiments supported these patterns in individuals unselected for reading ability). These observations suggest that the endogenous engagement of temporal features of task-set may be slower or disrupted in developmental dyslexia.

When, not if: The inescapability of an uncertain climate
Timothy Ballard, Stephan Lewandowsky
Both authors: University of Bristol and University of Western Australia
t.ballard@uq.edu.au

Climate change projections necessarily contain uncertainty. Analysis of the climate system reveals that greater uncertainty about future temperature increases is associated with greater expected damages. By contrast, uncertainty is frequently cited in public discourse as a reason to delay mitigative action. This failure to understand the implications of uncertainty may incur notable future costs. It is therefore important to communicate uncertainty in a way that promotes an accurate understanding of climate change risks. We examined whether responses to projections were influenced by whether the projection emphasised uncertainty in the outcome or in its time of arrival. We presented participants with statements and graphs indicating projected increases in temperature, sea levels, ocean acidity, and a decrease in arctic sea ice. In the uncertain-outcome condition, statements reported the upper and lower confidence bounds of the projected outcome at a fixed time point. In the uncertain-time-of-arrival condition, statements reported the upper and lower confidence bounds of the projected time of arrival for a fixed outcome. People perceived the threat as more serious and were more encouraging of mitigative action in the time-uncertain condition. This finding has implications for communicating climate change risks to policy makers and the general public.

Integration times of global shape mechanisms are limited by low level processes operating prior to spatial integration
Jason Bell, Gideon Sacks, David Burr
1. University of Western Australia, Australia. 2. University of Florence, Italy.
jason.bell@uwa.edu.au

We investigated whether the temporal properties of higher level form mechanisms depend on spatial scale, as would be expected if the temporal limitation were low level. We measured spatial and temporal summation in mechanisms responsible for decoding visual shape, using Radial Frequency (RF) patterns, globally processed stimuli that represent familiar shapes and objects, while being easy to control. We measured pattern deformation thresholds for one and three cycles of an RF3 (triangular pattern), as a function of SF profile (1.25 or 10 cpd), and presentation time (10-320ms). The results show that sensitivity to RF shape improved sharply as presentation time increased. The improvement was more rapid, and quicker to plateau for the low, compared with the high SF profiled pattern; indicating a shorter temporal integration time for the former (consistent with results with simple sinusoidal patterns). Sensitivity also improved with number of features, almost linearly, irrespective of SF or presentation time. That the temporal properties of shape mechanisms vary with SF, in a similar way as for simple sinusoids, suggests that this integration may be limited at low levels, before spatial integration. We will discuss these results in relation to the temporal properties of other visual mechanisms.
Infant-directed speech by Fathers: Acoustic determinants of the moderate emotional message

Titia Benders & Floor Arts
*University of Newcastle*
titia.benders@newcastle.edu.au

As the traditional division between the mother as an infant’s primary caregiver and the father as out-of-home provider is fading (Berey, 2005), understanding father-infant interaction becomes increasingly important. Fathers, like mothers, speak to infants with a high pitch and large pitch range, but the extent to which they change their speech is more moderate (Fernald et al., 1989). The present study asks whether these objective differences between maternal and paternal speech have implications for the emotional message that is conveyed. We collected IDS and adult-directed speech from 10 Dutch fathers and 10 Dutch mothers. A sample of each speaker’s IDS was presented to 30 undergraduate listeners, who rated the emotional message of the speech on 9-point scales such as “the speaker expresses positive emotion” and “the speaker is soothing” (cf. Kitamura & Burnham, 2003). The fathers were found to express the same emotional messages as mothers, but to a lesser degree. Ongoing analyses investigate which acoustic and linguistic properties explain these observed differences between the emotional strength of maternal and paternal IDS.

Decision-makers pay for payoff-irrelevant information under uncertainty

Daniel Bennett, Stefan Bode, Hayley Warren, & Carsten Murawski
*The University of Melbourne*
daniel.bennett@unimelb.edu.au

Given the dynamic and stochastic nature of the world, an accurate model of the environment is vital for survival. To produce adaptive behaviour under uncertainty, organisms ought constantly to seek out new information with which to update their world models. This aspect of behaviour is not well captured by rational theories of decision making. To test the hypothesis that people have an intrinsic tendency to seek information, forty healthy participants completed a novel task in which they could choose to pay a cost to receive advance information about the likelihood of receiving a monetary reward in a lottery at the end of each trial. Importantly, acquiring information did not alter the probability of receiving the reward, which was known to participants. In this situation, theories of rational choice predict that agents ought never pay for information. Results showed that participants were willing to incur significant costs to acquire early but payoff-irrelevant information, which is inconsistent with standard theories of choice under uncertainty. Behaviour was well explained by a computational model that assumed a preference for information in addition to preference for reward. Our results suggest that existing normative models of decision making should be extended to account for information seeking.

Pre-attentive Auditory Processes in Adults with and without Long-Term Meditation Experience: An ERP study.

Britta Biedermann, Peter de Lissa, Yatin Mahajan, Vince Polito, Nicholas Badcock, Lena Quinto, Michael Connors, Linda Larsen, Greg Savage & Genevieve McArthur
*ARC Centre of Excellence for Cognition and its Disorders Department of Cognitive Science Macquarie University, Sydney, Australia*
britta.biedermann@mq.edu.au

There is empirical evidence that meditation has a moderate and reliable effect on attention in typical adults (e.g., Sedlmeier et al, 2012). This study explores pre-attentive auditory processes reflected in event-related potentials: ERPs. Two questions of interest were addressed: (i) Do auditory processing and attention change during meditation compared to non-meditation? (ii) Do long-term meditators differ in neural indices of auditory processing from non-meditators? We compared ERPs of 12 long-term meditators and 14 non-meditators during an auditory odd ball task. Participants were tested while listening passively to sounds during a meditative condition and a non-meditative control condition. Results revealed differences between the meditative and non-meditative conditions in early pre-attentive ERP peaks (P1 and N1), as well as differences between long-term meditators and non-meditators in the N1 component, and the later MMN component. We conclude that meditation seems to have an effect on both people’s traits and people’s states, when processing auditory stimuli.
Selective attention to threat in social anxiety: A top-down or bottom-up bias?

Hannah L. Boal, Bruce Christensen, & Stephanie C. Goodhew
Research School of Psychology, The Australian National University
hannah.boal@anu.edu.au

Selective attention toward threatening facial expressions has been found to precipitate and maintain symptoms of social anxiety. However, the automaticity of this bias is under debate. The current study aimed to test the involvement of top-down attentional processes in the engagement of attention with threatening faces for individuals with high versus low symptoms of social anxiety. In a variation of the probe detection task, participants’ attention was initially cued to the left or right of fixation before an upright face (disgust or neutral), paired with an inverted face, was presented. Participants then responded to a probe, which appeared in the locus of the upright or inverted face. This task was performed under no additional load, low load (1-digit memory task), and high load (6-digit memory task). It was hypothesised that individuals with high social anxiety would display faster engagement with disgust faces relative to neutral faces and that this bias would be attenuated under high load, suggesting that top-down attentional mechanisms are, at least partly, at play. Contrary to predictions, the results suggested that the engagement bias to threatening information was exacerbated by increasing load. These results are discussed in relation to theoretical models of social anxiety.

Using Eye-tracking to Investigate the Benefits of Contextual Cues to Prospective Memory

Vanessa K. Bowden, Shayne Loft, Rebekah E. Smith
University of Western Australia
vanessa.bowden@uwa.edu.au

Research has shown that context can have a significant effect on prospective memory (PM) – the ability to ‘remember to remember’. In the current study, participants completed a trivia task which required determining whether a sentence was true or false. Participants were asked to memorize four PM target words and to make the PM task response when they saw those targets. The context condition were told that memorized targets could only appear within a specified trial window, and the no-context condition were given no cues regarding when targets would appear. Participants in the context condition responded more quickly to ongoing trials outside the target window compared to participants in the no-context condition, indicating that context was successful at reducing ongoing task costs. Inside the target window, participants in the context condition slowed their responses as much as the no-context condition and responded more accurately to PM targets. Therefore, context improved PM accuracy without further ongoing task costs. Eye-tracking results showed larger pupil dilations for the context condition within the target window, but no differences outside the window, which when coupled with the other behavioural data suggests an increased allocation of attention to the entire ongoing-PM task set during the target windows.

Evidence for integrated processing of faces and bodies in the anterior face patch

Bronson Harry; Paul Downing
The MARCS Institute, University of Western Sydney; School of Psychology, Bangor University
b.harry@uws.edu.au

Functional imaging studies have uncovered face selective regions located in the occipital cortex, fusiform gyrus, and the anterior temporal lobes. Although the posterior regions have been shown to demonstrate highly specific responses to faces, the anterior face patch (AFP) is not well understood. Here, we measured the response of the AFP to a broad range of stimulus categories to better assess face selectivity in this region. Participants were presented images from 20 stimulus categories in an event-related fMRI design. The profile of responses in individually defined AFP was similar to that found in face-selective regions of the occipito-temporal cortex. This similarity included a particularly strong response to faceless bodies in the right hemisphere AFP, similar to the overlapping face- and body-selective representations found in the fusiform gyrus. We pursued this finding in a second study that utilised high resolution fMRI. Multivoxel pattern analyses revealed that while in the fusiform gyrus, body and face representations are distinct, selectivity for these two categories were positively correlated in the AFP. These findings suggest integrated processing of face and bodies in this region.
Motion across a tactile scotoma shifts perceived position

Jack Brooks (1,2), Tatjana Seizova-Cajic(3), Janet L. Taylor(1,2)

1. Neuroscience Research Australia, 2. University of New South Wales, 3. Faculty of Health Sciences, University of Sydney

j.brooks@neura.edu.au

The statistics of past stimulation shapes sensory brain maps (Merzenich & Jenkins, 1993). Here we use a tactile stimulus similar to an artificial visual scotoma (blind spot) to investigate if motion influences perception of the position of a static stimulus. The motion stimulus we expected to most affect position skips the scotoma in an instant, as if it does not exist (Seizova-Cajic & Taylor, 2014). Subjects (n=12) pointed to 60-g von Frey filaments applied to the skin of the forearm following back-and-forth brush motion at 15 cm/s, with a 10-cm ‘scotoma’ (non-stimulated skin) in the middle. Scotoma traverse speed was either 15 cm/s or 100 cm/s. The presence of scotoma resulted in inward position shift (5.9 and 8.9 mm for 15 and 100 cm/s traverse speeds, respectively) compared to the control condition (brushing without scotoma), F(2,22)=8.48, p=0.002. The quick traverse time was significantly different from the control (p=0.02, Bonferroni corrected). Trends in the data also suggest that scotoma traverse speed affected position shift. We conclude that tactile scotoamas modulate perceived position and propose that the degree of shift is influenced by the spatiotemporal characteristics of the surround stimulus.

Body Adaptation and the Encoding of Self and Other

Kevin R. Brooks, Alexa Murley and Ian D. Stephen

Department of Psychology, Macquarie University, NSW 2109

kevin.brooks@mq.edu.au

Body image disturbance is a fundamental component of eating disorders. While media exposure to the “thin ideal” has been blamed for this misperception, relatively little research has examined visual adaptation as a potential mechanism. We examined the extent to which the bodies of ‘self’ and ‘other’ are processed by common or separate mechanisms. Experiment 1: Participants were given prolonged exposure to images of the self and of another female that had been distorted in opposite directions (e.g. expanded self/contracted other). The resultant aftereffect was assessed using test images both of the self, and an other. Aftereffects were contingent on the test stimulus, demonstrating differences in the encoding of these body types. Experiment 2: Participants were adapted to either expanded or contracted images of either the self or an other. While adaptation effects were largest when adapting and testing with the same body type, substantial aftereffects were also demonstrated for cross adaptation conditions, demonstrating some overlap in the coding of self and other. Alongside revelations about differences in the encoding of these body types, the evidence of misperception of one’s own body following exposure to “thin” others demonstrates the viability of visual adaptation as a model of body image disturbance.

Integration of auditory and visual temporal rate in aging


University of Melbourne

cjbrooks@student.unimelb.edu.au

We investigated how older adults integrate temporally modulated visual and auditory cues. The experiments aimed to disentangle the effects of any age-related changes in temporal rate discriminability from those of the integration process itself. Eleven younger (22-32, mean 26) and twelve older adults (60-74, mean 68) participated. To normalise individual differences in sensitivity, temporal rate discriminability was equated for 10 Hz sinusoidal auditory flutter (amplitude modulation of 500 Hz carrier around 65dB) and visual flicker (LED, mean 438 cd/m2, 100% modulation) for each participant by manipulating auditory modulation depth. Concurrent presentation of asynchronous rates skewed perceived rate comparably in younger and older adults for both flicker (main effect of age: F(1,19)=0.13, p=0.73) and flutter (main effect of age: F(1,17)=0.26, p=0.62), indicating similar integration. However, older adults required greater auditory modulation to equate discriminability (Man Whitney, U=18, p=0.01), indicating a relative decline in auditory rate discriminability with older age. In a supplementary experiment, audition dominated perceived rate when young observers were presented with the greater auditory modulation used for older adults (flutter: t(5)=4.7, p=0.005; flicker: t(5)=2.7, p=0.04). Altogether, our results indicate that older adults maintain their ability to integrate auditory and visual temporal rate despite reduced sensitivity to auditory modulation.
Do older listeners modulate speech recognition dynamics in response to decreased speech signal reliability?

Laurence Bruggeman and Esther Janse
The MARCS Institute UWS, Centre for Language Studies and Donders Institute for Brain, Cognition, and Behaviour, Radboud University Nijmegen, Netherlands
L.Bruggeman@uws.edu.au

When young adults listen to reduced, casually articulated speech or speech interrupted by bursts of noise, they flexibly adjust the parameters of word recognition to allow for speech signal unreliability. Consequently, mismatches in the input are treated more leniently such that lexical candidates are not immediately deactivated; onset competitors (e.g., cloud-clown) compete less strongly, and rhyme competitors (e.g., cent-tent) compete more strongly than in clear-speech conditions. Using eyetracking, we assessed whether this modulation of recognition dynamics is also available to older listeners. Dutch participants (aged 60+) heard Dutch sentences containing a critical word while viewing displays of four line drawings. The name of one picture shared either onset or rhyme with the critical word (i.e., was a phonological competitor). The other pictures were unrelated distractors. Sentences were either clear and noise-free, or had several phonemes in the context of the critical word replaced by bursts of noise. Contrary to earlier results with young adults, a larger preference for onset competitors than for rhyme competitors was observed in both clear and noise conditions; performance did not alter across condition. This suggests dynamic adjustment of spoken-word recognition parameters in response to a change in listening condition is less available to older listeners.

When you’re smiling, does the whole world really smile with you?

Darren Burke, Johanne Knowles and Taylor Braund
University of Newcastle
darren.burke@newcastle.edu.au

Humans have an elaborate evolved communication system that relies, in part, on facial movements. Previous attempts to understand this system have been limited by studying artificial, one-sided interactions. To overcome some of these limitations, we analysed videos of naturally interacting dyads to investigate the communicative nature of two different kinds of smiles - the Duchenne and non-Duchenne smile. 18 mixed-sex dyads (friends or strangers or romantic partners) were recorded conversing in topics designed to create some agreement and some disagreements. Based on previous research, we predicted that friends would show longer durations of smiling for both smile types, compared to romantic partners and strangers, and that females would engage in more of both smile types. We also hypothesised that participants would mimic their conversation partner’s smile type with high fidelity and that friends and romantic partners would mimic Duchenne smiles more frequently than non-Duchenne smiles. Our results did not support either of the duration hypotheses, but supported both mimicry hypotheses. Results are interpreted in terms of the possible communicative functions of the two smile types.

The distractor frequency effect in an interleaved word task

Jennifer S. Burt, Roger W. Remington, James D. Retell
University of Queensland
j.burt@psy.uq.edu.au

When a red and green word are vertically displaced and partially interleaved, and participants name (say) the red word, the frequency of the distractor word affects the time taken to name the target word. Experiment 1 (N = 76 students) revealed frequency effects of 40 ms for targets and 13 ms for distractors (faster responses with high-frequency distractors) with no interaction. The distractor frequency effect was similar for skilled and less-skilled word readers. Experiment 2 (N = 56) alternated the position of the target (upper vs. lower word) between each pair of consecutive trials. The effects of target and distractor frequency interacted with target position (switch vs. same), such that on same trials there was a reverse distractor frequency effect for high frequency targets. The results show some control over spatial attention, and suggest that a low frequency distractor may not be processed when conditions allow the target to be processed quickly. In Experiment 3 we will further assess the ability of participants to control their spatial attention by presenting a brief spatial cue of the red and green word-positions prior to each trial.
Two hands versus one: The influence of prismatic adaptation on eye movements and pseudoneglect

Carragher, D. J., Macey, P. W., Loetscher, T., & Thomas, N. A.
Flinders University (Carragher, Thomas), Curtin University (Macey), University of South Australia (Loetscher)
daniel.carragher@flinders.edu.au

Prismatic adaptation temporarily alters the oculomotor behaviour of neglect patients, increasing exploration of the previously neglected left visual field. Study 1 investigated whether prismatic adaptation led to a change in the eye movement patterns of healthy participants, who completed the greyscales task. It had been suggested that a two-handed adaptation procedure better adapts participants and should be used in place of the conventional right-hand only adaptation procedure. As such, each participant completed the prismatic adaptation procedure using both hands. Ninety-seven participants were adapted to left-shifting or right-shifting prisms, or to control glasses that did not shift the visual field. Oculomotor behaviour remained unchanged in all three conditions following prismatic adaptation. Interestingly, response biases and error rates for the greyscales task also remained unchanged, indicating that prismatic adaptation did not alter pseudoneglect. It is possible that the two-handed procedure engaged different spatial mechanisms to the right-hand procedure, and therefore did not alter pseudoneglect. To investigate this possibility, fifty-six participants were adapted to left-shifting prisms or control glasses. Participants completed the procedure using either two hands or the right hand. Response biases on the greyscales task will be compared to determine whether the two-hand and right-hand procedures differentially influence pseudoneglect.

Time course of target detection and localisation during rapid presentation of natural scenes.

Ann Carrigan, Dr. Susan Wardle & A/P. Anina Rich
Macquarie University
ann.carrigan@mq.edu.au

The human visual system is capable of distinguishing superordinate categories of a scene extremely rapidly. This is achieved based on scene summary statistics, or ‘gist’. Although scene categorisation has been investigated extensively, we know less about the extent to which objects within a scene can be localised at these brief presentation times. We examined the time courses of detection versus localisation in natural scenes by presenting a Gabor target in masked natural and man-made scenes. We first verified that observers could classify the scenes as natural vs. manmade at very brief durations [30 ms]. Next, we used a 2AFC design to examine whether observers could detect and localise a Gabor target inserted into the scenes. We manipulated the display duration and the nature of the localisation task (e.g., exact click on target location vs. localise to left or /right of the scene). At durations as short as 30 ms, observers were able to both detect and localise the target above chance. The results inform our understanding of the information that can be extracted from natural scenes in the earliest stages of processing, and may have implications for research in applied settings such as medical image diagnostics.

Evolving the keys to visual crowding

John Cass, Chris N. L. Olivers, Erik Van der Burg
University of Western Sydney
j.cass@uws.edu.au

Peripheral vision can be severely impaired by the mere presence of nearby visual clutter. Decades of research using sparse displays have established that this phenomenon, known as visual crowding, is present at target-distractor separations up to half the target’s eccentricity. This, so-called Bouma’s law, is considered the greatest constraint on human vision. Here, we investigate crowding in densely cluttered displays using a genetic algorithm. Participants were instructed to identify the orientation of a target line (6° eccentricity) among 283 distractor lines. Displays supporting highest accuracy were selected (“survival of the fittest”), and combined to evolve the displays. Performance improved over generations, predominantly driven by the emergence of horizontal flankers within 1° of the vertical target with no evidence of interference beyond this radius. This indicates that Bouma’s law does not necessarily hold in cluttered displays, suggesting that a nearest-neighbour segmentation rule provides a better account of performance.
Visual field anisotropies in the temporal resolution of high-level motion tracking

John Cass, Isuri Gunatillake, Erik Van der Burg

University of Western Sydney
j.cass@uws.edu.au

Spatial attention is worse in the upper compared to lower visual fields, and along vertical compared to horizontal meridia. Somewhat surprisingly no such visual field anisotropies exist for judgments involving temporal attention (Aghdaee & Cavanagh, 2007) suggesting the existence of distinct attentional systems devoted to the analysis of space and time. Here we examine the resolution of temporal attention by measuring temporal order judgment thresholds. Four luminance-defined target disks (diameter = 1.5") located 8 degrees left, right, above and below fixation. On any given trial pairs of targets located along either horizontal or vertical meridia changed from black to white (SOA ranging ±400ms). Each target disk was surrounded by 10 distractor disks, whose luminance remained unchanged (static condition) or reversed polarity throughout the trial (dynamic condition). TOJ thresholds were more than a factor of four greater under dynamic conditions, highest along the vertical meridian and in the upper visual field. We propose that contextual flicker masks low-level motion signals leaving performance to rely exclusively on attentionally demanding motion tracking. This methodology reveals for the first time that the temporal resolution of high-level motion tracking exhibits visual field anisotropies qualitatively similar to those observed for other attentionally demanding tasks.

What Conditions Produce Optimal Behaviour?

Peter Cassey, Guy E. Hawkins, Chris Donkin, & Scott D. Brown
University of Newcastle
peter.cassey@newcastle.edu.au

Prediction is a ubiquitous part of everyday life. Previous work has demonstrated that prediction can be framed as statistically optimal Bayesian inference. We describe a quantitative test of this Bayesian analogy against human experimental data. We explored the conditions under which the Bayesian analogy holds in a simple prediction task. Participants were presented with a scenario where only two types of coins existed, both with different head/tail probabilities. Before and after seeing a series of coin flip outcomes, participants needed to make a prediction about which of the two coin types was being flipped. Overall participants behaved in a manner inconsistent with what would be expected if they were updating their beliefs via Bayes rule. Elements of the prediction task had to be reduced to a straight-forward level in order to induce participants to make predictions more consistent with optimal Bayesian inference.

Effects of nonword and word distractors on reading words aloud

Ceccherini, L.i, Coltheart M.2, Mulatti, C.3.
1. The MARCS Institute, University of Western Sydney. 2. Macquarie University, Department of Cognitive Science, ARC Centre of Excellence in Cognition and its Disorders, Macquarie University. 3. DPSS – Università degli Studi di Padova.

lisa.cecccherini@gmail.com

Mulatti, Ceccherini & Coltheart (2014) proposed an empirically driven model of visual attention to multiple words using the word-word interference task (La Heij et al., 1990). In this task two written words are presented simultaneously on the screen, a distractor stimulus (displayed in the centre) and a target stimulus (displayed above or below the distractor). The aim of the present study was to test the Mulatti et al., 2014 model by investigating its applicability to nonword distractors. Three experiments are reported. Experiment 1 and 2 explore the effects of the pronounceability and the length of nonword distractors. Experiment 3 investigated the role of target frequency and the target-distractor onset phonological relatedness when distractors are words. On the whole our results speak in favour to the role of the nonlexical route involved in reading nonword distractors (Coltheart et al., 2001). The results obtained in Experiment 3 emphasize the possible articulatory nature of the obtained interaction between target frequency and the phonological relatedness effects. We discuss how to integrate Mulatti et al., (2014) model’s structure with the nonlexical reading route and how/when the position information of the nonword distractor is available to the system.
The Working Memory Power Test for Children

Kerry A. Chalmers and Emily E. Freeman

University of Newcastle

kerry.chalmers@newcastle.edu.au

The relationship between working memory and academic achievement was examined in 105 Year 4 children (mean age 9 years 11 months). Working memory was assessed using the Working Memory Power Test for Children (WMPT), a newly developed online test comprising five levels of increasing difficulty. Parent ratings of executive function were obtained using the Behavior Rating Inventory of Executive Function (BRIEF). Children also completed the Wechsler Individual Achievement Test - Australian Abbreviated (WIAT-II) and their Year 3 results from the National Assessment Program - Literacy and Numeracy (NAPLAN) were obtained. Results showed that both confidence and accuracy in working memory performance (as assessed by the WMPT) decreased as difficulty increased. WMPT accuracy was significantly correlated with all measures of academic achievement: WIAT-II reading, numeracy and spelling; NAPLAN reading, numeracy, spelling, writing, and grammar. Confidence was significantly correlated with numeracy as assessed by both the WIAT-II and NAPLAN. WMPT accuracy was also significantly correlated with the inhibition, planning, and working memory scales of the BRIEF. Next steps in evaluating the validity and reliability of the WMPT are discussed.

Facilitatory interaction between motion imagery and motion perception

Shuai Chang and Joel Pearson

School of Psychology, University of New South Wales

shuai.chang@student.unsw.edu.au

The current project investigated functional effects of motion imagery and motion perception, together and separately on subsequent perception. In Study 1, participants reported the dominant direction in motion binocular rivalry perception after imagining directional motion. We found a significant priming effect of imagery direction on motion rivalry, which was attenuated by concurrent expanding and contracting motion, but not uniform background luminance. Study 2 examined how prior motion perception influenced the dominance in motion rivalry. Results showed that low-contrast perceptual motion had a facilitation effect while high-contrast motion led to a suppressive effect. In study 3, while imagining motion, participants were presented with low-contrast motion in the same or opposite direction as imagined motion. Significant priming was found when the two directions were the same but no effect when they were opposite. In Study 4, significant priming was found when imagery and motion rivalry were at different visual locations, suggesting that motion imagery had global effects on motion rivalry perception. These results show that motion imagery can bias subsequent motion rivalry perception either separately or together with motion perception. They further suggest the involvement of MT+ area, which is sensitive to directional motion, in generating motion imagery.

Part-whole information assists same-feature conjunction searches in topology and aspect ratio but not in orientation

Weijia Chen, Anthea G. Blunden, Piers D. L. Howe

The University of Melbourne

weijiac@student.unimelb.edu.au

Visual search is a routine task used in everyday life and is an important field of research in cognitive psychology. It has been shown that search for a target defined by a unique conjunction of two colours is more efficient if one colour surrounds the other (a part-whole search) compared to when no such hierarchical structural relationship exists (a part-part search). A similar result has been shown to hold for size x size conjunction searches. Our experiments showed that this result also holds for topology x topology and aspect ratio x aspect ratio conjunction searches, but not for orientation x orientation conjunction searches. We then use the simultaneous-sequential paradigm to investigate a possible reason for the inefficient part-whole search of orientation, compared to other features. We argue that two different attribute values from the same dimension can be processed independently, without interfering with each other, for colour, size, and topology, but not for orientation. Since it is obviously more efficient to process a conjunction stimulus when both components of the conjunction can be processed without mutual interference, it follows that colour, size, topology and aspect ratio part-whole conjunction searches are likely to be more efficient than orientation part-whole conjunction searches.
Development of mismatch responses to pitch in different domains in infancy

Ao Chen; Varghese Peter; Denis Burnham
the MARCS Institute University of Western Sydney
a.chen@uws.edu.au

We examine how pitch perception across different domains develops in infancy. 4- and 12-month-old English infants’ event related potentials (ERP) to musical and speech pitch were recorded. In two conditions, we presented three-note musical pitch and Chinese lexical tones to the infants respectively. The musical pitch and lexical tones had identical duration and shared a similar pitch contour. In each condition, the infants passively listened to 600 trials, with one “standard” stimulus occurring at 80% of the time, and another “deviant” stimulus occurring at 20% of the time. The responses to deviants were compared with the responses to standards to find out how the neural detection of the change developed. For the 4-month-olds, a late positive mismatch response was found in the music condition, and an earlier left-lateralized positive response in the lexical tone condition. For the 12-month-olds, in both conditions, the infants showed an adult-like left-lateralized mismatch negativity (MMN) response. The 12-month-olds showed a more pronounced MMN than their adult counterpart in the lexical tone condition. These indicate that the neural responses to complex auditory pitch change mature by 12 months; by 12 months, infants have not fully developed a language specific neural mechanism for pitch change detection.

Effect of adenosine 2A receptor knockdown in the nucleus accumbens shell on conditioned reward for methamphetamine

Rose Chesworth, Robyn Brown, Jee Hyun Kim, and Andrew Lawrence
Brain and Mind Research Institute, University of Sydney
rose.chesworth@sydney.edu.au

Addiction to methamphetamine (METH) is a global health problem for which there are no approved pharmacotherapies. The adenosine 2A receptor (A2A) provides an interesting therapeutic avenue, this receptor modulates reward behaviour for METH (Chesworth et al. 2015. Addiction Biology). Of critical interest was the neural locus where A2A mediates reward behaviour for METH. To address this question, we employed viral-mediated knockdown of A2A, by injecting the adeno-associated virus Cre-recombinase (AAV-Cre) into the nucleus accumbens shell (NAcc shell) of A2AloxP/loxP mice. This region was selected due to high A2A expression and the strong implication of the NAcc shell in reward processing. Following a 3 week transduction period, A2AloxP/loxP mice injected with AAV-Cre or mCherry (a fluorophore control) were tested for METH conditioned reward behaviour using conditioned place preference (CPP). Our injections resulted in Cre recombinase expression in ~70% of the NAcc shell. Viral mediated knockdown of A2A had no effect on the development or expression of METH CPP, nor the development or expression of psychomotor sensitization. These results suggest the NAcc shell may not be the sole locus where A2A modulates conditioned reward or psychomotor behaviour for METH.

Accessing distant phonological memories

Jiyoun Choi, Mirjam Broersma and Anne Cutler
MARCS Inst., Univ Western Sydney
a.cutler@uws.edu.au

Dutch-speaking adults (mean age 32) who had been adopted from Korea as young children (age at adoption three months to six years) were trained over 11 days on perceptual identification of phonetic contrasts occurring in Korean but not in Dutch. Two control groups also participated, one of age-, sex- and education-matched Dutch speakers, the other of siblings or partners of the adoptee participants matched for incidental exposure to Korean influences. Prior to training, no participant reported knowledge of Korean, and in a pre-test on the training contrasts, adoptees and controls performed indistinguishably. Both adoptee and control participants improved their ability to discriminate the trained contrasts across the experiment, although never reaching in this period the standard established for adult Korean speakers. Importantly, however, learning from training occurred significantly more rapidly in the adoptee group, with a midpoint test showing already greater identification accuracy by adoptees than by either group of controls. Age at adoption was unrelated to adoptees’ performance. These results suggest that phonological knowledge acquired from linguistic exposure in early childhood, even in infancy, though unused for decades and not
Consciously accessible, can still be tapped such that it confers an advantage in relearning the first language’s phonology.

**Perceiving Emotion: When Lexical Tone Meets Emotional Prosody**

Chee Seng Chong, Jeesun Kim & Chris Davis  
*University of Western Sydney*  
*L.Chong@uws.edu.au*

Our previous study (Chong et al., 2014) shows that in identifying emotions (angry, happy, sad, surprise and disgust) expressed in spoken English sentences, listeners of Cantonese (a tone language) were significantly poorer than listeners of English and also Malay (both non-tone languages). We postulated that tone language characteristics that use F0 in the production of lexical tones may affect the language user’s perception and production of emotion expressions via F0 change. In following up this, we conducted a perceptual experiment using Cantonese spoken expressions of emotions as stimuli and tested Cantonese, Malay and English listeners. The results showed that Cantonese listeners performed better than English and Malay listeners, supporting the idea that tone language characteristics affect the way emotion is produced and perceived by the language users. The results will be discussed with additional measures of acoustic properties of emotion expressions in Cantonese and English.

**Susceptibility to optical illusions as a function of autistic traits in the general population.**

Philippe A. Chouinard1, Katy Unwin2, Oriane Landry1, Irene Sperandio2  
1. School of Psychological Science and Public Health, La Trobe University. 2. School of Psychology, University of East Anglia (United Kingdom).  
p.chouinard@latrobe.edu.au

We examined how susceptibility to 13 optical illusions related to scores on the autism spectrum (AQ), empathy (EQ), and systemising (SQ) quotient questionnaires in a sample of 127 participants (56 males, mean age = 24) from the general population. The participants adjusted the size of a comparison stimulus to match a standard stimulus on illusory displays and a susceptibility score was measured for each illusion. A principal-components analysis (PCA) classified the illusions into different categories and Pearson correlations were computed between illusion susceptibility for each category and AQ, EQ, and SQ scores. The PCA revealed six components (C1: Delboeuf, Ebbinghaus, and Jastrow illusions; C2: Ehrenstein, Ponzo, and Sander’s parallelogram illusions; C3: Shepard and square-diamond illusions; C4: Muller-Lyer and horizontal-vertical illusions; C5: Oppel-Kundt illusion; C6: Poggendorf illusion). Susceptibility to illusions from C3 decreased significantly as a function of AQ (R2 = .062), SQ (R2 = .031), and the Social Skill (R2 = .041) and Imagination (R2 = .049) subcomponents of the AQ. The findings demonstrate that the cognitive operations underlying global processing differ for different types of illusions -- some of which are affected by autistic traits (accounting for ~5% of the variance in susceptibility) and some of which are not.

**Neurophysiological correlates of emotional directed-forgetting in persons with Schizophrenia: An event-related brain potential study**

Bruce K. Christensen, Regan E. Patrick & Michael Kiang  
*Australian National University*  
*Bruce.Christensen@anu.edu.au*

Patients with schizophrenia (SCZ) exhibit reduced directed forgetting (DF) for negative words, suggesting impaired goal-directed inhibition over competing, emotion-driven responses. However, disrupted inhibition is not the only possible mechanism underlying this effect. The objective of this study was to use event-related potentials (ERP) to investigate alternative hypotheses. ERPs were recorded while patients and controls completed an item-method DF paradigm using negative and neutral words. The N2 indexed goal-directed inhibition of to-be-forgotten items. The late positive potential (LPP) indexed emotional memory enhancement for negative study items. The P300 indexed selective rehearsal of to-be-remembered items. The SCZ group exhibited a reduced DF effect overall, but this was not modulated by emotion. N2 amplitude at anterior sites was larger for forget versus remember cues in the control group only, but this effect was not modulated by emotion. LPP amplitude was greater for negative versus neutral words in both groups. P300 amplitude at posterior sites was greater for remember versus forget cues in the control
group only. These data suggest that reduced DF in SCZ may be due to both diminished goal-directed inhibition and reduced selective rehearsal. However, goal-directed memorial processes were not disrupted by competing, emotion-driven processes in SCZ.

**Separate cognitive mechanisms drive the perceptual biases in horizontal and vertical dimensions**

Owen Churches, Tobias Loetscher, Nicole Thomas, Mike Nicholls  
*Flinders University*  
[owen.churches@flinders.edu.au](mailto:owen.churches@flinders.edu.au)

Perceptual attention in healthy young participants is characterised by two biases, one which draws attention leftward and the other which draws attention upward. That these biases are found together has led previous researchers to search for a relationship between them. However, these investigations have failed to find any association. One reason that previous studies may have failed to find a relationship is that vertical and horizontal stimuli were presented separately rather than being measured from a single stimulus. In the present study, two dimensional stimuli were presented and participants were asked to mark the centre. In addition, the shape of the stimuli were manipulated to determine if this produced the same modulation of the two biases. The results were consistent: there were no correlations between the vertical and horizontal biases. And, manipulations of stimulus shape which effected biases in one dimension did not affect the biases in the other dimension. There were however, consistent correlations between the degree of bias within each dimension across the different stimuli. This study found converging evidence that horizontal and vertical biases in spatial judgments are separate cognitive mechanisms in healthy young participants. The implications for our understanding of spatial neglect will be discussed.

**Partial reinforcement, extinction, and placebo effects for pain.**

Colagiuiri, B., Au Yeung, S. T., Lovibond, P. F., Quinn, V. F., & Colloca, L.  
*University of Sydney*  
[ben.colagiuri@sydney.edu.au](mailto:ben.colagiuri@sydney.edu.au)

Numerous studies have shown that conditioning manipulations can produce placebo effects for pain. However, to date, these manipulations have exclusively involved continuous reinforcement schedules. Thus, it is currently unclear whether placebo effects can be established under partial reinforcement and whether this affects the strength or durability of these effects. In two experiments, we examined the effects of training schedule on the magnitude and durability of placebo effects for pain. The first experiment compared continuous and partial reinforcement training schedules for placebo analgesia. Here, continuous reinforcement led to larger initial placebo analgesia, but the weaker placebo analgesia established under partial reinforcement was more resistant to extinction, suggesting a partial reinforcement extinction effect. The second experiment compared continuous and partial reinforcement training schedules for placebo hyperalgesia. Like placebo analgesia, the placebo hyperalgesia established under continuous reinforcement was stronger than that established under partial reinforcement, however, in both cases this placebo hyperalgesia failed to extinguish. These findings suggest an asymmetry in the extinction of beneficial and aversive placebo effects. Particularly concerning is that, once established, placebo hyperalgesia appears difficult to disrupt.

**Grasping versus pointing facilitates obstacle over-avoidance during perceptual uncertainty**

Hayley A Colman, Roger W Remington & Ada Kritikos  
*University of Queensland*  
[h.colman@uq.edu.au](mailto:h.colman@uq.edu.au)

We examined how action goals influence the distribution of visuospatial attention near the body and how the temporal relationship between the non-task relevant visual distractors and targets modifies shifts in visuospatial attention. Targets cylinders mounted with LEDs were presented in the left and right hemispace of a visual display. Following illumination of the target, participants reached to point-to or grasp the top of the target in blocked trials. Randomised within blocks, a distractor (smaller cylinder with mounted LED) onset in the same or opposite hemispace halfway between the initiation point and target, or no distractor appeared. Distractors onset either 200ms prior (-200ms), coincident with (0ms) or 200ms (+200ms) following the target. For both pointing and grasping -200ms distractors results in slower reach initiation compared with 0ms and +200ms. For pointing reaches -200ms distractors
were associated with more deviated reach trajectories compared with coincident and +200ms. For grasp reaches +200ms distractors resulted in slower reach initiation compared with 0ms and greater trajectory deviation for -200ms distractors compared with 0ms. These findings suggest that for grasping actions, objects in the frame of action are prioritised in visuospatial attention compared with pointing reaches and perceptual uncertainty regarding reaching layout intensifies distractor prioritisation.

The integration of edge and region cues: the effect of a compressive nonlinearity in search tasks
Alexander Coningham1, Geoff W Stuart2, Ken McAnally2, Mark Edwards1 1Research School of Psychology, Australian National University, Australia 2Aerospace Division, Defence Science and Technology Organisation
Australian National University
Alex.Coningham@gmail.com

Studies that assess the interactive contributions of edge and region information to object conspicuity via search time often report nonlinear feature combination, whereas the results from paradigms employing subjective evaluations of conspicuity such as pair-wise comparisons often report linear summation. We suggest that this discrepancy is due to the compressive influence of generalised floor effect in search paradigms that mimics subadditive feature summation. We used both paradigms to assess the conspicuity of objects defined by combinations of edge contrast, and surface texture coarseness and orientation contrast. Results from both paradigms suggest a critical role for edge information, a strong contribution of texture coarseness, and a relatively weaker contribution of orientation contrast. Results from the search paradigm could be derived from additive cue combination (as seen in the results of subjective comparison) followed a compressive nonlinearity. Both tasks therefore reflect the same underlying metric of visual conspicuity.

Visual short-term memory capacity and the double-target deficit
Elaine Corbett and Philip Smith
University of Melbourne
elaine.corbett@unimelb.edu.au

The brain’s ability to attend to visual stimuli is constrained by the capacity limitations of visual short-term memory (VSTM). One manifestation of this limited capacity is the double-target deficit: in multiple channel monitoring tasks, detection of two simultaneous targets is substantially worse than detection of a single target. We hypothesized that the double-target deficit is a reflection of the limited information capacity of VSTM, which we have shown is well described by a sample-size model. This model assumes that the total number of evidence samples available to represent stimuli is constant. We sought to characterize the conditions under which the double-target deficit is found by comparing performance on detection, discrimination, and parity tasks, using a signal detection MAX model and a likelihood model to assess performance. In visual search, these tasks have been characterized as involving parallel or serial processing to differing extents. For detection and discrimination, some participants’ performance followed the sample-size model, while others could be explained by the effects of noise alone. For the parity task, which is thought to involve serial processing, performance was consistently well-characterized by the sample-size model. We discuss the implications of these results for models of target selection, memory, and decision making.

Shared Processing in Multiple Object Tracking and Visual Working Memory in the Absence of Response-Order and Task-Order Confounds
Simon J. Cropper, Mark D. L. Lapierre, Piers D. L. Howe
University of Melbourne
scropper@unimelb.edu.au

To understand how the visual system represents multiple moving objects and how those representations contribute to tracking, it is essential that we understand how the processes of attention and working memory interact. In the work described here we present an investigation of that interaction via a series of tracking and working memory dual-task experiments. It has been argued that tracking is resistant to disruption by a concurrent working memory task, and that when disruption occurs it may be due to making a response to the working memory task, rather than due to competition for shared resources. We found that when a tracking task is performed during the maintenance phase of a working memory task there are substantial differences between individuals in dual-task performance costs. Similarly,
there are individual differences in the impact of responding to either task first. In contrast, when the stimuli are altered so that task order and response order confounds are avoided, all participants show a similar decrease in both tracking and working memory performance. These results provide clear evidence that tracking and working memory tasks share processing resources. The results are discussed in relation to current models of working memory and tracking.

**Back to basics: Perceptual grouping supports holistic face perception**

Kim Curby & Robert Entenman  
*Macquarie University  
kim.curby@mq.edu.au*

Recent evidence suggests that perceptual grouping mechanisms contribute to holistic face perception: holistic processing of faces, but not objects, is significantly reduced when they are presented on backgrounds that discourage the perceptual grouping of face fragments into cohesive units (Curby, Goldstein, & Blacker, 2013). To further probe the influence of perceptual grouping cues on face perception, participants made part-matching judgments about faces presented in either an intact external oval frame or a frame made from misaligned oval parts, which discouraged the perceptual grouping of face halves into cohesive units. Thus, the external contour of the face image in the misaligned frame condition was the same as that in the misaligned condition used within the typical composite task indexing holistic perception. However, unlike in the typical task, the configuration of facial features remained intact (aligned). For comparison, participants also made part judgments when the face parts and frames were both misaligned. The impact on holistic processing of disrupting only the frame was indistinguishable from that of disrupting the frame and configuration together. This comparable attenuation of holistic perception through disruption of perceptual grouping cues supports the potential importance of grouping mechanisms for understanding even “specialised” aspects of face perception.

**Throwing a word in the works**

Chris Davis and Jeesun Kim  
*The MARCS Institute, University of Western Sydney  
chris.davis@uws.edu.au*

In masked form priming a clearly visible printed target stimulus is processed more efficiently (faster and sometimes with fewer errors) when preceded by a related masked prime than by an unrelated one. Here we describe an interesting variation of this technique where an additional masked form or repetition prime is displayed between the prime and target. We show that the size of masked repetition priming can be reduced to that of form-priming by the insertion a form prime, and that the size of form-priming can be increased by the insertion of a repetition prime. We also show that these effects are influenced by the relative word frequency of the first and second prime. We discuss these results with regard to different models of the word recognition process and also in terms of the potential for this technique to provide an index of processing efficiency.

**Following others’ eye-gaze is not always mandatory**

Amy Dawel*1,2, Romina Palermo1,2,3, Richard O’Kearney2, Martin Sellbom2, Jessica Irons1,2, Elinor McKone1,2  
*Presenting author 1ARC Centre of Excellence in Cognition and its Disorders 2Research School of Psychology, The Australian National University 3School of Psychology, University of Western Australia  
amy.dawel@anu.edu.au*

An important claim of the gaze-cueing literature is that people cannot help but follow where others look. This claim is predicated on evidence that people tend to follow others’ gaze-direction even when others look in the opposite direction to an object of interest. The present study (Dawel et al., In Press, PD:TRT) is the first to examine whether gaze-cueing remains mandatory with practice, and whether this is influenced by a personality variable (callous-unemotional traits, CU) which theory suggests could be associated with enhanced ability to suppress information that is goal irrelevant (e.g., eye-gaze non-predictive of target location). In our non-predictive paradigm, a face either looks-at (valid trials), or looks-away-from (invalid trials), a target object. Low CU participants (n=75) showed no reduction in gaze-cueing effects (RT for invalid minus valid trials) even with extensive practice (no reduction in gaze-cueing across 3
Face perception in the dynamic brain: a fixation-related potential experiment

Peter de Lissa, Federica Degno  
Macquarie University  
peter.delissa@mq.edu.au

Faces are one of the most important categories of objects in our world, capturing our attention from infancy. ERP investigations of neural responses to faces have revealed a brain potential sensitive to such stimuli, known as the N170. However, the perception of faces in our environments often occurs through peripheral viewing, and subsequent eye-movements and fixations over the faces, rather than a simple central presentation. The current study aimed to investigate the time-course of brain activity elicited by faces when they are presented peripherally, and during subsequent fixations to the faces. EEG and eye-movement recordings were co-registered while participants were presented with left and right peripheral images of faces and wristwatches (control), and while they fixated upon the images. Face-sensitivity of the N170 was only observed at stimulus presentation, and not in response to stimulus fixation. To test the relevance of the peripheral preview, additional scrambled faces and wristwatch stimuli were presented peripherally, and updated to their unscrambled images during saccades to the images. In this condition, face-sensitivity was not observed at presentation, but did manifest at stimulus-fixation. Additional results, and a thorough over-view of the methodology will be discussed.

Semantic priming with visually degraded targets in the semantic categorization task.

Bianca de Wit & Sachiko Kinoshita  
ARC Centre of Excellence in Cognition and its Disorders & Department of Cognitive Science, Macquarie University  
biana.dewit@mq.edu.au

Visual degradation of the target typically magnifies the semantic priming effect, an effect that has recently been demonstrated to mainly manifest itself in the tail of the RT distribution in the lexical decision task (e.g., Balota et al., 2008). While this pattern has been taken as support for the notion that target degradation increases the reliance on the prime, the evidence has primarily come from lexical decision studies. Recently, we presented results from our RT distribution analyses that indicate that the processes driving semantic priming effects are task-dependent. The present study builds on this task-dependence notion by investigating the effect of target degradation on semantic priming in the semantic categorization task, using a combination of mean RT and RT distribution analyses. In stark contrast with reports from lexical decision studies, the present results demonstrate that target degradation has no effect on the size of the semantic priming effect in the semantic categorization task. Furthermore, the RT distribution analysis reveals that target degradation has a constant effect throughout the RT distribution, with slower overall responses to degraded than clearly presented targets. Together, these findings indicate, and support our notion, that the processes underlying semantic priming effects are indeed task-dependent.

Protecting courts against bad science: Do legal safeguards moderate the impact of poor quality expert evidence in cases involving identification from CCTV?

Helen Dimitrios & Richard Kemp  
UNSW Australia  
z3372897@zmail.unsw.edu.au

Prosecutors sometimes rely on “facial mapping” evidence to identify an offender from CCTV images. This evidence has been criticised, but rather than excluding it many courts rely on legal safeguards to protect against undue influence of the evidence. We describe three experiments designed to assess these safeguards. Results showed that judicial warnings and limits to the language used by experts did not reduce identification errors, but the inclusion of evidence from a defence expert offered some protection to innocent defendants. Our results show that courts need to be more willing to exclude poor quality expert evidence.
The Effect of Eating Disorder-Related Rumination on Approach and Avoidance of Female Body Shapes
Laura Dondzilo, Elizabeth Rieger, Romina Palermo, Sue Byrne and Jason Bell
School of Psychology, University of Western Australia and Research School of Psychology, Australian National University
laura.dondzilo@research.uwa.edu.au

Overconcern with eating, weight and shape is a diagnostic feature of eating disorders. The Rumination Response Scale for Eating Disorders (RRS-ED) was developed to assess negative thinking processes concerning eating, weight and shape. To date, no research has investigated the role of the RRS-ED in predicting eating disorder-related behaviours. The current study tested the effect of eating disorder-related rumination on approach-avoidance tendencies towards female body shapes, in a young female sample. Eighty-six female undergraduate students (ages 17-24) completed online questionnaires, including the RRS-ED, followed by a computerised approach-avoidance task involving a joystick, assessing approach-avoidance tendencies towards images of positively and negatively evaluated female body shapes. Participants high on rumination displayed significantly greater approach tendencies (quicker to pull female body shapes closer to them than to push them away) than participants low on levels of rumination. Surprisingly, the level of approach did not differ across body types, indicating a general strategy of approaching body images. This study shows preliminary evidence of rumination as a moderator of approach-avoidance tendencies towards body shape-related information. Clinical implications include specifically targeting rumination in treatment for eating disorder patients and assessing consequent behavioural change.

Is Psychology ready for Bayesian statistics?
Chris Donkin
UNSW
c.donkin@unsw.edu.au

In recent years, an increasing number of people have been aggressively pushing for Bayesian statistics to replace the frequentist approaches that are standard in Psychology. The first part of the talk will give an overview of frequentist methods for hypothesis testing and parameter estimation, paying particular attention to their limitations. The second part will outline Bayesian equivalents to these procedures. The limitations of Bayesian estimation will be discussed. Finally, we will talk about the central role of priors in Bayesian hypothesis testing, and how our anxiety over their use may be representative of a fundamental issue with the way that we do research.

Heads, Faces, Mouths and Voices: Infants’ Perception of Point-Line Displays of Motherese.
Anne Dwyer, Christa Lam-Cassettari, Isabel Lopez, and Christine Kitamura.
MARCS Institute, University of Western Sydney
a.dwyer@uws.edu.au

Infant-directed (ID) speech provides exaggerated prosodic cues in the auditory and visual domain, but it is unclear to what extent infants are sensitive to visual correlates of prosody in continuous speech. Recently, Kitamura, Kim and Guellai (2014) investigated infants’ sensitivity to auditory and visual prosodic cues typical of ID speech. Using an intermodal preferential looking paradigm, they tested 8-month-olds’ ability to detect the match between two silent line-joined point-light displays of speaking faces and an auditory only sentence that matched one of the displays. Kitamura et al. found that 8-month-olds looked longer to the matching display, whether they heard full-spectrum or low-pass filtered auditory only sentences, indicating a reliance on auditory prosody. In the current experiment we extended this work with 5- and 12-month-olds, testing 48 infants (n=24) with the visual displays and full-spectrum auditory sentences used in the original study. Preliminary results indicate that 5- and 12-month-olds look longer to the mismatching than matching visual displays, which suggests that, like 8-month-olds, they are able to extract prosodic information from auditory visual speech. However, it seems 5- and 12-month-olds may use the ability differently to 8-month-olds, such that they show a preference in the opposite direction previously observed in 8-month-olds.
Ambiguous local motion contributes to global form

Josh Ebert, Juno Kim (Supervisor).
UNSW
j.ebert@student.unsw.edu.au

Patterns of light falling on the retina are processed by the visual system into a meaningful three-dimensional perception of the world. The perception works through a refined grouping process involving a hierarchy of local and global motion elements. It is shown synchronised independent pairs of dots will be perceptually grouped into dominant global shapes (Anstis and Kim, 2011). Using simple animations we compared the effect of varying the rotation of local and global elements by the number of locally moving groups. Observers indicated whether they perceived global or local motion in each condition. We found differences in the degree of the visual system’s capacity to detect global motion depending on the relationship of direction between local features and the overall global motion.

Role of temporal synchrony in motion pooling and segmentation.

Mark Edwards, Reuben Rideaux, David Badcock, Alan Johnston
Australian National University, University of Western Australia, University College London
mark.edwards@anu.edu.au

Small receptive-field sizes of V1 cells mean that grouping and segmentation are two fundamental tasks for the visual system, i.e. the grouping of elements that are part of the same object, and segmenting them from the elements of other objects. The temporal synchrony of element changes could act as a potential grouping-segmentation cue. We investigated the role of this cue in motion processing by examining the pooling of 1D motion signals (those where the aperture problem has not been solved and so require an Intersection of Constraints (IOC) or equivalent pooling process). The stimulus consisted of a field of Gabor’s with each Gabor defined to be either signal (drift rate of the sinewave consistent with a global IOC solution) or noise (drift rate inconsistent with the IOC solution). The temporal cue was generated by changing the drift rate of a subgroup of the Gabor’s. Simply changing the drift-rate of Gabor’s such that they changed from noise to signal, was not an effective grouping cue. However, when this change was preceded by counter-phase flickering, it was effective, indicating that common-fate motion alone is not an effective cue. We also determined the temporal and spatial properties of this process.

Holistic and adaptive coding are correlated but only adaptive coding relates to face recognition ability.

Laura M. Engfors, Linda Jeffery & Romina Palermo
ARC Centre of Excellence in Cognition and its Disorders, School of Psychology, The University of Western Australia.
laura.mclaughlinengfors@research.uwa.edu.au

Holistic coding and adaptive norm-based coding are two perceptual mechanisms that are argued to play an important role in face recognition. However, it is not currently known whether these mechanisms have anything in common, nor whether they independently relate to face recognition ability. In the current study, we took a novel approach to addressing these questions by assessing individual variation in the strength of these two mechanisms, and in face recognition ability, in the same participants (N=188). Holistic coding was measured using the standard composite-face paradigm (Rossion, 2013), adaptive norm-based coding was measured using an identity aftereffect task (Rhodes et al, 2014) and face recognition ability was measured using the Cambridge Face Memory Test (Duchaine & Nakayama, 2006). All tasks had acceptable reliability. We found a small but significant positive association between the strength of holistic coding and the strength of adaptive coding. However, only one of these mechanisms—adaptive face coding—was significantly correlated with variation in face recognition ability. These results are the first to show a link between these two key face perception mechanisms, and raise interesting questions regarding the nature of their relationship and how each may contribute to individual differences in face recognition memory.
Individuals with autistic-like traits show reduced lateralization on a greyscales task

Michael C.W. English, Murray T. Maybery, Troy A.W. Visser
University of Western Australia
michael.english@uwa.edu.au

Individuals with autism spectrum conditions attend less to the left side of centrally presented face stimuli compared to neurotypical adults, suggesting a reduction in right hemisphere activation. To determine if this difference extends to non-facial stimuli, we measured spatial attention bias using the “greyscales” task in a large sample of neurotypical adults rated above- or below-average on the Autism Spectrum Quotient. The typical leftward bias in the below-average group was significantly reduced in the above-average group. Furthermore, a negative correlation between leftward bias and the Social Skills factor of the Autism Spectrum Quotient provides additional evidence for a link between atypical hemispheric activation and social difficulties in autism spectrum conditions that extends to non-facial stimuli and the broader autistic phenotype.

Re-assessing the evidence for exponential and power laws of practice through updated methods of model selection

Nathan Evans (1), Douglas Mewhort (2), Andrew Heathcote (1,3), Scott Brown (1)
(1) University of Newcastle, Australia. (2) Queen’s University, Ontario, Canada. (3) University of Tasmania, Australia.
nathan.j.evans@uon.edu.au

The identity of the non-linear function that governs the rate of decrease in reaction time (RT) over practice has been the subject of debate, with many studies contending for a power rate of RT decrease. However, Heathcote, Brown and Mewhort (HBM; 2000) disputed the findings of these studies due to the averaging of data over participants, and found the exponential function to better fit unaveraged RT data across 17 datasets. Though HBM improved upon the methods used in previous studies, their findings were based purely on goodness-of-fit; a method that has come under scrutiny for failing to account for issues such as model complexity and mimicry. Our study re-analysed the datasets used in HBM to more accurately assess the evidence for the power and exponential functions, using Cross-validation to account for functional-form complexity, and the Parametric Bootstrap Cross-fitting Method to account for mimicry. Although the preference for the exponential function remained for many datasets, there was a shift towards ambiguity or even the power function in some datasets, showing that the exponential function may not necessarily be the function governing RT decrease over practice in all tasks, and the importance of accounting for model complexity and mimicry in model selection.

How does experience with native vowel diphthongs influence the perceptual assimilation of non-native diphthongs?

Mona Faris, Michael Tyler, and Catherine Best
University of Western Sydney: The MARCS Institute and the School of Social Sciences and Psychology
m.faris@uws.edu.au

Adults’ perception of non-native speech is strongly influenced by native language (L1) experience. Studies have demonstrated that listeners perceive non-native consonants and vowel monophthongs in relation to those in their L1 inventory, but little is known about how experience with L1 vowel diphthongs influences the perception of non-native diphthongs. Forty monolingual Australian English (AusE) listeners categorised and rated all 35 Danish vowels in relation to their entire L1 vowel inventory. Results revealed that the Danish long vowels were primarily assimilated to tense AusE vowels, while Danish short vowels were assimilated to both lax and tense AusE vowels. Only two Danish diphthongs were assimilated to an AusE diphthong, while the remainder were assimilated to an AusE tense vowel or were uncategorised. This suggests that despite experience with L1 diphthongs, which inherently involve marked tongue, jaw, and lip movement during production (i.e., vowel dynamics), listeners do not assimilate non-native diphthongs to L1 diphthongs purely based on vowel dynamics, but on perceived phonetic similarity. Given these assimilation patterns, future studies should investigate discrimination of pairs of non-native diphthongs, particularly those that are uncategorised.
The composite task involves matching or identifying a target half of a face when that half is aligned or misaligned with another face half. Performance is poorer in aligned conditions due to perceptual integration of the two halves, that is, holistic processing, making it difficult to isolate the target half. This composite effect is robust and found across different conditions. With a few exceptions, however, the top half of the face is the target half to be matched or identified. And while composite effects have been found for top, bottom, left, and right face targets in different studies, as yet none have directly compared these effects. It is unclear whether perceptual integration is as strong across left-right composite faces as it is across top-bottom composites. In this study, we compared performance on a composite matching task across four target types (top, bottom, left, and right face half). Composite effects were found in all upright conditions with the effect magnitude smallest for right half and largest for bottom half targets. Overall results suggest while holistic processing is evident in all conditions, performance may be influenced by a right hemisphere advantage for holistic processing and the eyes attracting attention.

Native language attunement may lead to difficulties perceiving differences between certain non-native speech sounds. The Perceptual Assimilation Model (PAM; Best, 1995) predicts that cross-language discrimination ability is determined by the way non-native speech is assimilated to native language categories. To date, these discrimination predictions have been typically tested in auditory-only conditions. Therefore, it is still unknown whether visual and/or clearly articulated speech enhances cross-language speech discrimination. Monolingual Australian-English listeners were presented with pairs of non-native Sindhi consonants (/t/-/ /, /b/-/ /) across auditory-only (AO) and auditory-visual (AV) conditions, in clear and citation speech. PAM predicts that discrimination should be poor because the consonants in each pair are assimilated to the same English consonant category. For the bilabial voiced plosive/implosive pair /b/-/ / (a laryngeal feature difference), AV was discriminated more accurately than AO in citation speech, but not in clear speech, while for the voiceless dental/retroflex pair /t/-/ / (a place-of-articulation difference), the reverse was found, where AV was discriminated more accurately than AO, for clear, but not for citation speech. These results highlight the multimodal nature of perception, where perceivers attempt to utilise even subtle visual speech differences, but speaking style and modality differentially contribute to successful cross-language speech discrimination.

The masked congruence effect (MCE) is characterized by faster response times (RTs) and higher accuracy rates to congruently primed targets than incongruently primed targets. According to one general set of "head-start" accounts (direct parameter specification, action trigger, rapid-chase), prime processing is thought to begin influencing the response formulation process before the target has been presented and consciously perceived. In contrast to the head-start accounts are the "integration" accounts, where it is argued that the accumulation of evidence for the correct response is integrated across the prime and target, almost as if visual system has been "tricked" into treating the prime and target as a single perceptual object (cf. Norris & Kinoshita, 2008). While both sets of accounts correctly predict the observed RT differences, they make distinct predictions in terms of how responses are formulated early on in stimulus processing. The aim of the present study is to distinguish between these accounts by using the reach-to-touch paradigm to establish how the MCE emerges within the first 150ms of stimulus processing.
Music and language: Do they draw on similar syntactic working memory resources?

Anna Fiveash and Kristen Pammer
Macquarie University
anna.fiveash@students.mq.edu.au

The cognitive processing similarities between music and language is an emerging field of study, with research finding evidence for shared processing pathways in the brain, especially in relation to syntax. This research combines theory from the shared syntactic integration resource hypothesis (SSIRH; Patel, 2008) and syntactic working memory (SWM) theory (Klajevic, 2010), and suggests there will be shared processing costs when music and language concurrently access SWM. To examine this, word-lists and complex sentences were paired with three music conditions: normal; syntactic manipulation (out-of-key chord); and a control condition with an instrument manipulation. As predicted, memory for sentences declined when paired with the syntactic manipulation compared to the other two music manipulations, but the same pattern did not occur in word-lists. This suggests that both sentences and music with a syntactic irregularity are accessing SWM. Word-lists however are thought to be primarily accessing the phonological loop, and therefore did not show effects of shared processing. Musicians performed differently from non-musicians, suggesting the processing of musical and linguistic syntax differs with musical ability. Such results suggest a separation in processing between the phonological loop and SWM, and give evidence for shared processing mechanisms between music and language syntax.

High spans have better opportunities for improvement from working memory training

Jeffrey L. Foster, Tyler L. Harrison, Kenny L. Hicks, Christiopher Draheim, & Randall W. Engle
University of Western Sydney
jeff.foster@uws.edu.au

Recent research suggests that training people on tasks that measure a variety of cognitive abilities—such as working memory capacity (WMC)—can transfer to improvements on other tasks that measure similar, and sometimes different, cognitive abilities. But who benefits the most from training? More to the point, is it people with high or low cognitive abilities that improve the most? We asked subjects with either high or low WMC to complete training in one of three training groups: a working memory group, an updating group, and an active-control group. Subjects also completed a battery of cognitive tasks before, half-way through, and after the training sessions. One critical finding shows that only high spans showed consistent improvements in the WMC and updating training tasks. In both of these groups, low spans showed only minor improvements on the trained tasks. In other words, high spans benefited the most from training.

Time estimations are affected by the consumption of primary reward.

Bowen Fung, Carsten Murawski, Stefan Bode.
The University of Melbourne
bowenjfung@gmail.com

An accurate perception of time is critical for human behaviour, for instance, when deciding how long to engage in the pursuit of reward. Yet, despite the fact that many accounts of time-dependent behaviour treat time as an objective quantity, the perception of time is highly subjective. It has been suggested that reward itself may be a factor that influences time perception - either during the anticipation of reward (anticipatory utility), or via consumption of reward (experienced utility). We used a novel behavioural paradigm to test whether the perception of time is affected by primary reward (fruit juice), during anticipation and after consumption. Subjects were asked to estimate different durations between the presentation of a reward cue and the delivery of the reward. Their estimates were analysed as a function of the magnitude of the upcoming reward and previous reward. Our results show that time estimations were affected by the magnitude of previously consumed primary rewards, but not by anticipated rewards. This experiment demonstrates that subjective time perception can be driven by factors that are relevant to reward-based behaviours, and this may play a role in decisions that involve both reward and time components.
Music in the mind: A MEG Study of Pitch Imagery
Rebecca W. Gelding; William Forde Thompson; Blake W. Johnson
Department of Cognitive Science, Macquarie University; Centre for Cognition and Its Disorders
rebecca.gelding@students.mq.edu.au

Musical imagery provides the everyday experience of hearing a song in your head, but the neural substrates of this phenomenon remain relatively unexplored, partly because of deficiencies in existing experimental paradigms. To address these deficiencies, the Pitch Imagery Arrow Task (PIAT; Gelding, Thompson, Johnson, PLOS ONE 2015 in press) was designed to reliably induce pitch imagery in individuals with a range of musical training. The present study investigated the neural mechanisms of pitch imagery during performance of the PIAT. Magnetoencephalographic (MEG) measures of brain activity were obtained from 14 healthy adults. Minimum norm estimates showed significant differences in temporal, parietal and frontal brain activation for pitch imagery, pitch perception and mental arithmetic. Audible probes presented after the imagery trials elicited significantly greater activation in temporal and frontal areas compared to responses to identical probes presented after auditory perception trials. These results demonstrate that the PIAT is a useful tool for investigating the neural underpinnings of musical imagery because it elicits robust brain responses in conjunction with rigorous behavioural measures of task performance.

The interacting roles of para cues, trans cues, and gap size in the perception of occlusion.
Barbara Gillam
University of New South Wales
b.gillam@unsw.edu.au

I distinguish two types of cues to the perception of occlusion when multiple objects are cut off in a linear alignment. “Para” cues produce a sense of occlusion at a single edge and include perceived incompleteness of the inducers at the edge as well as entropy of the inducer set with respect to size, orientation etc. “Trans” cues support perceived occlusion by allowing amodal completion of pairs of inducers across an occluder, requiring relatability and common contrast polarity of the inducers. Using subjective contour strength as an index of perceived occlusion, we showed that para inducers on both sides of a potential occluding surface increased subjective contour strength at aligned edges. However adding trans factors enhanced perceived occlusion surprisingly little except when the gap size between inducers was small. Furthermore subjective contours were consistently weaker for the smaller gaps. A perceptual interaction between para factors, trans factors and gap size can explain these effects. Assume that para factors are more powerful in generating perceived occlusion than trans factors. At small gaps, trans relations tend to dominate, generally diminishing the salience of para factors thus reducing subjective contour strength. This is partially compensated when amodal completion across the gap is present.

Temporal dynamics of object processing: The impact of spatial frequency content and task difficulty on multi-sensor object coding in MEG
Erin Goddard, Thomas Carlson, Nadene Dermody and Alexandra Woolgar
Macquarie University
erin.goddard@mq.edu.au

Object perception involves a range of visual and cognitive processes, and is known to include both a feedforward flow of sensory information from early visual cortical areas, along with task related feedback from areas such as prefrontal cortex. Previous studies have found that low and high spatial frequency information regarding object identity may be processed over different timescales. Here we used magnetoencephalography (MEG) combined with multivariate pattern analysis to measure information related to object identity in frontal and peri-occipital areas. We found that signals related to object identity in low spatial frequencies is present in the MEG signal at an earlier time in peri-occipital cortex, but we did not find any evidence for any object-related information in frontal cortex until a later time (400ms post stimulus onset). We further did not find evidence for greater feedback of object-related information from frontal areas to the visual cortex when the stimulus contains low rather than high spatial frequency information. Our findings confirm that frontal cortex contains information about object identity and provide evidence that this information is fed back to peri-occipital areas, but we do not find any support for the hypothesis that this process takes place within 200ms of stimulus onset.
The interaction of meta-cognitive learning strategy and learning task structure.

Micah Goldwater, Hilary Don, Justine Greenaway, Evan Livesey
University of Sydney
micah.goldwater@sydney.edu.au

Transfer of knowledge to novel contexts is the mark of successful learning. However, 100 years of education research has shown that transfer from learning examples to novel examples of an abstract category (e.g., problems that concern Newton’s laws of motion) is extremely challenging for students (Chi, Feltovich, & Glaser, 1981). However, students vary in their propensity to transfer, and this relates to their learning strategy. That is, some students start with the meta-cognitive strategy to look for generalizations across learning examples, while other students look to memorize individual exemplars (Little & MacDaniel, 2015). An independent line of research has shown that interleaving examples from different categories improves learning relative to blocking a series of exemplars in a row from the same category (Roher & Pashler, 2010), but this interleaving effect may reverse when category exemplars are quite distinct from each other, as with many abstract categories (Carvalho & Goldstone, 2014). Regardless, no research has examined whether the benefits of interleaving vs. blocking depends on meta-cognitive strategy. The current research attempts to tie these threads together by investigating whether interleaving vs. blocking promotes learning of categories defined by abstract structure vs. superficial features, and whether this further interacts with meta-cognitive strategy.

Both global structure and local features contribute to scene categorisation

Martin J. Goldzieher, Irina M. Harris
University of Sydney
mgol6527@uni.sydney.edu.au

A briefly presented visual scene can be identified within the first 100ms of viewing. Low level, global features of a scene are thought to be sufficient for this process, rather than a more in depth examination of local features, or identification of diagnostic objects. However, there is evidence that local details play a complementary role in scene identification, even at early stages of processing. We will present a set of experiments examining the interaction of both local features and global configuration in scene categorisation. We use a category discrimination paradigm, in which participants were asked to decide whether the two images presented were members of the same category. We manipulated global image structure through either rotation or scrambling of scenes, as well as manipulating local feature similarity by varying the relationship between the two presented images, either identical, mirror reversed, category related, or category unrelated. Our results indicate a predominant effect for global configuration, with performance most affected by degrading this structure. However, it was shown that local features were sufficient for scene identification, albeit with much lower sensitivity. This supports both local and global routes to scene understanding.

Learning new symbolic representations of number

Patrick T. Goodbourn, Evan J. Livesey, William X.Q. Ngiam, Alex O. Holcombe, & Jason D. Forte
University of Sydney
patrick.goodbourn@sydney.edu.au

Learning to map non-symbolic (•••••) representations of number onto symbolic (5) representations is critical to mathematical development. We asked whether non-symbolic representations could become symbolic through repeated exposure. Participants announced the sum of two dice with face values represented by digits, canonical dot configurations (standard dice), or noncanonical dot configurations. Reaction times to noncanonical configurations increased substantially and approximately linearly with number (~140 ms per dot), suggesting serial enumeration. In contrast, reaction times to digits and canonical configurations increased only marginally with number (~25 ms per dot), suggesting that both were processed as symbols. Each participant then performed the numerosity judgment task in eight one-hour sessions over two weeks, using a consistent, unique set of non-canonical dot configurations. Across sessions, the reaction time slope became shallower, signifying a shift from serial enumeration to symbolic processing; in a final test session, it was indistinguishable from the slope for canonical dice. Although the trained configurations lacked the symmetries of canonical configurations, learning occurred quickly, without feedback or explicit instruction. Learning did not transfer to untrained noncanonical dot configurations. These findings suggest that observers could exploit configural regularities in non-symbolic representations to learn new symbolic representations of exact number.
Selective spatial enhancement: Attentional spotlight size impacts spatial but not temporal perception

Stephanie C. Goodhew, Elizabeth Shen, Mark Edwards
The Australian National University
stephanie.goodhew@anu.edu.au

Spatial attention is a core visual mechanism that selects certain aspects of a visual scene for preferential processing while minimising the processing of others, so as not to overwhelm our limited-capacity processing resources. An important but often neglected aspect of attention is how changes in the attentional spotlight size impact perception. The zoom-lens model predicts that a small (‘focal’) attentional spotlight enhances all aspects of perception relative to a larger (‘diffuse’ spotlight). However, based on the physiological properties of the two major classes of visual cells (magnocellular and parvocellular neurons), we predicted trade-offs in spatial and temporal acuity as a function of spotlight size. Contrary to both of these accounts, however, across two experiments we found that attentional spotlight size affected spatial acuity, such that spatial acuity was enhanced for a focal relative to a diffuse spotlight, whereas the same modulations in spotlight size had no impact on temporal acuity. This likely reflects the function of attention: to induce the high spatial resolution of the fovea in periphery, where spatial resolution is poor but temporal resolution is good. It is adaptive, therefore, for the attentional spotlight to enhance spatial acuity, whereas enhancing temporal acuity does not confer the same benefit.

Ground Continuity and Distance Perception: An Investigation of the Effect of Texture Discontinuity on Perceived Distance

Jordan Goodison, John Philbeck & Stephen Palmisano
University of Wollongong
jordan.goodison@gmail.com

The ground plane is thought to be important in perceiving intermediate distances (2-25m). Sequential Surface Integration Process (SSIP) theory proposes that a continuously textured ground surface is needed to accurately localise objects at such distances (especially as distance increases). There are a number of ways to manipulate texture continuity of the ground plane, many of which have been empirically tested and shown to result in systematic distance underestimation. In the current experiment, observers were instructed to indicate the distance to an object located at ground level using a modified blind-walking task. We manipulated ground plane texture discontinuity using a simple, yet effective approach; by placing a strip of material level with the grass covered ground plane, effectively occluding the grass texture between the viewer and the target. Contrary to the predictions of SSIP theory, we found no performance advantage associated with viewing targets across a continuous ground surface, as compared to when we occluded the texture of the ground surface. To further explore the effects of texture continuity, we attempted to replicate another ground manipulation that has previously been shown to affect distance perception by occluding the ground surface with a rectangular box.

Investigating the role of perceptual assimilation in the effectiveness of second-language perceptual training

Kimberley M. Gordon & Michael D. Tyler
University of Western Sydney
m.tyler@uws.edu.au

The Perceptual Assimilation Model of Second Language Speech Learning (PAM-L2) predicts that a new second-language (L2) phoneme category is more likely to be formed when learners detect a goodness-of-fit difference between similar-sounding non-native phonemes (a category-goodness assimilation) than when the phonemes sound similar to each other (a single-category assimilation). Although PAM-L2 was devised to account for L2 acquisition in a naturalistic setting, the same predictions should apply to perceptual training in the laboratory. To test this, Australian-English listeners were assigned to one of two training conditions, single-category or category-goodness, and completed discrimination tasks with Arabic fricative contrasts: a pre-training AXB discrimination task with a single speaker and no feedback, six blocks of training on AX discrimination with feedback using three different speakers, and a post-training AXB discrimination task with the single speaker. Performance improved on AXB discrimination from pre- to post-training, but there was no interaction with assimilation type. This suggests that training is equally effective for category-goodness and single-category assimilations. However, performance did not improve
significant over the training blocks, so future research will clarify whether the improvement was due to training or a test-retest effect.

**The effect of caricaturing on memory for faces under gaze contingent simulated prosthetic vision**

Tamara Gradden, Guanling Zhang, Jessica Irons, Xuming He, Nick Barnes, Elinor McKone
Research School of Psychology, Australian National University
u4844938@anu.edu.au

A visual prosthetic device, or “bionic eye”, restores rudimentary vision to individuals with partial or complete blindness. Electrodes implanted in the retina, optic nerve or cortex, produce visual arrays comprised of “phosphenes”. Resolution of current devices is low, therefore making tasks such as face recognition difficult. At last year’s EPC, we demonstrated the effectiveness in phosphenised vision of caricaturing face identity to improve face perception, but obtained corresponding improvements in recognition memory only for resolutions that were unrealistically high compared to current devices. Here, we build on this research by adding gaze contingent viewing, in which participants are able to scan the phosphene array around the face to see all parts of it. In an old-new recognition task, we then found caricaturing improved face recognition at a more realistic device resolution of 40x40 phosphene array with 30% dropout (e.g. due to electrode failure). Learning and testing the face caricatured enhanced performance, relative to veridical, on measures of d’ and confidence in accurate responses. Analysing old and new faces separately, caricaturing lowered false recognition of new faces; positive recognition of old faces did not become more accurate, but required less scanning time to achieve that accuracy.

**Negative emotional stimuli and the boundary restriction phenomenon**

Deanne Green & Melanie Takarangi
Flinders University
deanne.green@flinders.edu.au

Memory errors occur frequently. Boundary extension, a tendency to remember scenes as having extended peripheral detail, is a robust example. More recent research has also demonstrated that negative or traumatic content triggers the opposite phenomenon: boundary restriction. However, because boundary restriction competes directly with the robust boundary extension effect, it is unclear whether boundary restriction is a genuine or spurious phenomenon. Recent research into the boundary restriction effect has been contradictory, with some studies finding the effect and others unable to replicate it. Our aim in the current research was to investigate what factors contribute to producing the boundary restriction effect and address limitations of previous research. We showed participants negative and neutral photographs, and then, after a delay, we showed them each an original photograph paired with a distractor depicting the same scene from further away, or closer up. Participants were more likely to incorrectly identify the closer-up photograph as being the original (boundary restriction) when the original material was negatively valenced, as opposed to neutral. However, participants showed the same degree of boundary extension – incorrectly identifying the farther-away photograph as being the original – for negative and neutral material. Our follow-up research tests potential mechanisms for this effect.

**Investigation of Delay Punishments in the Rodent Iowa Gambling Task**

Phillip Green and Simon Killcross
University of New South Wales
p.green@unsw.edu.au

The Rodent Iowa Gambling Task (rIGT) has been used extensively to examine risk-based decision making behaviour in rats and to draw inferences regarding the neurological mechanisms underlying gambling behaviour. However, many of these inferences rely on the assumption that animals are sensitive to the time-out delay punishments that are used to signal loss. In an initial experiment animals were presented with a choice between a high-punishment and low-punishment lever, which were matched for rate of reinforcement. Animals demonstrated a significant preference for the high-punishment lever, contrary to previous literature using the rIGT. The duration of the delay punishment was then increased on the preferred high-punishment lever and animals did not alter their responding. Subsequent
experiments examined which variables animals were using to make their choices in these tasks, and further demonstrated the low efficacy of time-out delays used in these gambling models as punishments.

Assessing the spatiotemporal limits of global integration using Radial Frequency patterns
Robert Green, Edwin Dickinson, David Badcock
*University of Western Australia*
robert.green@research.uwa.edu.au

Radial frequency (RF) patterns have been used to demonstrate people are able to detect deviation from circularity that can only be accounted for by the integration of local shape features (global shape processing). Research has also indicated shape perception is a result of post-retinal processes which integrates information over both time and space. However, there are no published studies which have explicitly tested temporal and spatial properties of global shape processing. Here we examined the effects of temporal and spatial displacement of an RF3 by passing narrow apertures (slits) over the target or the target behind the slit respectively. Surprisingly, results indicate that not only can global shape processing still occur despite temporal and spatial displacement of the local features, but it can occur over significantly longer durations than was predicted. Global shape integration occurred in all 5 temporal displacement conditions (250, 500, 1000, 2000, and 4000 ms), with no significant differences of either the strength of integration or sensitivity to deformation between conditions. The results further demonstrate the robust nature of global shape processing and suggest that temporal integration of shapes can occur over far longer time periods than previously estimated.

Electrophysiological correlates of sensory and cognitive prediction error signals
Oren Griffiths*, Thomas Whitford and Mike Le Pelley
*University of New South Wales*
oren.griffiths@unsw.edu.au

Contemporary cognitive theories of the formation of psychotic symptoms posit that delusions and hallucinations might arise due to failures in the transmission of ‘prediction error’ (PE) signals. Here PE refers to the difference between a sensation one expects to experience, and the actual sensation experienced. The present experiment examined the relationship between 3 types of PE signalling and schizotypy (thought to be a measure of vulnerability to psychotic symptoms) in healthy individuals using electroencephalography (EEG). The observed associations between PE signal magnitude and schizotypy were generally inconsistent with our hypotheses.

Decoding the human mind from the monkey brain
Tijl Grootswagers & Thomas Carlson
*Perception in Action Research Centre, Department of Cognitive Science, Macquarie University, Sydney, Australia & Centre for Cognition and its Disorders, Macquarie University, Sydney, Australia*
tijl.grootswagers@students.mq.edu.au

Brain imaging studies have shown similarities in representational organization of objects in inferior temporal cortex (ITC) between humans and non-human primates. Evidence has also shown that the structure of ITC’s representation of objects can be used to predict human reaction times for object categorization. In the present study, we examined whether human object categorization behavior could be predicted from monkey ITC’s representation of objects. We trained multivariate pattern classifiers to decode categories from monkey ITC single-neuron responses to 10,000 stimuli, and gathered human reaction time behavior for categorizing these stimuli using Amazon’s Mechanical Turk. Our results show that human reaction times can be predicted from monkey ITC’s representation of objects, for multiple categorization tasks. This strong connection between the representational space of objects in both human and primate ITC and reaction time behavior supports the notion that object information in IT is used by the brain in categorical decision making processes.
Semantic neighbours in speech production: friends or enemies?
Solène Hameau, Britta Biedermann, & Lyndsey Nickels
Macquarie University
solene.hameau@students.mq.edu.au

It is a common claim that in the course of spoken word production, several semantically related representations are activated along with the target word. It remains unclear to date, what type of semantic relationship between these representations exists, and how this co-activation of semantic neighbours can influence word retrieval. We investigated the influence of semantic neighbourhood density (SND: number of words that are similar in meaning to the target word) on picture naming performance of (i) unimpaired speakers (n=50) and (ii) speakers with aphasia (n=193). We first carried out a factor analysis that allowed us to distinguish four conceptually different types of SND. In a second step, a multiple regressions analysis was applied to our “unimpaired” data and did not reveal any influence of SND on response time or accuracy, consistent with previous findings (e.g. Bormann, 2011). Third, a linear mixed effects modelling approach was used analysing the aphasic data: we found facilitating effects of high SND on accuracy for the group, contrary to previous findings (e.g. Mirman, 2011). Further investigation of the influence of SND on error types and the interaction with the patients’ type of impairment was carried out and discussed within psycholinguistic models of speech production.

How early are visual-tactile temporal frequency interactions?
Shui’Er Han and David Alais
University of Sydney
han.shuier@gmail.com

Previous studies have revealed early audiovisual influences on tactile temporal frequency perception. Of notable mention are the findings by Arabzadeh et al. (2008), where weak, uninformative visual flashes were found to induce a lateral shift in tactile intensity discrimination dipper functions, suggesting that these modalities undergo mandatory summation in the same neural transducer. To evaluate this idea, the current study asks if any tactile influences on visual flicker detection are dependent on baseline visual temporal contrast sensitivity, stimulus reliability and tactile intensity. While it is not surprising for touch to have a significant influence when visual detection is poor, mandatory summation is more plausible if significant changes are observed regardless of stimulus reliability and visual temporal contrast sensitivity. Our findings reveal a subtle effect of touch on visual flicker detection. Significant improvements in flicker detection were only observed when visual temporal contrast sensitivity is low and this effect was limited to significantly supra-threshold matched tactile temporal frequencies. Varying tactile intensity also did not result in differences in visual-tactile thresholds. The theoretical implications on possible underlying mechanisms are discussed.

You disgust me! Exploring the neural correlates of moral and physical disgust using biographical memory
Kate Hardwick, Luc Charmet-Mougey, Anina N. Rich & Mark A. Williams
Perception in Action Research Centre & Department of Cognitive Science, & ARC Centre of Excellence in Cognition and its Disorders Macquarie University.
katherine.hardwick@students.mq.edu.au

Moral disgust refers to the emotion evoked by morally reprehensible people, whereas physical disgust is evoked by foul stimuli (e.g., smells, sights or tastes). Moral disgust is regarded as having a strong link with physical disgust. We explored the possible link between these two types of disgust by looking at their neural correlates using fMRI. We trained 25 participants to remember faces paired with biographies that were physically disgusting, morally reprehensible, or ‘normal’ (our neutral condition). We compared the neural activity in response to faces paired with disgusting vs. neutral biographies and untrained faces. Faces paired with physical disgust or moral disgust minus our baseline neutral faces did not reveal significant activity at a conservative threshold. However, using a more liberal threshold we found activity in the temporal pole only in the physical disgust comparison. We therefore found no strong evidence of similar brain systems being recruited by moral and physical disgust. We conclude that physical disgust may be represented differently in the brain compared with moral disgust.
Panum’s fusalional range for horizontal disparities in the central visual field
Ashleigh L. Harrold & Philip M. Grove
The University of Queensland
a.harrold1@uq.edu.au

Stereoscopic depth perception is based on comparisons between slight positional differences, called disparities, in the left and right eye images. Single vision occurs over a finite range of disparities. Diplopia is experienced for large disparities. Measurements of the range of horizontal disparities for which single vision is experienced have previously been restricted to the horizontal plane of regard. We extended these measurements to locations across the central visual field. We measured the empirical vertical horopter and fusional limits at identical elevations in the median plane and at two additional eccentricities and observed backward inclined empirical vertical horopters with a fusional range centred upon each. The relationship between measurements of the vertical horopter and fusional range is similar to the established relationship between Panum’s fusalional range and the horizontal horopter and this relationship is similar for locations to the left and right of the median plane. We replicated previous findings that the vertical horopter is inclined top back. We have demonstrated, for the first time, that the fusional range of horizontal disparities is centred upon the vertical horopter in the median plane and at eccentric locations.

The time course of inductive and deductive reasoning
Brett K. Hayes, Laura Pentney, Rachel Stephens & John Dunn
University of New South Wales, University of Adelaide
B.Hayes@unsw.edu.au

Two experiments examined the effects of decision time on inductive and deductive reasoning. In Experiment 1 participants were presented with arguments that varied in their logical validity and consistency with causal knowledge, and asked to decide whether each argument was valid/invalid (deduction condition) or plausible/implausible (induction condition). Judgments were unspeeded or made under time pressure (deadline = 2200 ms). Response patterns showed that deductive judgments were mainly affected by argument validity whereas inductive judgments were more strongly affected by causal knowledge. This pattern remained largely unchanged under time pressure. Experiment 2 replicated these results using a different set of logical structures. These results challenge certain “single process” models of reasoning (e.g., the threshold model, Rips, 2001) and at least one prominent “dual process” model (the default interventionist model, Evans & Stanovich, 2013). Alternative models that may account for the data are discussed.

Inhibitory self-control moderates the effect of implicit food evaluation retraining on unhealthy snack intake.
Ashleigh Haynes; Flinders University, Australia. Eva Kemps, Flinders University, Australia. Robyn Moffitt, Griffith University, Australia.
Flinders University
ashleigh.haynes@flinders.edu.au

This study examined the effects of a modified implicit association test (IAT) on implicit evaluations of unhealthy snack food and subsequent snack food consumption. Additionally, we investigated whether the intervention effects were moderated by inhibitory self-control. A sample of 148 women aged 17-25 years completed an experiment with a 2 (intervention condition: positive, negative) x 2 (time: pre-, post-training assessment) mixed factorial design. The intervention trained participants to pair unhealthy food stimuli with either positive or negative stimuli. Measures included IATs assessing implicit evaluation of unhealthy food, a taste-test assessment of unhealthy snack consumption, and a self-report inhibitory self-control scale. Implicit evaluations of unhealthy food became more negative following the food negative pairing intervention; however, there was no corresponding change in the food positive pairing condition. The effect of training on snack consumption was moderated by inhibitory self-control such that only participants low in inhibitory self-control showed lower snack intake following the food negative training than the food positive training. Findings support dual-process models, which predict that self-control capacity renders impulses less influential on behaviour. Furthermore, they suggest that interventions retraining implicit food evaluations could reduce unhealthy eating, particularly among individuals with low inhibitory self-control.
Choice response time: Evidence of nonlinearity revealed by multifractal analysis

Rachel Heath and Andrew Heathcote
University of Newcastle, NSW (Heath) University of Tasmania and University of Newcastle, NSW (Heathcote)
rachel.health@newcastle.edu.au

Sequential Response Time (RT) effects are ubiquitous in choice tasks, the current RT depending on stimulus-response contingencies on up to five previous trials. Kelly et al. (2001) showed that RTs from a four-choice visual task with a fixed 1 sec ISI contained nonlinear information processing when noise reduction methods and surrogate series were used to detect nonlinearity. In that experiment, ten subjects took part in three sessions, each containing 2400 trials. These RT data were reanalysed using multifractal methodology to provide a more general representation of information processing in a simple cognitive task. The RT series for each session were multifractal, as revealed by monotonic decreasing generalized Hurst functions and multifractal spectra that spanned overlapping, possibly multiplicative, time scales. Except for one session for each of two subjects, significant nonlinearity in the multifractal spectra was indicated by no overlap between spectra computed from the data and spectra computed from 30 phase-randomised surrogate series. The latter contained all the linear stochastic properties of the RT series but without the nonlinearity. The multifractal spectra were similar across sessions and relatively immune from practice effects. The implications of multifractal spectral analysis for our understanding of the temporal structure of RT data are discussed.

Qualitative reversals in the effect of category frequency on generalization

Andrew T. Hendrickson, Amy Perfors, Daniel J. Navarro
University of Adelaide
drew.hendrickson@adelaide.edu.au

The generalization of category labels to new items is a critical process in many cognitive tasks. Yet a fundamental disagreement exists between the categorisation and generalisation literatures about how category frequency influences inductive generalisation. In categorisation studies people are more likely to assign new items to a category as the base rate of that category increases (e.g. Nosofsky, 1988). The generalisation literature finds the exact opposite effect: as the base rate of a category increases, people are less likely to assign new items to that category (e.g. Navarro et al., 2012). The source of these conflicting results is not clear because these studies have differed across a number of critical factors including the dimensionality of stimuli, the number of categories, the training procedure, the response task, and the required memory load. In this current work we replicate both the base rate and the revered base rate effects in a unified experimental context. Furthermore, we show that manipulating the number of categories produces qualitatively different patterns of category label generalisation. The implication of this work for theories of categorisation and generalisation will be discussed.

Forget-Me-Not: How does the number of intervening items influences memory for melodies

Steffen A. Herff, Roger T. Dean, Kirk N. Olsen
MARCS Institute, University of Western Sydney. Sydney, NSW, Australia
s.herff@uws.edu.au

The number of intervening items has a significant effect on recognition in various modalities. The more intervening items presented, the worse recognition tends to be. But is this an omnipresent property of memory? This project investigates whether the influence of intervening items is applicable to a very specific memory domain - memory for melodies – as recognition of musical stimuli has been shown to be long lasting and resistant to memory impairing diseases. Three studies (N = 70) used a carefully piloted corpus of unfamiliar European folksong melodies in a continuous recognition task. As predicted, recognition performance decreased between immediate repetition and one intervening melody. Interestingly, further intervening items did not lead to any observable changes in recognition. Some melodies showed long lasting recognition, while others were not even recognised after a small number of intervening melodies. We conclude that, in contrast to other memory systems, the number of intervening items beyond the first does not affect melody recognition. It is likely that instead specific features within the melody play a significant role in predicting melody recognition. The results are consistent with recent findings in the literature and help understand general memory mechanics and memory for melodies in particular.
Hearing faces: The effect of voice sex on searching for male and female faces

Eliza Hill, Dr Danielle Sulikowski
Charles Sturt University, School of Psychology
elhill@csu.edu.au

The ability to utilise informative signals of mate quality provides a reproductive advantage over conspecifics. The face and voice are two such signals of the genetic and behavioural quality of potential mates. The present study uses a visual search paradigm to explore the cross modal effects of voices on the covert attention and perception of faces. The target stimuli were prototypical female and male faces amongst an array of androgynous distractor faces. The auditory cue was a prototypical male or female voice. The vocal cues provided no information about the location of the face. It was predicted that sex-congruent voice/face conditions would produce a facilitation effect, whilst sex-incongruent conditions would produce inhibition effects. To account for individual variation in perception of androgyny, each participant’s point of subjective equality (point at which they perceive faces as androgynous) was calculated using a psychophysics procedure. Visual search performance was evaluated and is discussed in terms of sex-specific sensitivities to signals of sexual dimorphism.

Effects of amphetamine on the acquisition and expression of sign-tracking behaviour in the rat

Martine Hofmann and Simon Killcross
University of New South Wales, Sydney; School of Psychology
martine.hofmann@unsw.edu.au

When a lever extension serves as a Pavlovian cue to signal food delivery upon retraction, such a lever can gain strong incentive salience. Rats will learn to approach the lever and engage with it, a behaviour called sign-tracking (ST). Alternatively, rats may approach the magazine during lever extension, a behaviour called goal-tracking (GT). We explored the effects of systemic administration of amphetamine on ST and GT, because it has been postulated that drugs of abuse increase incentive salience attribution to cues. In the first set of experiments, rats were presented with one lever followed by reward (L1→US). We found that vehicle-treated rats all acquired a ST response and that administration of amphetamine biased responding towards a GT response. Further, rats were presented with a sequence of two levers followed by reward (L1→L2→US). Vehicle-treated rats developed a strong ST response to both levers, whereas amphetamine-treated rats developed a GT response to L1 and a ST response to L2. Devaluation of the reward had no effect on responding to L1 in either treatment group, but reduced the ST response to L2, suggesting that rats engage with L1 because L2 is reinforcing and not because L1 has a direct association with the outcome.

The influence of colour on task discrimination in visual search

Vanessa J Honson and Sieu K Khuu
University of NSW
v.honson@unsw.edu.au

Colour has been shown to be a cue for identifying and localizing objects in the visual scene. This has been widely reported in visual search studies that coloured targets lead to pop-out. While colour is effective for visual search per se, what remains unclear is when the level of colour discrimination is useful for an observer to successfully carry out a task. In this study, we were interested in determining the colour threshold at which colour informs the discrimination of another task. In Experiment 1, we measured colour detection by presenting a two interval forced choice procedure: each image displayed 16 elements spaced equally in an annulus arrangement. In blocked trials, a staircase procedure was given with the observer required to indicate the image with one coloured element. Each block was a function of orientation in CIE 1976 colour space. In Experiment 2, we repeated the visual search experiment but colour was used as a cue to an oriented target. We measured and compared the colour thresholds for both tasks to determine the colour point for detection and for function. Our findings suggest the point at which colour is useful for function is significantly higher than that for colour detection.
A certain face in a certain place: The role of visual context on judgements of trustworthiness, dominance and attractiveness.

Kalyce J. Howard; Darren Burke
University of Newcastle
kalyce.howard@uon.edu.au

In a single glance we make judgements about an individuals’ trustworthiness, dominance, and attractiveness. These judgements have various implications from immediate safety to mate choice and social interaction. Faces (and facial expressions) are vital for forming these impressions. Thus, much of the research focuses solely on facial cues. Yet we rarely view the face in isolation. Faces are encountered within a complex visual context, often laden with emotion. Indeed, emotionality of visual backgrounds alters the general valence evaluation of a face (Koji & Fernandes, 2010). Determining whether context influences specific facial judgements is thus important. Faces portraying angry, happy and neutral expressions were imbedded within positive, negative, or neutral visual scenes. Forty-six participants rated these for trustworthiness, dominance, and attractiveness. Faces in positive backgrounds were rated as more attractive than those in neutral and negative backgrounds, and those in neutral backgrounds were rated as more attractive than those in negative backgrounds. Likewise, trustworthiness varied in a linear fashion with background valence, but this interacted with both facial expression and stimulus sex. Interestingly, visual context did not influence participant ratings of dominance. Face evaluation is significantly influenced by contextual factors, but this varies as a function of the judgement being made.

Searching for the Highest Number

Piers D. L. Howe and Daniel R. Little
University of Melbourne
pdhowe@unimelb.edu.au

When viewing a collection of products how does a consumer decide which one to buy? To do this task, the consumer not only needs to evaluate the desirability of the products taking into account such factors as quality and price but also needs to search through the products to find the most desirable one. In our experiments we studied the search process using an abstraction of a common consumer choice task. Observers searched an array of numbers for the highest one. Crucially, the observers did not know in advance what this number would be, which made it difficult to know when the search should be terminated. In this way our search task mimicked a problem often faced by consumers in a supermarket setting where they also may not know in advance what the most desirable product will be. We compared several computational models. We found that our data was best described by a process that assumes that observers terminate their search when they find a number that exceeds an internal threshold. Depending on the observer and the circumstances, this threshold appeared either to be fixed or to decrease over the course of the trial.

What’s more ecologically relevant? Spatial vs. Intensity based image characteristics of natural scenes

Zoey Isherwood, Mark Schira, Branka Spehar
The University of New South Wales
z.isherwood@student.unsw.edu.au

Natural scenes are characterised by a specific distribution of spatial frequencies and associated luminance intensities, known as the 1/fα amplitude spectrum. This relationship is thought to underlie both the scale invariance and fractal properties of natural scenes, which is characterised by a line with a slope between 1.2 and 1.4. Previously, using fMRI, we found that early visual cortex is tuned to images with a “natural” 1/f slope, however it is unclear if the driving factor behind this optimisation is mainly due to the spatial (geometric) or intensity (photometric) based image characteristics of natural scenes. To disambiguate this, we measured fMRI responses between greyscale and thresholded random noise images with varied 1/f slopes (0.25, 0.75, 1.25, 1.75, 2.25). As previously, we found a modulation dependent on slope (inverted U-shape with the strongest response at a natural slope of 1.25) but no significant differences between image types. This provides evidence that the visual system is not tuned to the variations in luminance intensities within a natural scene, but rather their fractal geometrical properties. This may occur because the structural properties of natural scenes remain constant regardless of changing levels of illumination, making it a more ecologically relevant source of visual information.
Individual frontoparietal voxels can contribute to multiple neural codes depending on the demands of the task

Jade Jackson, Alexandra Woolgar
Perception in Action Research Centre (PARC) & Department of Cognitive Science, Faculty of Human Sciences, Macquarie University
jade.jackson@mq.edu.au

In everyday life we need to select relevant information and ignore distraction. A circuit of frontal and parietal areas, referred to as multiple-demand (MD) regions, are believed to support this process by adjusting their responses to selectively process information that is currently relevant (Duncan 2001). In different tasks, the same neurons may be “re-used” to code different information. Evidence from non-human primates suggests that the extent to which neurons can be re-used between tasks depends on the similarity of the stimuli (Cromer et al. 2011; Roy et al. 2011).

To examine this in humans, we developed a variant of multivoxel pattern analysis for functional magnetic resonance imaging data. In two independent data sets, we established the multivoxel codes for different visual stimuli and then assessed the extent to which the same voxels were used in each code. We predicted a counter-intuitive increase in the extent to which voxels were re-used when the encoded stimuli were more different from one another. Indeed, a larger proportion of MD voxels were re-used to code dissimilar visual objects than were to code different aspects of the same visual objects. This suggests that the flexibility of population coding depends on the demands of the task.

Form perception and neural feedback: insights from V1 and V2

Rhiannon Jeans
Australian National University
rhiannon.jeans@anu.edu.au

In the brain, every cortical inter-area feedforward projection shares a reciprocal feedback connection. Despite its pervasive nature in the brain, our understanding of the functional role of neural feedback in form perception remains incomplete, particularly in behaving animals. This problem is addressed in humans with a novel form completion paradigm. Seven subjects (5 female) had their EEG waveforms analysed using three linear models showing non-significant differences between stimulus conditions designed to produce differences by manipulating neural feedback to V1. Two of these subjects (one female), in addition to EEG waveforms, had combined magnetic resonance imaging (MRI) and functional MRI (fMRI) cortical maps that allowed anatomically close areas such as V1 and V2 to have their signals decomposed and neural feedback inferred. Differences between stimulus conditions arose once signals had been divided into V1 and V2. Significant differences (p < .05) for one subject in V1 and V2 suggests cortical interactions at 100ms and 350ms. This suggests the form completion paradigm has utility at investigating the influence of the V2 far receptive field surround on V1, given future given signal to noise issues are resolved.

Coding facial identity: Evidence for a channel tuned to the average (norm) face

Linda Jeffery, Nichola Burton, Stephen Pond and Gillian Rhodes
ARC Centre of Excellence in Cognition and its Disorders, The University of Western Australia
linda.jeffery@uwa.edu.au

Face identity is represented relative to an average (norm) that occupies the centre in a multi-dimensional space.

However, it is not yet clear how this norm is neurally coded. It has been proposed that each dimension of face space is coded by only two, oppositely-tuned, channels, each responding most strongly to one end of the dimension. On this view the average is coded implicitly by equal activation of both pools. An alternative account posits a third channel, tuned explicitly to the average (i.e., centre of a dimension). We used a face aftereffect paradigm to distinguish between these two possibilities. We measured how the range of faces identified as the average was affected by two adapting conditions - adapting to alternating images from opposite ends of an identity trajectory (e.g., Dan, AntiDan) and adapting to the average (i.e. the centre of the trajectory). A two-channel model predicts similar effects for both adapting conditions, whereas a three-channel model predicts opposite effects for the two conditions. We found opposite effects: Alternating adaptation widened the range of faces identified as the average whereas adaptation to the average narrowed the range. These data provide the first evidence for explicit coding of the norm.
Recognizing bilingual voices: the cost of switching language and tone of voice

Elizabeth K. Johnson and Nida Qureshi
University of Toronto
elizabeth.johnson@utoronto.ca

Two experiments investigated how language and tone of voice (TOV) changes impact English-speakers’ performance in a voice line-up task. In Experiment 1, listeners were presented with an English passage. Shortly after they were presented with four voices and asked to identify the voice that had read the passage. Participants were tested in four conditions: 1) No Change, 2) Language Change, 3) TOV Change, and 4) change in both language and TOV. Trials involving changes in TOV went from neutral in the exposure phase to angry in the test phase, or vice versa. Trials involving a change in language went from English to Urdu. Listeners performed significantly worse in the two conditions involving a language change than in the two conditions involving no language change. Experiment 2 was identical to Experiment 1 in all respects except the order of language presentation. Here, listeners were first presented with a passage read in Urdu. In this case, overall performance was poorer than in Experiment 1 and no differences between test conditions was observed. We conclude that bilingual speakers are easier to identify if initial exposure is in a familiar language. Moreover, a language switch disrupts voice recognition far more than a TOV change.

Children can implicitly, but not voluntarily, direct attention in time.

Katherine A Johnson; Emma Burrowes; Jennifer T Coull
University of Melbourne
kajo@unimelb.edu.au

Children can use spatial cues to orient their attention to discrete locations in space from around 4 years of age. In contrast, no research has yet investigated the ability of children to use informative cues to voluntarily predict when an event will occur in time. The spatial and temporal attention task was used to determine whether children were able to voluntarily orient their attention in time and in space, with 30 typically developing children (average age 11 yrs) and 32 adults (average age 27 yrs). Adults made use of both spatial and temporal cues to optimise behaviour, and were significantly slower to respond to invalidly cued targets in either space or time. Children were also significantly slowed by invalid spatial cues, yet their responses were not slowed by invalid temporal cues, suggesting that they were not using the temporal cue to voluntarily orient attention through time. Children, as well as adults, did however demonstrate signs of more implicit forms of temporal expectation. Overall, our results suggest that although children implicitly made use of the temporally predictive information carried by the length of the current and previous trial’s cue-target interval, they could not deliberately use symbolic temporal cues to speed responses.

Interactive effects of approach bias and inhibitory control training on behavioural food choice

Naomi Kakoschke, Eva Kemps, Marika Tiggemann
Flinders University, Australia
Naomi.Kakoschke@flinders.edu.au

Previous studies have effectively reduced unhealthy food intake by re-training either approach biases or inhibitory control. This study aimed to determine whether the combined effect of approach bias and inhibitory control training is more effective than either intervention alone. Undergraduate women (N = 78, 18-27 years) were randomised to the conditions of a 2 (Approach bias: training vs. control) x 2 (Inhibitory control: training vs. control) experimental design. Food choice was assessed by a Behavioural Choice Task. Implicit evaluations of unhealthy food were measured using a single-category implicit association task, and trait impulsivity was measured via self-report. Results show that participants in the approach bias training group showed an avoidance bias for unhealthy food, while the control group showed an approach bias. This training was more effective when combined with inhibitory control training, and training effects were more pronounced for individuals high in trait impulsivity and for those with more positive implicit evaluations of unhealthy food. In addition, the approach bias training group made healthier food choices when presented with healthy and unhealthy foods. These findings provide support for dual-process models of health behaviour, and propose the need for a combined intervention aimed at modifying unhealthy food intake.
Non-verbal skills in reading comprehension: What role does visual imagery play?

Lia Katsipis, Bethanie Gouldthorp, & Helen Davis
Murdoch University
l.katsipis@murdoch.edu.au

Previous research has failed to establish a relationship between visual imagery and narrative comprehension, although theories based on situation modelling and embodied cognition suggest this link exists. This may be due to a lack of studies that distinguish between the distinct subcomponents of the visual imagery system. The current study measured three types of visual/visuospatial imagery (image maintenance, scanning and rotation), along with several other reading and cognitive skills that have been found to influence comprehension (reading rate, reading accuracy, inference generation, and verbal working memory), in a sample of 80 children in Years 4 and 5 at schools in Perth, Western Australia. Hierarchical multiple regression analysis revealed that visuospatial imagery did provide a significant contribution to reading comprehension, although this was not as great as the contribution provided by some of the more verbal-based skills such as reading accuracy and rate. Results are interpreted in relation to cognitive theories of reading and limitations of using existing standardised measures of reading accuracy and comprehension.

Decreased visual speech benefit for foreign-accented speech perception in noise

Saya Kawase, Jeesun Kim, Vincent Aubanel, Chris Davis
The MARCS Institute, University of Western Sydney
S.Kawase@uws.edu.au

It is well established that seeing the talker’s face/articulatory movements (visual speech) facilitates speech perception particularly in noise. The present study investigated the extent to which this visual effect occurs for foreign-accented speech perception. The reason for such an inquiry is that non-native talkers often articulate differently from native ones, and so similar to foreign-accented auditory speech information, their visual speech information may not be as facilitative as that of native talkers. In the experiment, twenty-one native Australian English listeners performed a speech perception task with native Australian English and Japanese-accented English sentences mixed in speech-shaped noise (SNR: -4dB). These sentences were presented in an audio-only condition (AO) and an audio-visual condition (AV) where the talker’s face and articulatory movements were shown. The results showed that additional visual speech information facilitated the perception in noise for both native English and Japanese-accented English. However, the visual benefit was relatively smaller in the perception of Japanese-accented English, possibly because foreign-accented speech involves non-native articulatory movements that are different from native ones in terms of form and/or timing.

Metacognition and Time Perception

Brendan Keane, Kielan Yarrow, Derek Arnold
University of Queensland
brendan.keane1@uqconnect.edu.au

Subjective ratings of decisional confidence correlate well with objective performance in a range of perceptual tasks (for reviews, see Yeung & Summerfield, 2012; Fleming & Dolan, 2012). This ability is a form of metacognition, as it requires the brain to assess its own decision-making processes. We have found that human decisional confidence ratings also predict performance in temporal judgments. In subjective temporal order judgments, participants’ confidence ratings predicted JND magnitudes. Confidence ratings also predicted objective temporal discriminability in a ternary odd-one-out task. Finally, using a binary similarity judgement, signal-detection theoretic analyses indicated that humans have greater-than-chance metacognitive insight (Maniscalco & Lau, 2011). These data reveal that people have insight into how they have encoded temporal information on a trial-by-trial basis. It remains to be seen whether this insight pertains to the magnitude of the difference between encoded information and a decisional criterion, or if this relates to an estimate of encoding precision, or to some combination of these two possibilities.
Social communicative functions of the “beacon effect” in music performance

Peter E. Keller, Rasmus Koenig, & Giacomo Novembre
The MARCS Institute, University of Western Sydney
p.keller@uws.edu.au

A number of animal species (e.g., fireflies and frogs) engage in synchronous behavioural displays that are produced by males in order to attract females. The current study investigated potential social communicative functions of this “beacon effect” in human musical behaviour. The voices of members of the renowned St Thomas Boys Choir were recorded with head-worn microphones as they performed a short concert program first with an all-male audience, then with female peers in the audience, and finally with an all-male audience again. Acoustic analyses revealed that the basses (the oldest boys with the deepest voices) increased the energy in a high frequency band (2500-3500 Hz) of voice’s spectrum when females were in the audience. Consistent with a beacon effect, this frequency band—known as the “singers’ formant”—adds brilliance and carrying power to the voice. Subsequent perceptual judgment tasks showed that some listeners were able to identify the performances sung in the presence of females, and that there was a slight preference for these performances. The reliability of these results was higher in male than female listeners, suggesting a vestigial function of the beacon effect in alerting competing males to the (presumably desirable) presence of females.

how do i txt my boss???: Written language style and recipient in digital communication

Nenagh Kemp
University of Tasmania
nenagh.kemp@utas.edu.au

Digital communication, such as by email and text message, is everywhere. Digital messages are often written informally, with missing or excessive punctuation (hi did it work?!?!), expressive spellings (PLLEEASSE), and symbols ;), in a style known as “textese”. However, there is no experimental research how different recipients respond to messages written with different levels of textese. In three settings, we examined people’s tendency to grant requests made in these messages, and to converge their own language to match that of a recipient, a possible measure of liking. Participants were high school students and teachers (Setting 1, n=168), lecturers and undergraduates (Setting 2, n=89), and employers and employees (Setting 3, n=144). They responded to digital messages purportedly sent from peers and non-peers in their own setting. Overall, participants were more likely to grant requests to messages written with no/medium levels of textese (compared to high levels), and more likely to converge their language to messages written with medium levels of textese (compared to no/high levels). There were further individual patterns within each setting, but the main conclusion is that across age groups and recipients, using medium or no textese facilitates digital interaction much better than using high levels of textese.

Stability of food-related attentional re-training effects in overweight individuals

Eva Kemps, Marika Tiggemann and Sarah Hollitt
Flinders University
Eva.Kemps@flinders.edu.au

Evidence shows that overweight individuals exhibit an attentional bias for food, and that this bias can be modified. This study examined the longevity of such bias modification effects. Using a dot probe paradigm, a community sample of overweight adults (N=104) was trained to direct attention either toward (‘attend’) or away from (‘avoid’) food pictures. Participants completed 5 weekly training sessions. Attentional bias was measured before and after training, at 24-hours and 1-week follow-up. To increase generalizability, at each of the post-training and follow-up assessments, participants were shown a mix of old and new food pictures; they also completed an independent measure of biased processing, i.e., a word stem task. Attentional bias for food increased in the ‘attend’ group and decreased in the ‘avoid’ group. These re-training effects were maintained at 24-hour and 1-week follow-up, and extended to new food pictures. Participants in the ‘avoid’ group also produced relatively fewer food words on the word stem task than those in the ‘attend’ group. Results are consistent with recent neuro-cognitive perspectives of obesity. They further suggest that attentional bias modification, which targets the cognitive processes that underlie the heightened food responsivity in overweight individuals, could help combat pathological (over)eating.
Eye-tracking evidence of localized competition in emotion-induced blindness

Briana L. Kennedy, Daniel Pearson, David J. Sutton, Tom Beesley, & Steven B. Most
University of New South Wales
b.kennedy@unsw.edu.au

Emotional distractors can disrupt awareness of subsequent targets, an effect known as “emotion-induced blindness” (EIB). Recent evidence suggests that EIB reflects spatiotemporal competition between a target and distractor, with emotional distractors dominating due to tendencies to prioritize emotional information (Wang, Kennedy, & Most, 2012). For example, when participants monitor two simultaneous rapid serial streams for a single target, EIB occurs when the distractor and target appear in the same location but not when they appear in different locations (Most & Wang, 2011). Although suggestive of spatiotemporal competition, an alternative explanation may be that such a pattern arises simply because of where participants look. For example, if a participant happens to be looking at the location containing the target, an emotional distractor appearing in the opposite stream may simply not be processed. To test this, we used an eye-tracker to allow gaze-contingent presentation, allowing us to manipulate where distractors and targets appeared in relation to participants’ eye gaze. We found that EIB was localized to the location of the distractor regardless of eye gaze, providing further support for a spatiotemporal competition mechanism driving emotion-induced blindness.

Visual and pre-frontal cortex excitability modulates the strength of visual imagery

Rebecca Keogh and Joel Pearson
University of New South Wales
rebecca.keogh@gmail.com

The ability to imagine visual images varies greatly between individuals. However the reason for these individual differences is poorly understood. Here we investigated the role of cortical excitability in two areas of the brain often implicated in the ability to imagine images: visual and pre-frontal cortex. To measure imagery strength participants were required to imagine one of two patterns followed by the presentation of a brief binocular rivalry display. As in many prior studies, imagery strength was measured as percent primed. We found a negative correlation between visual cortical excitability (measured by automated TMS phosphene threshold procedure) and imagery strength. We then investigated whether imagery strength could be manipulated by altering cortical excitability with transcranial direct current stimulation (tDCS). Decreasing visual cortical excitability resulted in a significant increase in imagery strength whereas decreasing excitability in the pre-frontal cortex resulted in a slight decrease in imagery strength. Conversely increasing cortical excitability in the visual cortex had little effect on imagery strength while increasing excitability in the pre-frontal cortex resulted in increased imagery strength. Taken together these results suggest that the cortical excitability of the visual and pre-frontal cortices play different key roles in governing the strength of mental imagery.

The development of letter position processing in primary school readers: does orthographic knowledge play a role?

Yvette Kezilas, Saskia Kohnen, Meredith McKague, Serje Robidoux & Anne Castles
Macquarie University
yvette.KEZILAS@MQ.EDU.AU

Developmental changes in the processing of letter position are typically interpreted as reflecting changes in the initial stages of the visual word recognition system (e.g., Acha & Perea, 2008). However, an alternative hypothesis is that these effects are driven by changes in later stages of processing, e.g., the influence of top-down orthographic knowledge. We tested this hypothesis by administering a novel variant of the Reicher-Wheeler task to 81 children in grades 2-5. Participants were required to report the identity of a letter at a specified position within three orthographic contexts: migratable words (e.g. form (which has the migration partner, from)), pseudowords (e.g., pilf (pilf)) and illegal nonwords (e.g. ftkl (ftkl)). The influence of orthotactic constraints on letter position processing was investigated by comparing performance for pseudowords to illegal nonwords (pseudoword-superiority-effect), and the influence of lexical representations was investigated by comparing performance for words to pseudowords (word-superiority-effect). If changes in orthographic knowledge across development influence letter position processing, the size of the word- and pseudoword-superiority effect should increase as reading advances. Whilst the pseudoword-superiority-effect increased, the word-superiority-effect did not. These results will be discussed within the context of previous studies looking at letter position effects in developing readers.
The effect of temporal duration on the integration of local motion in the discrimination of global speed

Sieu K. Khuu, Charles Chung & Kirsten Challinor
University Of New South Wales
charles.eric.chung@gmail.com

In the present study, we examined the dependency of global speed discrimination on spatial summation and stimulus temporal duration. In Experiment 1, speed discrimination thresholds were measured using an annulus of moving Gabor elements in which the number of elements forming the stimulus (2-8) and their temporal duration (0.1-3.2s) were varied. We report that at brief stimulus durations (3.2s) were varied.

The effect of organic solvent exposure on low and high level visual function in dry cleaners.

Sieu K. Khuu and Ingrid B.A. Jimenez
The University of New South Wales
s.khuu@unsw.edu.au

Organic solvents are volatile chemicals used in the dry-cleaning industry to dissolve lipids from garments. However, exposure to occupational levels of organic solvents can lead to neurotoxicity which selectively affects visual system function. In the present study we assessed the effect of organic solvent exposure on basic visual functions such as contrast detection (by measuring the contrast sensitivity function, CSF) and colour discrimination (100-Hue test), as well as complex global motion and form detection as indicated by global dot motion and Glass pattern thresholds respectively. 33 Dry cleaners and 35 non dry-cleaners were recruited and their neurotoxicity was assessed using the gold standard Q16 questionnaire. We find that dry cleaners had significantly higher Q16 scores and more neurotoxic symptoms than non dry-cleaners. Dry cleaners had significantly lower contrast sensitivity and performed more errors in colour discrimination than non dry-cleaners. Additionally, global form and motion thresholds were significantly higher in dry cleaners than non dry-cleaners. Our results show that exposure to occupational levels of organic solvents is associated with deficits in both low and high level visual function. This raises concerns about the use of organic solvents in industry and at home, which at present is highly prevalent but not regulated.

A domain-general capacity for statistical learning independently predicts children’s comprehension of specific syntactic structures.

Evan Kidd & Joanne Arciuli
The Australian National University & The University of Sydney
evan.kidd@anu.edu.au

A substantial body of research shows that statistical learning (SL) supports speech segmentation and word learning (e.g., Saffran, Aslin, & Newport, 1996). By contrast, evidence implicating SL in the acquisition of syntax, where its role is more controversial, is scarce. We investigated whether SL independently predicted 6 – 8-year-old’s comprehension of syntax. Sixty-eight (N = 68) children completed a test of comprehension of four syntactic structures (actives, passives, subject relative clauses, and object relative clauses), a test of visual SL utilising non-linguistic stimuli, and three additional control measures (vocabulary, non-verbal IQ, and verbal working memory). The results revealed that SL independently predicted comprehension of two syntactic structures that show considerable variability in this age range: passives and object relative clauses. These data provide the most comprehensive demonstration to date that a domain-general capacity for SL is implicated in the acquisition and processing of the syntax natural language. References Saffran, J., Aslin, R., & Newport, E. (1996). Statistical learning by 8-month-old infants. Science, 274, 1926 - 1928.
Stroop, semantic priming and conflict
Sachiko Kinoshita
Macquarie University
sachiko.kinoshita@mq.edu.au

In the classic Stroop task, the stimulus is a colored word (e.g., the word “GREEN” presented in red) and participants respond to the color. RT distribution analysis shows that the “interference effect” – the difference between the incongruent condition (e.g., the word GREEN presented in red) and neutral condition (e.g., a row of Xs presented in red) – is small for fast responses and increases as responses slow. In contrast, in semantic categorization task, De Wit & Kinoshita (2014, 2015) showed that the effect of semantic congruence shows a distributional shift. Here we report that temporally separated Stroop stimuli, i.e., where a word prime is presented before a color patch, also show a distributional shift pattern, both when the prime is clearly visible and when it is backward-masked. The results are discussed in terms of task conflict vs. information conflict.

The Effect of SMS Alerts on Attentional Resources.
Miss Joanna Kirlagitsi, Dr John Cass
University of Western Sydney
j.kirlagitsi@unsw.edu.au

The popular belief that SMS alerts pose a threat to one’s attentional resources is based almost exclusively on anecdotal evidence. The present study aims to ascertain whether SMS alerts do indeed interfere with performance on an attentionally demanding task, and whether SMS alerts emitted by one’s own mobile phone are more distracting than alerts from another phone. The study was a within-subjects design and consisted of 57 first year psychology students. Participants were intermittently exposed to auditory SMS alerts either from their own phone or a different phone whilst engaged in a visual orientation search task. Search times were computed for trials preceding, during and succeeding alert onset. It was hypothesized that participants would demonstrate increased RTs on experimental trials coincident with the onset of an SMS alert, compared to immediately preceding trials. Moreover, SMS alerts emitted from the participants’ own mobile phone were predicted to yield longer RTs. Both hypotheses were supported. We propose that the difference in reaction times associated with the two types of SMS alerts result from a value-driven attentional mechanism, such that stimuli of high value (one’s own SMS alert) mandate attentional priority.

Effects of adaptor gaze direction on the magnitude of face identity aftereffects
Nadine Kloth, Linda Jeffery, & Gillian Rhodes
ARC Centre of Excellence in Cognition and its Disorders, School of Psychology, The University of Western Australia
nadine.kloth@uwa.edu.au

Adaptive mechanisms constantly recalibrate face coding to our current diet of faces. Here, we investigated whether the social cues conveyed by a face can influence its adaptive impact. We compared the magnitude of face identity aftereffects induced by adaptors with direct and averted gaze. We reasoned that direct-gaze faces may be more engaging and better attended, and thus produce larger aftereffects, than averted-gaze faces. Using a 5-s adaptation, we found that aftereffects for adaptors with direct and averted gaze did not differ. Using a 1-s adaptation, gaze direction did affect the magnitude of the aftereffect, but in an unexpected direction: aftereffects were larger for adaptors with averted than direct gaze. Differences in looking time to the adaptors between the two gaze directions could not account for these findings. Subsequent ratings of the stimuli showed that averted-gaze adaptors were perceived as more expressive and interesting than direct-gaze adaptors. Therefore it appears that the averted-gaze faces were more engaging, leading to larger aftereffects. Overall, our results suggest that naturally ocuring facial signals can modulate the impact a face exerts on our perceptual system. The faces we perceive as most interesting also appear to calibrate the organization of our perceptual system most strongly.
Interactive map learning: The effects of cognitive load
Matthew Knight, Michael Tlauka
*Flinders University*
*matt.knight@flinders.edu.au*

Traditional models of spatial learning state that active navigation is beneficial over passive observation. Working memory theory presents an alternative explanation, which suggests that activity may be detrimental if task demands are high. This prediction was assessed in the context of spatial knowledge derived from maps. Active and passive participants studied a map selectively, or while performing a simultaneous interference task. Over three experiments, the type of interference task was altered to affect discrete components of working memory. A spatial interference task revealed a passive advantage in high load tasks, whereas verbal and central interference equally affected active and passive learners. These outcomes suggest that passivity benefits working memory in spatially demanding tasks, whereas interactivity has little effect if task demand is low.

Linguistic Relativity and the Role of Recognisability in Visual Search for Colour
Garry Kong, David Alais, Erik van der Burg
*University of Sydney*
*garry.kong@sydney.edu.au*

Linguistic relativity is the notion that language affects the way we perceive the world. In the field of visual search, this has been interpreted to mean that distractors interfere with targets when they share the same colour label, but not when they belong to different colour labels. In the present study, we investigate this theory by using displays with a red or green hue, but varying levels of saturation. A genetic algorithm was employed, which evolved the search display to reveal the way in which participants searched. Results show that participants were able to search within only mid-saturated red items, but not mid-saturated green items, providing evidence for linguistic relativity, as we have a colour label for mid-saturated red (i.e., “pink”), but not for mid-saturated green. However, a follow-up experiment revealed that it was possible to search within mid-saturated green items if the exact target colour was primed before each trial. We therefore suggest that priming increases the recognisability of the target colour, which has been speculated to affect visual search. Furthermore, we conclude that linguistic relativity is a special case of recognisability.

Thinking can get in the way of learning: Mediated serial overshadowing of long-delay taste aversion learning
Dorothy Kwok and Bob Boakes
*The University of Sydney*
*dkwo0706@uni.sydney.edu.au*

Mediated overshadowing occurs when an evoked representation of one stimulus interferes with the formation of an association between two other stimuli. The general strategy was to first pair a cue with the sour taste of hydrochloric acid (HCl) and then introduce the cue during the delay between the target taste, sucrose, and injection with lithium chloride (LiCl). Either two or six cue-HCl pairings were given. In Experiment 1 the cue was almond. The introduction of almond was found to produce greater overshadowing of the sucrose aversion in the group given two almond-HCl pairings (Paired-2) than in an unpaired control. Interestingly the opposite pattern was found in the group given six almond-HCl pairings (Paired-6). This group acquired a stronger sucrose aversion that its unpaired control. This confirms that few pairings can be better than many in determining whether representation-mediated effects occur (Holland, 1990). A possible explanation for the Paired-6 results is that almond evoked an aversive response rather than memory of the sour HCl and that this added to the aversion produced by the sucrose-lithium pairing. Experiment 2 obtained similar results when a context was used as the cue intended to evoke an HCl representation.
Identifying the components of hazard perception

Lacherez, Philippe; Lester, Robert; Turner, Laura; Burns, Zoe
Queensland University of Technology
p.lacherez@qut.edu.au

Hazard Perception Tests (HPTs) involve the presentation of video recordings of real-world driving scenes in which a potential hazard occurs to which the driver must respond. Participants are required to signal the location of the hazard as quickly as possible. HPTs have demonstrated ability to distinguish safe from unsafe drivers and can predict accident involvement. Given the variety and complexity of different objects that can be seen as hazardous in such scenes, a relevant question is what perceptual functions contribute to hazard perception scores on these tasks. We examined the performance of 76 licensed drivers aged between 20 and 76, on a standardised HPT test, and also measured their cognitive function (using the Trail Making Test and the Mini-Mental State Examination), visual acuity, contrast sensitivity, useful field of view, and motion sensitivity. We also included a separate video-based assessment of time-to-contact and direction-of-heading judgments based on the same videos used in the HPT. All of the measures except visual acuity correlated with performance on the HPT, however cognitive function, useful field of view, and motion perception were the best predictors of HPT performance.

Contrasting alignment and transformation based accounts of similarity

Steven Langsford, Daniel Navarro, Amy Perfors, Andrew Hendrickson
University of Adelaide
langsford.steven@gmail.com

Similarity judgement is a basic ability invoked as a primitive operation in prominent models of categorization, memory, induction, and problem-solving, among others. The process by which people make similarity comparisons is still unclear: classical approaches such as locating stimuli in a psychological space or tallying common and distinctive features fail to account for structured representations, which people are known to use. Two modern accounts that do allow structured representations are structural alignment (Gentner 1983, Gentner & Markman 1997), and transformational similarity (Hodgetts, Hahn, & Chater 2009, Hahn 2014). Structural alignment proposes computing similarities by assigning features to roles and counting matches within and between roles. In contrast, transformational similarities are computed by counting the number of operations required to transform a base representation into a target, given a set of allowable transformations. Both enjoy some empirical support. This study directly compared the two. Participants were shown a base item and two option items and asked to indicate which option was most similar to the base. Triads were chosen such that alignment and transformational similarity gave opposite predictions. Participants preferred items indicated as more similar by alignment, choosing them on 85% of trials.

‘Free Will’: Assessing the content of the general population’s concepts using two-dimensional semantics

Andrew J. Latham & David Braddon-Mitchell
The University of Sydney
olat6470@uni.sydney.edu.au

Philosophers, psychologists and cognitive scientists have all debated the nature of our concepts. However, just what the structure and content of the general population’s concepts are is an empirical matter. Here we introduce the formal framework of two-dimensional semantics and show how it can be practically used to explore the content of individual concepts. Under the two dimensional framework an individual’s expressions are evaluated – not just according to the features of the possible scenario where the evaluation is taking place, but also according to the supposed features of the actual world. The results of these analyses are incredibly fine grained allowing for confident assignment of group membership according to conceptual content. In addition, they allow the experimenter to track and predict an individual’s responses ahead of time when presented with new information. We illustrate this talk using the ongoing investigation into the general population’s concept of ‘free will’ (Roskies, & Nichols, 2009).
Video gamers show superior temporal precision when selecting letters from a stream

Andrew J. Latham, Elizabeth Nguyen, Patrick T. Goodbourn, Vince Polito, & Alex O. Holcombe
The University of Sydney
alat6470@uni.sydney.edu.au

Video-game players (VGPs) show less leftward bias in visuospatial tasks (Latham et al., 2014). Their temporal order judgments show less auditory-first bias (Donohue et al., 2010). We investigated both bias and sensitivity in space and time, using a dual-stream RSVP task to quantify the properties of attentional selection in the left and right hemifield. VGPs (n=18) had substantially better temporal precision (M = 49 ms, SE = 3.7) relative to expert musicians (M = 71 ms, SE = 3.6, n=19) and control participants (M = 76 ms, SE = 4.1, n= 15), F(2,49) = 15.0, p < .001. Remarkably, other aspects of sensitivity and bias on the task such as the latency of selection or its probability of success (efficacy) were similar for the three groups. A strong leftward efficacy bias was present in all groups. This may index a serial process of memory consolidation. The gamer advantage in temporal precision could reflect better use of the cue to trigger attentional temporal buffer. However, some evidence suggests it instead reflects the precision of binding within a leaky temporal buffer (Goodbourn & Holcombe, 2015).

Reward learning, attentional capture, and cognitive control

Mike Le Pelley & Daniel Pearson
UNSW
m.lepelley@unsw.edu.au

Recent experiments have demonstrated that reward learning influences the extent to which stimuli capture our attention. We have shown that this pattern of value-modulated attentional capture extends to stimuli that have never been task-relevant. In a visual search task, certain stimuli signalled the magnitude of available reward, but reward delivery was not contingent on responding to those stimuli. Indeed, any attentional capture by these critical distractor stimuli led to omission of the reward that would otherwise have been obtained. Nevertheless, distractors signalling the availability of high reward produced greater attentional capture than those signalling low reward, even though this meant that participants were more likely to miss out on large rewards. Recently, we have demonstrated that this counterproductive pattern of value-modulated attentional capture is immune to cognitive control based on propositional knowledge, in that it persists even if participants are explicitly informed of the omission contingency that results in loss of reward. However, training on the task allows participants to reduce the impact of reward learning on attentional capture, partially but not completely. This distinction between the impact of trained and propositional knowledge suggests a role for associatively-mediated instrumental conditioning in the value-modulated capture effect.

Testing the limits of the Perruchet effect in choice response time tasks

Annabelle Lee Cheong Lem, Evan Livesey, & Justin Harris
University of Sydney
vlee6781@uni.sydney.edu.au

The Perruchet effect is a dissociation between the conscious expectancy of an event and responding to that event. For example, in a go/no go task, participants respond with increasing speed as the number of consecutive go responses increases, despite showing decreasing expectancy of the go responses, consistent with a gambler’s fallacy. Despite being repeatedly demonstrated in conditioning and simple response time tasks, mixed results have been found in the choice version of the Perruchet effect when expectancy is measured concurrently (that is, both expectancy and responding are measured on the same trial). We examined why the dissociation seems to disappear by directly comparing response time on trials on which expectancy is measured to trials on which expectancy is not measured. The results suggest that making an expectancy rating concurrently weakens the Perruchet effect but does not abolish the effect.
Rule and similarity-based generalization in human category learning

Jessica C. Lee \& Evan. J. Livesey
School of Psychology, University of Sydney
jlee4128@uni.sydney.edu.au

After discrimination learning with two simple stimuli that vary on one dimension, animals typically show a pattern of generalization that is peak-shifted when tested on stimuli further along the dimension. In contrast, analogous procedures in humans produce a monotonically increasing gradient of generalization consistent with the formation of a relational rule. Previous studies have shown that whether rule-based generalization (a monotonically increasing gradient) or similarity-based generalization (peak shift) eventuates is determined by whether or not participants can verbalize a relational rule describing the training stimuli. We present evidence of a peak shift despite knowledge of a relational rule, suggesting that participants can learn about rules and physical features of the stimuli simultaneously during training, and that rule- and similarity-based generalization compete for expression on test.

Effects of errors on the storage and retrieval of subsequently studied material

Jack Leggett and Jennifer S. Burt
University of Queensland
jack.leggett@uqconnect.edu.au

More is learnt from a passage of text if learners answer questions about its content before they read it, even if all of their answers are incorrect. We studied the extent and causes of this phenomenon in two experiments with simple materials. In Experiment 1, participants made guesses from hints which were more or less direct, then read corrective feedback, or simply read hints shown with their answers. Except when hints were entirely misleading, guessing before reading led to better recall. More direct hints led to better recall whether learners guessed before reading or not. In Experiment 2, we measured the development of associations between hints, errors and answers. The findings bear on explanations of testing effects and on the effective use of tests and feedback in education.

The thin line between approach and avoidance motivation

Nathan C. Leggett, Nicole A. Thomas, Michael E. R. Nicholls
Flinders University
legg0028@gmail.com

Approach motivation leads to greater left hemisphere activation, whereas an avoidant motivational state activates the right hemisphere. Recent research, which served as the basis for the current experiment, suggests line bisection provides a simple measure of approach/avoidance lateralisation. Findings from the first experiment indicated that the landmark task was sensitive enough to identify lateral asymmetries evoked by happy and angry faces; however, follow-up experiments failed to replicate this finding. When task instructions were slightly modified or when a mixed design was used, motivation did not influence landmark task performance. The use of images in lieu of faces also failed to produce a significant effect. Importantly, a straight replication of the first experiment produced a null result. Line bisection does not appear to be a suitable measure of lateralised approach/avoidance biases, possibly due to the high individual variability inherent in visuospatial biases. Implications for null hypothesis significance testing are also discussed.

The role of the supplementary motor area in beat-based timing

Li-Anne Leow1,2, Jessica A. Grahn2,3;
1 Centre for Sensorimotor Performance, School of Human Movement Studies, The University of Queensland, Australia.
2 The Brain and Mind Institute, Western University, Canada
3 Department of Psychology, Western University, Canada
liann.leow@gmail.com

Introduction: Timing is crucial in cognition and behavior, but our understanding of its neural mechanisms is limited, particularly for sequences of time intervals. Temporal sequences can be represented relative to a recurrent beat (beat-based timing), or as a series of absolute durations (non-beat-based timing). Neuroimaging and neuropsychological work suggests involvement of the basal ganglia, supplementary motor area (SMA), the premotor
cortices, and the cerebellum in beat and non-beat-based timing, however, more causal evidence is needed. Methods. We examined how beat-based timing and non-beat-based timing were affected by increasing or decreasing excitability of the SMA, right cerebellum, and dorsal premotor cortices, using transcranial direct current stimulation (tDCS). Participants completed a verum stimulation session (2mA) and a sham stimulation session, as they discriminated beat rhythms (which can be timed relative to a beat), and nonbeat rhythms (which cannot be timed relative to a beat). Results. Beat-rhythm discrimination was improved by increasing SMA excitability, and impaired by decreasing SMA excitability. This effect was not evident for cerebellar or premotor cortex stimulation. Conclusions. The findings provide causal evidence that basal ganglia and SMA networks play a greater role in beat-based rhythm discrimination than premotor or cerebellar networks.

Perceptual learning of unfamiliar musical pitch systems through short exposure

Yvonne Leung, Roger T. Dean  
MARCS Institute, University of Western Sydney  
y.leung@uws.edu.au

Becoming familiar with a musical pitch system involves learning previously unfamiliar relative pitches and how they are arranged in the system (e.g. recurrent pitch interval ratios). It is postulated that learning would be facilitated if the to-be-learnt system is structurally similar to the familiar 12 tone equal temperament (12-TET) music system. Thirty non-musicians were randomly allocated into an Exposure and a No Exposure group. The Exposure group performed an exposure task that involved detecting a deviant tone in the second playing of the same melody, before a Goodness of Fit (GOF) perception task where they had to rate how well a probe tone fits with a just presented melody. The No Exposure group performed the two tasks in the opposite order. In both tasks, the melodies were generated from either the Western 12-TET music system (Control) or another three unfamiliar systems that varied in their structural similarity to the Control. Results suggested that exposure leads to higher GOF ratings and participants may be able to differentiate the systems, as shown by the systematic difference between their GOF ratings of probe tones from the same pitch system as the melody just heard and probe tones from other pitch systems.

A simple bandwidth model of fine orientation discrimination in visual short-term memory tasks

Simon D. Lilburn, Philip L. Smith, David K. Sewell  
Melbourne School of Psychological Sciences, The University of Melbourne  
lilburns@unimelb.edu.au

Sewell, Lilburn, and Smith (2014) showed that the capacity of visual short-term memory is well-described by a sample-size model. This model, which predicts that the sum of the squared detection sensitivities will be constant for displays of different sizes, implies the existence of an information capacity limit on VSTM, which is independent of any item-capacity limits that might also exist. Sewell et al. used an orthogonal discrimination task, in which discrimination accuracy was limited by stimulus contrast and display noise. In this talk, we generalise their results, using a fine orientation discrimination task in which the orientation difference between members of a stimulus pair were systematically varied. The results are well described by a combination of the sample-size model and a cosine-shaped, orientation-tuned channel model. We discuss our results in relation to other visual memory procedures for assessing the fidelity and precision of VSTM representations.

Anger or happiness superiority? A tale of two procedures

Ottmar V. Lipp, Belinda M. Craig, & Ruth A. Savage  
School of Psychology and Speech Pathology, Curtin University; School of Psychology, University of Queensland  
ottmar.lipp@curtin.edu.au

Differences in the speed of processing emotional expressions are well documented in visual search and categorisation, however, anger seems to be detected faster than happiness in visual search whereas happiness is recognised faster than anger in categorisation. Experiment 1 confirmed this overall pattern of results for the same set of male faces, but there was no relationship between the processing advantages across task. Experiment 2 assessed whether this apparent independence reflected the use of the same face identities as targets and distracters in visual search adding to the demands of the search task. Anger was found faster in visual search regardless of whether the same or
different face identities were used as distracters, but no relationship between the processing advantages emerged across tasks. Experiment 3 replicated Experiment 2 using closed mouth expressions to reduce the impact of expression related perceptual confounds in visual search. The anger superiority effect found in both visual search tasks explained about 10% of the variance in face categorisation. These findings suggest that the opposing processing advantages documented for emotional expressions across different task domains share some variance, but also indicate the presence of considerable process or task specific variance components.

**Yours and Mine: Development of the Concept of Ownership in Children**

Jessica Lister, Samuel Sparks, Virginia Slaughter, Kate Sofronoff, Andrew Bayliss, Ada Kritikos  
*The University of Queensland*  
j.lister@uq.edu.au

The concept of ownership pervades our everyday interactions with objects. Adults show subtle but consistent kinematic differences when interacting with self-owned vs. other-owned objects, drawing self-owned objects towards the body and moving other-owned objects away. This pattern fits within the general concept of embodied cognition. Children begin to attach verbal labels of ownership to objects at about 18 months of age, but it is unclear how or when they show embodiment of ownership. Here, children aged 23 – 35 months were gifted a drink bottle, and returned to the lab after two weeks. They performed a bottle lifting task with both self-owned and experimenter-owned drink bottles. At the point of maximum lift height, children drew the self-owned bottle closer to the self, compared with the experimenter-owned bottle which was lifted further from the self. Additionally, the pattern of these findings was unchanged when pushing and pulling actions were analysed simultaneously with lifting actions, suggesting that children are drawing the self-owned bottle closer to themselves compared with the experimenter-owned bottle, regardless of what type of movement the child is making. These findings demonstrate that the starting point for self- and other-behavioural differences may emerge in line with verbal labels of ownership.

**Deconstructing paired associate learning deficits in children with dyslexia**

Robin Litt, Kate Nation, Nicholas Badcock, Anne Castles  
*ARC Centre of Excellence in Cognition and its Disorders, Macquarie University*  
robin.litt@mq.edu.au

We present a series of experiments investigating the underlying causes of paired associate learning (PAL) deficits in children with dyslexia. Experiment 1 contrasted performance across four PAL mapping conditions (visual-verbal, verbal-verbal, visual-visual, verbal-visual) designed to dissociate crossmodal and verbal demands. In comparison to age-matched controls, children with dyslexia exhibited deficits in visual-verbal and verbal-verbal PAL only, indicating a difficulty with phonological output tasks. A follow-up experiment revealed an item-specific relationship between phonological form learning and later associative learning success on a visual-verbal PAL task; visual-verbal PAL deficits were fully accounted for by a difficulty learning the nonwords used in the task. A third experiment sought to clarify the nature of the phonological form learning deficits identified in the first two experiments by determining whether the difficulty affects both the phonological input and output system, or the phonological output system exclusively. Children with dyslexia and age-matched controls completed two PAL tasks in which phonological distinctiveness and phonological demand (input, output) were manipulated. Children with dyslexia learned at the same rate as controls when the task required phonological input learning, regardless of phonological distinctiveness. However, they performed significantly below controls in both the distinct and confusable tasks when phonological output was required.

**Inference and attention in the Inverse Base-Rate Effect**

Evan Livesey, Hilary Don  
*University of Sydney*  
evan.livesey@sydney.edu.au

The inverse base-rate effect (IBRE) refers to a persistent and seemingly irrational bias in human contingency learning. In a typical IBRE task, one cue compound (AB) predicts a frequent outcome, while another cue compound (AC) predicts an infrequent outcome. When presented with BC at test, participants predict the infrequent outcome, a
choice that opposes the underlying base-rates of the outcomes. The result suggests an increased emphasis placed upon the consequences of the rare predictor C, perhaps due to biases in attention, competitive learning or inferential reasoning. Surprisingly, many of the experimental parameters that may be important for acquiring the IBRE have not been explored. We tested the effects of global outcome frequency, rule exclusivity, and discrete choice at test on the magnitude of the IBRE. In doing so, we found that none of the prominent explanations of the IBRE provide a completely satisfactory explanation for the effect.

Performance and emotional responses in simulation versus tutorial style learning
Jason M. Lodge; Gregor E. Kennedy
Science of Learning Research Centre, University of Melbourne
jason.lodge@unimelb.edu.au

Previous research on the effective use of educational technology suggests that interactive simulations provide a superior learning experience than do traditional didactic approaches. This is particularly so when students use a systematic approach to explore the relationship between simulated variables. What remains unclear is the role emotional responses to the learning process play in students obtaining productive learning outcomes. In this study, students were exposed to either a simulation or tutorial version of an online module about blood alcohol concentration. Participants were tested for their understanding of the material in the module before and after completing it. During the session, they were asked to self-report their emotional responses, level of understanding of the material and the perceived difficulty of the content. Audit trail data were also collected. The results suggest that tutorial versions of the module led to more frustration and confusion, with participants in this condition performing marginally worse in knowledge assessments than those in the simulation condition. These results indicate a complex relationship between emotion and learning that is moderated by the instructional design, familiarity with the material and the learning approach students adopt when exploring interactive learning activities.

Induction of rules during associative learning determines generalisation
Lovibond, P.F., Ahmed, O., Wong, A.H.K. & Hayes, B.
School of Psychology, UNSW
p.lLovibond@unsw.edu.au

Responding on the basis of an observed association between a predictive cue and an important outcome can be seen as a form of induction, since there is no guarantee the association will continue to hold in the future. Similarly, generalising that learning to a cue that is similar to but clearly different from the original trained cue is an inductive leap. In this talk I will describe some recent experiments in both causal judgment and fear conditioning which suggest that generalisation depends critically on the rules or hypotheses that participants induce at the time of learning. These rules are shaped by features of the learning situation such as the nature of the stimulus and the provision of negative instances. However they also appear to be shaped by participant characteristics since there are large individual differences in generalisation gradients, especially when situational information is minimal. The results suggest that an inductive reasoning perspective may help explain generalisation both in the laboratory and in clinical phenomena such as over-generalised anxiety in PTSD.

The sequence matters -- Blink startle potentiation reverses during backward fear conditioning.
Camilla C. Luck & Ottmar V. Lipp
Curtin University
camilla.luck@postgrad.curtin.edu.au

Blink startle potentiation is traditionally considered a measure of fear learning, being larger during a conditional stimulus (CS+) which predicts an aversive unconditional stimulus (US), compared to a conditional stimulus (CS-) presented alone. Startle potentiation is also larger during a CS+ which predicts a non-aversive US, making it unclear whether it reflects on emotional or anticipatory processes. We aimed to separate these processes by assessing blink startle potentiation and rated conditional stimulus valence during forward (CS+ precedes the US) and backward conditioning (US precedes the CS+). Emotional processes are not dependent on the sequence of stimulus presentation, but as anticipatory processes are, startle potentiation during backward conditioning cannot reflect anticipation.
Startle potentiation was larger during CS+ throughout forward conditioning, but smaller during CS+ throughout backward conditioning. As reduced startle potentiation is typically indicative of positive emotion, this reversed pattern of responding during backward conditioning could indicate that the CS+ became pleasant, as it acted as a safety signal indicating the US was over. During both forward and backward conditioning, the CS+ was rated as less pleasant than the CS−, suggesting a possible dissociation between startle modulation and conditional stimulus valence ratings.

Gambling with time: Comparing described and experienced choices about when, rather than whether, an outcome will occur.
Ash Luckman & Ben R. Newell
University of New South Wales
a.luckman@unsw.edu.au

Most research into choices involving both risks and delays focuses on the similarities between the two attributes as impediments to achieving an outcome. Very little research has examined time delays as the outcome of a gamble, despite how common these situations are. We presented participants with gambles, either descriptively or in situations in which outcomes and probabilities were revealed via trial-by-trial sampling. For each gamble the outcome amount was always the same, but there was uncertainty about when the amount would be paid (e.g. An 80% chance of receiving $5 now, else receiving $5 in 4 weeks). In Experiment 1, participants in the description condition seemed to prefer having certainty about when an outcome would occur, if possible, and otherwise chose as if underweighting low probabilities of outcome receipt. However, participants in the sampling conditions showed a reversal of this pattern, with a reduced preference for certainty. Experiment 2 suggested that this reversal was not due to uncertainty about whether all possible outcomes had been observed in the sampling condition. Taken together, the results appear to show that gambling with time (when do I receive payment) is not the same as gambling with risk (whether I receive payment). The implications for understanding the “description-experience gap” in risky and delayed choice are discussed.

DECOMPOSING INTUITION: INFORMATION PROCESSING TYPES MODULATE NON-CONSCIOUS EMOTIONAL BOOST TO DECISION-MAKING.
Galang Lufityanto, Chris Donkin, Joel Pearson
The University of New South Wales (UNSW)
g.lufityanto@unsw.edu.au

The long-held popular notion of intuition, despite lacking strong scientific support, has garnered much attention both academically and conversationally. Here, we employ a novel empirical paradigm, physiological measures and decision models to show that unconscious emotional information can boost accuracy in an emotion-free decision task. Participants were instructed to decide the global direction of a noisy moving dot stimulus, presented simultaneously with suppressed emotional images. The binary emotional valence of the images was contingent with the binary direction of the moving dots. Suppressed intact emotional images boosted decision accuracy and confidence relative to the phase-scrambled version of the same images. Further, a computational model of simple decision-making suggests that sensory and emotional information are integrated into a single stream of evidence to initiate decisions. Together with skin conductance response data, a trend emerged that the boost from emotional information was modulated as a function of decision difficulty. Lastly, by categorizing participants into their informational processing type using a standard psychological scale, we found this effect was only present in a certain group, while others exhibited different trends. This divergence fits well with Dual-Process Theory of Informational Processing.

Human responses to weak visual stimuli reflect single-neuron properties
Gloria Luo-Li, David Alais, Alan W Freeman
The University of Sydney
gluo9518@uni.sydney.edu.au

Aims. The visual contrast-response function in human subjects typically has low gradient at low contrast. The resulting sigmoidal shape is inconsistent with signal detection theory: we wanted to understand the source of this discrepancy. Methods. Visually normal adults were briefly presented with grating patches that had a raised carrier so that each
presentation provided either a luminance increment or decrement. Either the left or right half of the patch was shown and subjects indicated which half was shown. Stimuli were randomly timed, and response correctness and reaction time were recorded. Results. There was a small range of contrasts, centred on zero, in which contrast sensitivity was indistinguishable from zero. Neurons in primary visual cortex have a resting membrane potential below threshold (Tan et al., Nature, 509, 226): we propose that the contrast sensitivity plateau indicates the minimum contrast required to depolarise these neurons to threshold. Further, reaction times at low contrast were shorter for contrast decrements than for increments. This corresponds with recent work showing that off-dominated cortical neurons have shorter latencies than do on-dominated neurons (Komban et al., Neuron, 82, 224). Discussion. Low-contrast measurements reveal behaviour that apparently reflects the properties of single neurons in primary visual cortex.

Uncertainty and predictiveness determine attention to cues: the role of automatic and controlled processes in learnt attentional biases.

David Luque, Tom Beesley, Mike Le Pelley and Miguel A. Vadillo

UNSW Australia
d.luque@unsw.edu.au

Evidence from human causal learning has shown that overt attention to stimuli (eye-gaze dwell time) is determined by both predictiveness and uncertainty (Beesley, Nguyen, Pearson & Le Pelley, in press). Participants in this task spent more time attending to predictive over nonpredictive cues, and in addition more attention was paid to cues within compounds that had an uncertain relationship with outcomes. I will present some recent work that has explored this uncertainty effect by examining the role uncertainty plays in a task that is thought to reflect covert attentional capture (i.e., the dot-probe task; Le Pelley, Vadillo & Luque, 2013). The results will be discussed with respect to the role of automatic and controlled processes in learnt attentional biases.

Tone and vowel processing in young tonal learners

Weiyi Ma, Peng Zhou, Stephen Crain, Liqun Gao

ARC Centre of Excellence in Cognition and its Disorders, Macquarie University

weiyi.ma@mq.edu.au

We examined the processing of tones and vowels in 2- and 3-year-old monolingual speakers of Mandarin, which relies on both vowels and tones to distinguish word identity. Four experiments examined children’s word recognition based on their visual fixation. Experiment 1 examined the influence of tone and vowel variation on learning of novel words. Results showed that tone and vowel variation hindered word recognition efficiency. However, tone variation hindered word recognition accuracy in 2-year-olds but not in 3-year-olds, suggesting a reduced sensitivity to tones in 3-year-olds. Experiments 2-4 focused on 3-year-olds. Experiment 2 replicated this finding of Experiment 1 using familiar words. Experiment 3 showed that 3-year-olds’ tonal representation was not specific to Mandarin. Experiment 4 showed that 3-year-olds could use tones to learn novel words, and that the word learning performance was influenced by the perceptual discriminability of tone pairs. This study is the first to show that despite the importance of tone in Mandarin, vowels still have a primacy over tones in Mandarin-speaking children’s word recognition, and that the primacy of vowel processing emerges around 2 to 3 years of age. Tonal language learners have a functional reorganization of tones at three years of age, featuring reduced tonal sensitivity.

Left lateral prefrontal a-tDCS as an intervention for age-related decline in executive language ability

Madden, D. L., Sale, M. V., & Robinson, G.

University of Queensland
daniel.madden@uqconnect.edu.au

There is demonstrated age-related decline in connected speech production and older adults have reduced executive language abilities. Non-invasive brain stimulation (e.g., transcranial direct current stimulation (tDCS)) is known to benefit verbal fluency and naming, but this has not been extended to generation and selection. This study investigated whether neural stimulation could facilitate executive language abilities such as idea generation in healthy older adults. Twenty-four participants aged 60-80 years were randomly assigned to two independent groups in a 2x2 mixed-design. In the first phase, participants completed language-related generation and selection tasks. Each participant then
completed an alternate version of the tasks in the second phase in conjunction with either sham or active stimulation, depending on their assigned condition. Active stimulation used 1mA anodal tDCS over the left inferior frontal cortex for the task duration (10 minutes). Change in task performance within participants was compared across sham and active stimulation. Participants showed improvement following active stimulation compared to sham. Furthermore, improvements were specific to task conditions involving generation and selection, and not observed in control conditions for which no benefit was predicted. This suggests that non-invasive stimulation can benefit executive language abilities such as idea generation and selection in older individuals.

**Do top-down processes influence involuntary attention in the elderly?**

Yatin Mahajan; Chris Davis; Jeesun Kim

*The MARCS Institute, University of Western Sydney*

*y.mahajan@uws.edu.au*

The efficient processing of target requires irrelevant non-target sounds be ignored. Irrelevant sounds can involuntarily capture attention (auditory distraction). In younger adults, such distraction can be reduced by top-down executive control. The extent to which elderly can employ such mechanism is not known. To answer this, elderly and young adults performed simple visual classification task or a n-back working memory version, during which they heard standard tones (600-Hz) or various novel environmental sounds. Event-related potentials were recorded and the auditory distraction caused by novel sounds was compared for young and elderly as a function of visual classification tasks. Preliminary results show: 1. The distractor sounds in the n-back task caused slower reaction times and higher error-rates in the elderly; 2. Larger attenuation of P3a response (neural indicator of auditory distraction) in the elderly; 3. The MMN (index of change detection) was greater in the elderly. These results suggest, elderly pay more attention to the difficult n-back task than young adults and allocate greater resources to the task resulting in weaker responses to the distracting sound (smaller distraction effect at the neural level). This concentration of resources to guard against distraction may compromise response execution, leading to slower, more erroneous responses.

**Sensitivity to the visual field origin of natural image patches in human low-level visual cortex**

Damien J Mannion

*UNSW*

*d.mannion@unsw.edu.au*

Asymmetries in the response to visual patterns above and below the centre of gaze have been associated with ecological factors relating to the structure of typical visual environments. Here, we investigated whether the content of the upper and lower visual field representations in low-level regions of human visual cortex are specialised for visual patterns that arise from the upper and lower visual fields in natural images. We presented image patches, drawn from above or below the centre of gaze of an observer navigating a natural environment, to either the upper or lower visual fields of human participants (n=7) while we used fMRI to measure the magnitude of evoked activity in the visual areas V1, V2, and V3. We found a significant interaction between the presentation location (upper or lower visual field) and the image patch source location (above or below fixation); the responses to lower visual field presentation were significantly greater for image patches sourced from below than above fixation. This finding demonstrates an association between the representation of the lower visual field in human visual cortex and the structure of the visual input that is likely to be encountered below the centre of gaze.

**Analysis of attentional bias using the Linear Ballistic Accumulator Model**

Amy Manuel, Eva Kemps, Jason S. McCarley

*Flinders University, South Australia*

*amy.manuel@flinders.edu.au*

The Linear Ballistic Accumulator (LBA) model has been proposed as the simplest complete model of choice response time (Brown and Heathcote, 2008). The current study applied the LBA model to data from the dot-probe paradigm, comparing the information garnered with that derived from traditional analysis of mean dot-probe RTs. The dot-probe paradigm has traditionally been used to measure attentional bias toward threatening and negative information, which is often stronger in individuals with anxiety and depression. In the current study, 100 undergraduate students with
differing levels of state anxiety and depression undertook the dot-probe task. Stimuli consisted of faces of differing emotional expressions (happy, angry, sad, neutral). Results showed no evidence of an attentional bias when analysed with either method; however, the LBA model identified that poorer emotion regulation is associated with less efficient cognitive processing and less careful decision making. The current findings suggest that the LBA model is able to discern different underlying cognitive processes in a way that the mean RT analysis measure is unable to do. They further suggest that the LBA model may help to illuminate the mechanisms of successful bias modification programs used in the treatment of anxiety and depression.

A special font for children with dyslexia: Does it work and if so how?

Marinus, Eva; Mostard, Michelle; Segers, Eliane; Madelaine, Alison; Wheldall, Kevin
Macquarie University
eva.marinus@mq.edu.au

A Dutch artist, Christian Boer, has developed a special font (“Dyslexie”) to improve reading performance for children and adults with reading difficulties. The font has received a lot of media attention and schools have started to use it for computerised reading exercises and publishers have started to use the font in books. Interestingly, there is barely any empirical evidence for the efficacy of this font. In this study we examined the effectiveness of Dyslexie font compared to Arial font in 39 low progress readers who were learning to read in English. In contrast to previous studies conducted with Dutch children, we used 1) a within-subject design and 2) three different control conditions (Arial font) in which we systematically matched for absolute font size and varied within and between word spacing. Results showed that the low-progress readers performed better (i.e., read more words per minute) in Dyslexie font than in Arial font matched on absolute letter size. However, when we slightly increased the within-word spacing and between-word spacing, the difference in reading speed was no longer significant. We conclude that there is no need to buy Dyslexie font: changing the spacing settings will do the same trick.

Same shading, different experiences of shape, material, and illumination

Phillip J. Marlow, and Barton L. Anderson
The University of Sydney
phillip.marlow@sydney.edu.au

A recurring theme in studies of surface perception is that the apparent light-reflectance properties of a surface depend on its 3D shape. These effects of shape are compatible with two different views about the nature of the computations and representations that underlie perceived reflectance. Reflectance may be computed from: (1) image properties that vary with both surface reflectance and shape; or (2) higher-order representations of 3D structure that contain explicit information about surface normals, surface curvatures, and related shape properties. Here, we present a series of experiments that manipulate 3D shape without introducing any confounding changes in image cues to surface reflectance. The stimuli hold fixed a surface’s luminance gradients (shading pattern) while varying its perceived 3D shape using texture gradients, parallax, binocular disparity, or a combination of these shape cues. We find that the shape differences depicted by any of these sources can induce striking transformations in the apparent reflectance properties of the surface, which vary from matte to specular. Our results indicate the visual system’s representation of 3D shape is used to derive surface reflectance, which suggests models of material perception should be formulated in terms of 3D shape coordinates, not just 2D image coordinates.

Things we know we know: situation awareness and metacognition

Ken McAnally, Adam Morris, Chris Best
Defence Science and Technology Organisation & Monash University
ken.mcanally@dsto.defence.gov.au

Operators in many safety-critical roles (e.g., air traffic control) are required to monitor and retain information presented on their visual displays. Observers’ knowledge of that information (i.e., their situation awareness, SA) was assessed by measuring their ability to detect changes to representative tactical displays. In many roles, operators must self-regulate their study of their displays on the basis of self-assessments of their knowledge (i.e., their metacognition). Observers’ metacognition was assessed by asking them to estimate on each trial the probability that
they had correctly detected a change to the display. Observers failed to detect some changes to the display, indicating limited knowledge, but confidence was reasonably well calibrated to objective performance. A signal detection analysis revealed that meta $d'$ was close to type-1 $d'$, suggesting good metacognitive sensitivity given their type-1 sensitivity. In summary, observers had limited knowledge of the tactical information, but good insight about their level of knowledge.

**The reliability of sight word training and phonics training in poor readers: A randomised controlled trial**

Genevieve M McArthur, Saskia Kohnen, Kristy Jones, Pip Eve, Erin Banales, Linda Larsen, Anne Castles

*Macquarie University*
genevieve.mcarthur@mq.edu.au

Given the importance of effective treatments for children with reading impairment, paired with growing concern about the lack of scientific replication in psychological science, the aim of this study was to replicate a quasi-randomised trial of sight word and phonics training using a randomized controlled trial (RCT) design. One group of poor readers ($N = 41$) did 8 weeks of phonics training (i.e., phonological decoding) and then 8 weeks of sight word training (i.e., whole-word recognition). A second group did the reverse order of training. Both sight word training and phonics training had large and significant valid treatment effects on trained irregular words, untrained irregular words, and word reading fluency. In addition, phonics training had a large and significant valid treatment effect on reading comprehension. These findings demonstrate the reliability of both phonics and sight word training in treating poor readers in an era where the importance of scientific reliability is under close scrutiny.

**Workload Capacity Analysis of Human-Automation Interaction in a Speeded Task**

Jason S. McCarley, Yusuke Yamani, & Christopher D. Morley

*Flinders University; Old Dominion University; Old Dominion University*

[jason.mccarley@flinders.edu.au](mailto:jason.mccarley@flinders.edu.au)

Although response accuracy and related measures are often used to measure the influence of an automated decision aid on human performance, aids can also influence response speed. Mean response times, however, conflate the influence of the human operator and the automated aid on team performance, and may mask changes in the operator’s performance strategy under aided conditions. The present study used measures of parallel processing efficiency, or workload capacity, to gauge human-automation performance in a speeded task. Participants performed a speeded visual search task with and without the assistance of an automated aid. RT distributions were used to calculate two variants of a workload capacity measure, $C(t)$OR and $C(t)$AND. Capacity measures revealed that a cue from the aid speeded human participants’ responses, and that participants did not moderate their own search times in anticipation of diagnoses from the aid. However, participants’ strategy of interacting with the aid varied with the shape of the aid’s RT distribution, even when holding the aid’s mean RT constant. Results indicate that capacity analysis can illuminate patterns of human-automation interaction.

**Vibrotactile frequency perception reveals spatial limits of temporal phase integration**

McIntyre, S., Andersson, R., Dicander, G., Vickery, R. M., Birznieks, I.

*Neuroscience Research Australia, University of Western Sydney, Linköping University, UNSW Australia*

[s.mcintyre@uws.edu.au](mailto:s.mcintyre@uws.edu.au)

Background: Tactile afferent responses vary in latency and conduction velocity, producing phase shifts between their inputs to the central nervous system. To investigate how integration of these phase-shifted inputs influenced perceived frequency, we conducted a psychophysical study using spatially separated, out-of-phase vibrations.

Methods: Two probes vibrating at 25Hz, 180° out of phase, were tested on both glabrous and hairy skin at separations of 1 – 16cm, and on glabrous skin at amplitudes 10 - 120µm. Participants made a two-interval forced choice about the frequency compared with in-phase vibration (18 - 54Hz). Results: Perceived frequency of the out-of-phase probes was close to double the in-phase frequency at 1cm separation (mean $= 43.9$Hz, $p < 0.001$), and reduced with increasing separation ($p < 0.001$). Skin type did not have a significant effect ($p = 0.087$). Amplitude changes between 40 and 120µm had a significant, but minimal effect ($p = 0.007$, η-squared(G) = 0.06). Conclusion: Perceived frequency is insensitive to skin type and amplitude, while phase information is preserved at separations beyond the receptive field.
sizes of primary afferents. This suggests a central mechanism for integration of temporal phase that is subject to spatial limits.

Summary Statistics in the Attentional Blink: is Attention involved in Mean Estimation?
Nicolas A. McNair, Lauren T. Shone, & Irina M. Harris
School of Psychology, University of Sydney
nicolas.mcnair@sydney.edu.au

The estimation of statistical properties of groups of visual objects has emerged as a plausible mechanism for compressing the vast volume of incoming sensory information. As such it has been argued to represent a fundamental aspect of visual processing, akin to low-level processes such as texture perception, and said to be ‘automatic’ and ‘pre-attentive’. However, some recent research has indicated that mean estimation is at the very least modulated by late-stage processes. Here we use the attentional blink (AB) paradigm to examine the degree to which attention and working memory are involved in the representation of such statistical properties. When participants are required to estimate the mean emotional expression of a group of faces their precision is degraded when the faces are presented during the AB. Our results suggest that attention is required to provide a precise estimation of the mean.

Assessment of Fidelity in Virtual Reality using Human Postural Reflexes
R.J. Menzies1, S. Rogers1, A.M. Phillips1, F.A.J. Verstraten1, C. de Waele2, E. Chiarovano2, I. Curthoys1, H. MacDougall1.
1University of Sydney, Australia, 2Centre d’Études de la Sensorimotricite, France
rmen9752@uni.sydney.edu.au

Despite the decades of development of virtual reality technologies and its recent renaissance, there is little of understanding of their visual fidelity. In order to assess and compare different visual conditions, in particular virtual reality equipment and natural vision (eyes open and closed), we used postural reflexes as an objective measure of the visual fidelity. The experiment was run with simple headsets and the more recent products of Oculus Rift, the DK1, DK2 and Samsung Gear. Subjects were tested for their ability to maintain a stable centre of gravity using visual feedback provided by the various headsets while standing feet together on the Wii Balance Board, covered by an Airex Balance Pad to impair sensory input provided by the feet. Posture during eyes open and closed was also tested to provide a comparison of high and low fidelity, respectively. We were thereby able to provide a physiological measure of virtual reality fidelity and distribute the stimuli on a continuum. This has important significance in virtual reality usability, including recreation, training and research.

Training reduces the functional size of the human physiological blind-spot.
Paul Anthony Miller and Derek Henry Arnold
The University of Queensland
paul.miller@uqconnect.edu.au

Many people suffer from localised regions of blindness due to damage to components of their visual system. To date there are no proven interventions to reduce the extent of localised blindness in these circumstances, but it has been suggested this might be achieved through visual training. By training, neurons with receptive fields that abut, or overlap a region of visual impairment might become more responsive, enhancing sensitivity to weak signals that originate primarily from within a functionally-defined region of blindness. According to this rationale, one could shrink the physiological blind spot – a zone of functional blindness that sighted humans have in each eye – by improving sensitivity at its boundary. Here we show, that the functional size of the physiological blind spot can indeed be shrunk through motion direction discrimination training at its periphery. We found that this training improved sensitivity to both direction and colour signals. Training on one blind spot, however, did not transfer the blind spot in the untrained eye. Nor could training benefits be attributed to eye movements, which were monitored to ensure stable fixation. Our data establish the validity of using training to improve visual sensitivity in order to shrink regions of localised functional blindness.
The Role of Expectancy on Caffeine Withdrawal

Llew Mills & Ben Colagiuri
University of Sydney
llew.mills@sydney.edu.au

That expectancies of drug effects can cause positive clinical outcomes even in the absence of an active drug is well established, however the role of expectancies in drug withdrawal symptoms has received little attention. 80 moderate to severe coffee drinkers (≥3 cups of coffee per day) were sent a Participant Information Statement (PIS) prior to testing. Half of these PISs contained a verbal prime suggesting that regular caffeine consumers who abstain from caffeine are likely to experience withdrawal symptoms and these withdrawal symptoms were listed while the other half contained no prime. Upon arrival to the test session all participants were given a caffeine withdrawal questionnaire. Following this questionnaire all participants were given decaffeinated coffee, however half participants were led to believe the coffee was caffeinated and half were told truthfully it was caffeinated. After coffee another withdrawal-symptom questionnaire was administered. There was no difference between groups in pre-beverage caffeine withdrawal scores due to the verbal prime. Participants who were led to believe they had consumed caffeinated coffee reported a significantly greater reduction in caffeine withdrawal symptoms than those who were told the coffee was decaffeinated, suggesting a placebo withdrawal-alleviation effect. This result has implications in addiction interventions.

Temporal Anticipation and Adaptation with a Tempo Changing Adaptive Metronome.

Peta F. Mills and Peter E. Keller
The MARCS Institute, University of Western Sydney.
p.mills@uws.edu.au

Rhythmic interpersonal coordination (e.g. musical ensemble performance) requires individuals to both anticipate and adapt to each other’s movement. These anticipatory and adaptive processes have traditionally been studied separately using sensorimotor synchronisation tasks that require participants to tap in time with an auditory pacing sequence. Temporal anticipation has been studied using tempo-changing sequences, whereas temporal adaptation has been investigated using adaptive pacing sequences that modulate their timing based on a participant’s performance. During real-world performance, however, anticipatory and adaptive processes occur concurrently. The present study assessed these two processes simultaneously by employing a drumming task where participants (N = 18) drummed in time with a tempo changing pacing sequence that also implemented an adaptive function. Anticipation was measured by calculating a prediction index while adaptive ability was measured by estimating the degree of temporal error (phase and period) correction that participants employed. As expected, sensorimotor synchronisation precision and accuracy were significantly improved with the adaptive pacing sequences. Furthermore, participants engaged in less prediction, and less phase and period correction when the pacing sequence was more adaptive. This indicates that in order to maximize synchronisation accuracy and precision, individuals modulate their performance depending on how adaptive their synchronisation partner is.

Aospan: Maximising its utility in memory research.

Kevin J Minotti and Mitchell G Longstaff
Southern Cross University
kevin.minotti@scu.edu.au

Working memory capacity (WMC) and its measurement are key elements in much research in learning and memory. A decade since Nash Unsworth and his colleagues (Unsworth, Heitz, Schrock, & Engle, 2005) developed the automated Operation Span test of WMC (Aospan) and made it freely available to other researchers it is appropriate to review its use and consider ways in which its efficacy may be maintained and improved. The ease of use for both researchers and participants combined with standardised computerised administration and scoring of the Aospan not only saves time and money but also reduces the risk of measurement error. Unfortunately, there are a number of issues in its current use that are undermining its effectiveness. These include the failure of many researchers to undertake and report appropriate reliability measures of their individual samples, failure to clearly state which score is used and how it was calculated, failure to provide descriptive statistics so that appropriate comparisons can be made with other studies as well as the failure to outline (and explain/justify) the manner in which participants are grouped into high and low WMC categories.
Reliability: The neglected issue in psychological testing
Kevin Minotti & Dr Mitchell G Longstaff
Southern Cross University
kevin.minotti@scu.edu.au

Generalised psychometric tests are a mainstay of modern psychological research. They are generally quick and easy to administer and score, enabling researchers to direct their energies and resources to the substantive issues of their research. Unfortunately, researchers frequently ignore the basic psychometric property of the reliability of the tests used to measure their variables. Too often researchers either overlook or fail to recognise that reliability is an issue that needs to be addressed in every sample and not something that can be imported from the relevant manual or previous research. Reliability goes to the very heart of detecting, measuring and interpreting any effect of various independent variables on the variables of interest in individual research. Failure to consider the reliability of measures used in the research may lead to misleading and erroneous conclusions. Here we conduct an experiment using two very commonly used psychometric tests, the STAI-Y and the Aospan, and examine the issue of reliability in detail showing how easy it is to calculate the appropriate reliability coefficients.

Are those all pictures of the same person? The influence of experience on recognizing identity despite natural variation in appearance.
Catherine J. Mondloch, Sarah Laurence, Xiaomei Zhou
Brock University, Canada
cmondloch@brocku.ca

Recognizing a person’s identity across images that incorporate natural variation in appearance (e.g., changes in hairstyle, lighting, or viewpoint) is a trivial problem for familiar, but not unfamiliar identities. When sorting 40 photographs (20 pictures of each of two people) based on identity, adults make two piles (the correct solution) for familiar faces but about seven piles (i.e., perceive about seven identities) for unfamiliar faces (Jenkins et. al., 2011). Whereas Jenkins showed the influence of experience with a particular face, we examined the influence of experience with a face category. In Experiment 1, Caucasian and East Asian adults made more piles when sorting other-race faces than own-race faces but only when unfamiliar with the identities being sorted and even after 1 year of intensive experience with other-race faces. In Experiment 2, we examined the development of this ability in children 4 to 11 years of age. Sorting familiar faces was adult-like by age 6, whereas sorting unfamiliar faces continued to improve across this age range. These results have implications for models of face representation and its development and practical implications for the utility of photo identification.

How do we separate intrinsic scene properties from optical properties of our eyes?
Scott W.J. Mooney and Barton L. Anderson
University of Sydney
scott.mooney@sydney.edu.au

A retinal image of a scene depends on both the physical attributes of visible surfaces and the focal properties of the eye’s lens. Introducing ‘defocus’ blur into an image can induce illusory changes in the apparent depth and scale of the depicted scene (the tilt-shift effect), but previous research has not investigated the visual system’s ability to separate defocus blur from its perception of intrinsic surface properties such as shape and material. Here, we show that defocus blur can actually be misattributed to illusory distortions in perceived surface gloss and shape, and identify conditions that predict when this effect will occur. We manipulated depth of field and focal length in images of surfaces varying in relief and specular reflectance, and measured differences in perceived shape, gloss, and focus. We found larger changes in perceived shape and gloss, and smaller changes in perceived focus, for depth of field manipulations that preserved the appearance of sharp shape contours in the image, rather than blurring them. Our results suggest that the visual system is more likely to attribute image blur to defocus, and consequently discount that blur from estimations of physical surface attributes, when it does not resemble shading gradients or specular reflections.
Contingency degradation in humans: competing for value in causal learning

Richard W. Morris  
UNSW  
rwmorris@unsw.edu.au

Learning the causal effects of our actions is essential for goal-directed behaviour. Distinguishing outcomes which are contingent on our actions from non-contingent outcomes is critical for this causal learning and depends on functionally segregated cortico-striatal loops. Multiple studies have shown non-contingent rewards reduce causal judgments in humans, however the neural computations which detect the action-outcome relationship are unknown. Here we modelled goal-directed choices while participants learned the causal value of their actions in a concurrent 2-choice free-response task while undergoing fMRI. We found non-contingent outcomes reduced goal-directed choices and causal judgments. A model in which the background context competed with actions for predictive value (cf. Rescorla & Wagner, 1972) explained choices better than other rational models. Consistent with this, signalling non-contingent outcomes restored goal-directed choices as well as causal judgments. Finally, contextual prediction-errors were distinguished from action prediction-errors in a distinct cortico-striato-thalamo circuit. The results suggest that actions must compete with other background cues for predictive-value during causal learning, in a manner consistent with associative cue-competition models.

Closer to the heart: Emotion-induced blindness reflects post-input attentional competition

Steven B. Most  
The University of New South Wales  
s.most@unsw.edu.au

Emotional stimuli grab attention to such a degree that they can “blind” people to other visual items, a phenomenon known as emotion-induced blindness (EIB). Whereas most studies of emotion-driven attentional biases focus on spatial attention, evidence suggests that EIB is distinct in stemming from spatiotemporal competition between emotional and non-emotional representations at a “post-input” stage of processing – after both representations have been registered by the visual system. In contrast to selection based on spatial location, the outcome of post-input competition depends on how people turn up (or down) the gain on perceptual representations that have already been encoded. Here, I discuss key evidence in support of a post-input locus of competition in emotion-induced blindness. An intriguing possibility is that whereas spatial attention mechanisms are the focus of most research on emotion-driven attentional biases, competition at the post-input stage may be more closely related to processes that gate higher-order thought. If so, then existing efforts to modify attentional biases as a form of anxiety intervention might benefit from targeting post-input competition.

Stroop and Emotional Stroop effects in media multitaskers

Karen Murphy  
Applied Cognitive Neuroscience Unit, Behavioural Basis of Health, Menzies Health Institute Queensland and the School of Applied Psychology, Gold Coast campus, Griffith University, Australia 4222.  
k.murphy@griffith.edu.au

Media multitasking refers to the simultaneous use of at least two types of media. Studies have shown that high levels of media multitasking are linked with reduced distractor filtering and task switching abilities and poorer attentional control. This study extends this research by examining the impact of media multitasking habits on performance in the Stroop and Emotional Stroop tasks. Participants (n =153) completed the Media Multitasking Inventory (MMI Ophir et al., 2009). Three sub-groups of 30 media users were then classified according to their self-reported media multitasking: low, average and high media multitaskers. These participants completed a button press Stroop and Emotional Stroop task. Colour identification RTs for the Stroop trials revealed facilitation and interference effects for the average and high media multitasking groups and only an interference effect for the low media multitaskers. For the Emotional Stroop trials the average media multitaskers had shorter colour identification RTs for the positive compared to neutral and negative conditions. There was no difference in RTs across emotion conditions for the low and high media multitaskers. These results suggest that differences in attentional and emotional processing are linked to media multitasking habits. Possible explanations for these different outcomes will be discussed.
Temporal dynamics of motor cortex excitability for task relevant and irrelevant information in the Simon task

Manjunath Narra, Shahd Al-Janabi, Paul F. Sowman, Matthew Finkbeiner

Macquarie University, Australia
manjunath.narra@students.mq.edu.au

In the Simon task, studies have investigated motor cortex excitability for task-irrelevant information over the responding and non-responding effector. The main objective of the present study was to explore the temporal dynamics of motor cortex excitability for task relevant and irrelevant information simultaneously over responding and non-responding effectors in a Simon task. We recorded motor evoked potentials from the responding and non-responding effectors (right hand index and pinky fingers) as participants completed the Simon task. The single-pulse TMS was delivered over left motor cortex at 4 different SOAs (50ms, 100ms, 150ms, 200ms) relative to target onset. At 150ms the MEP amplitudes were reliably greater in both the responding effector on compatible trials and the non-responding effector on incompatible trials. In contrast, at 200ms, the MEP amplitudes in the non-responding effector on incompatible trials had returned to baseline levels. The MEPS in the responding effector on compatible trials were reliably greater than baseline at 200ms. These results suggest that task-irrelevant information is activated very early on (150ms) but then it rapidly decays, giving way to the activation by task-relevant attributes at 200ms. These results are consistent with accounts of the Simon effect that posit decay or inhibition of task-irrelevant information.

Contextual diversity, not frequency, predicts children’s word reading accuracy: evidence from a corpus study

Kate Nation & Bram Vandekerckhove
University of Oxford, UK
kate.nation@psy.ox.ac.uk

Frequency is a strong item-level predictor of reading aloud performance and it features in most theoretical accounts of word reading and its development. Frequency (the number of times a word occurs in a corpus) is highly correlated with the contextual diversity of those encounters, with higher frequency words being associated with encounters that are more contextually and semantically diverse. Using a large corpus of children’s written language, we computed contextual diversity for items appearing in the Diagnostic Test of Word Reading Processes (comprising 30 regular words and 30 irregular words) for which we had reading aloud data from 350 children aged 6-13 years. Contextual diversity predicted reading success beyond frequency. In contrast, frequency did not predict reading success beyond contextual diversity. These findings suggest that (a) frequency effects may be a consequence of contextual diversity and (b) the linguistic environment in which children encounter words during their reading experience serves to shape orthographic development, with words encountered in more diverse semantic contexts enjoying a processing advantage, even in isolated word tasks such as reading aloud.

Non-symbolic number SNARC effect is independent of response modality

Fiona Nemeh (fnemeh@student.unimelb.edu.au), School of Psychological Sciences, University of Melbourne
Mark J. Yates (mjiyates@unimelb.edu.au), School of Psychological Sciences, University of Melbourne
University of Melbourne
f.nemeh@student.unimelb.edu.au

The ‘SNARC’ (Spatial Numerical Association of Response Codes) effect refers to the finding that speeded decisions about numbers – e.g. is the number ‘3’ odd or even? – are made more quickly with the left hand for (relatively) smaller numbers and with the right hand for larger numbers. Subsequent research demonstrated analogous effects when judgements were indicated via foot pedal responses or leftward/rightward saccades, demonstrating that the SNARC effect is independent of effector modality. Previous work by our group has revealed a SNARC effect for non-symbolic numbers – i.e. participants were presented with two dot cloud stimuli in sequence and asked to judge whether the second stimulus contained more or less dots than the first, faster responses were obtained when ‘less’ responses were assigned to the left hand and ‘more’ responses to the right hand compared to the alternative response assignment. Here, we extend this finding, showing that the non-symbolic number SNARC effect can also be observed for foot pedal responses. We conclude that the non-symbolic number SNARC effect is also independent of response modality. However, the effect for foot pedal responses was not as robust as that for manual responses.
The role of similarity in coding ensemble identity of face groups

Markus F. Neumann, Francesca de Bonis, Gillian Rhodes, and Romina Palermo

*ARC Centre of Excellence in Cognition and its Disorders, School of Psychology, The University of Western Australia*  
markus.neumann@uwa.edu.au

When people see a group of faces, they tend to code the average property, such as the mean identity. In fact, participants sometimes extract this ensemble representation rather than the individual identities, suggesting that coding an ensemble might be the “default mode” when processing groups of faces. Here, we tested whether the similarity of faces in the group affects when ensemble identity is coded. Participants viewed groups of four faces, followed by a set average (blends between group identities) or an individual exemplar, and indicated whether this was a member of the group or not. Our results showed that for sets of dissimilar faces, participants more frequently endorsed individual exemplars than set averages as members. For similar faces, participants endorsed set averages more frequently than exemplars. However, this set average advantage was attenuated when the design was modified, such that participants had to directly indicate their preference by selecting between the set average and the exemplar. In sum, there was no ensemble advantage for easily distinguishable faces, and even for very similar faces, the ensemble advantage was not as robust as expected, suggesting that ensemble representations may not be the default mode to code identity of face groups.

Cultural influences on perception and memory of emotional stimuli

Newman, Bryant and Liddell

*University of New South Wales*  
v.newman@unsw.edu.au

Emotion significantly modulates attention and memory processes, facilitating an automatic bias toward the more salient and focal aspects of an image. This automatic attentional bias enhances memory for centralised aspects of the image, often to the detriment of peripheral details. Accumulating research also indicates that cultural factors, including individualistic or collectivistic self-construal, significantly influence attention, perception and memory mechanisms. However, relatively little is known about how emotion and culture interact. This study aimed to examine the impact of primed self-construal on attention allocation, measured by eye-tracking, and subsequent memory for negatively valenced composite visual scenes comprised of a face overlaid on a background car image. Whilst primed self-construal did not significantly impact attention or memory, trait levels of individualism did account for a significant amount of variability in attention allocation to centralised components of negatively valenced stimuli. Additionally, trait collectivism accounted for a significant amount of variability in memory for peripheral aspects of neutral scenes. These findings lend support for a corresponding dissociation of the impact of self-construal on automatic and cognitively-mediated processes, and highlight the importance of considering cultural influences on perception and memory. The assumption of universality in information processing and current conceptualisations of culture are also implicated.

Encoding and capacity limits of visual working memory are not set by stimulus complexity

William X Q Ngiam, Patrick T Goodbourn

*The University of Sydney*  
wngi5916@uni.sydney.edu.au

Visual working memory (VWM) is limited in both the capacity of information it can hold and the rate at which it can encode that information. We examined the influence of stimulus complexity on these two limitations of VWM. Observers performed a change-detection task with alphabets differing in average perimetric complexity (κ), an objective estimate of the number of visual features contained within each letter. By varying the time between the memory array and mask, we estimated the number of items held in VWM (K) as a function of encoding time. For all alphabets, the number of items increased approximately linearly over 270 ms before reaching asymptote. Rate and capacity did not vary according to stimulus complexity: Performance was best modelled by assuming that rate and capacity were limited in terms of number of items (K), rather than number of features (K × κ). However, we found a higher encoding rate and capacity for familiar versus unfamiliar alphabets. We conclude that rate and capacity are determined primarily by (i) familiarity with memoranda, and (ii) similarity between memoranda. We argue that VWM encoding is not limited by the temporal constraints of feature integration, and that items are stored as integrated objects.
The use of intuitive causal models in probabilistic judgment tasks.

Jeremy Ngo & Brett K. Hayes  
*University of New South Wales*  
jeremy.ngo@unsw.edu.au

Previous studies have found that causal framing in probabilistic judgment tasks (e.g. providing a causal explanation for false positives) improves judgment accuracy. Krynski and Tenenbaum (2007) suggested that this ‘causal facilitation’ was due to the construction of a more coherent causal model of the problem, leading to more normative Bayesian reasoning. The current experimental series aimed to test this causal Bayesian account. In two experiments, either ‘standard’ or ‘causal’ versions of the mammogram problem, adapted from Krynski and Tenenbaum (2007), were administered on-line to 502 participants. In each condition we also manipulated the level of detail provided about the underlying problem structure by the provision of structural diagrams. Across experiments we replicated the causal facilitation effect. Presentation of a structural diagram improved judgment performance to a greater extent in the standard framing condition compared to the causal framing conditions. These results are consistent with the causal Bayesian account but alternative explanations will be discussed.

Near but not far surround suppression in parafoveal vision is decreased in older adults

Bao N Nguyen and Allison M McKendrick  
*Department of Optometry and Vision Sciences, The University of Melbourne*  
bnguyen@unimelb.edu.au

A recent study (Shushruth et al J Neurosci 2013;33:106-119) demonstrated that human perceptual contrast suppression mirrors macaque V1 single-cell responses when parafoveal stimuli are surrounded by spatially non-overlapping annuli: the ‘near’ and ‘far’ surrounds. Convergent neurophysiological evidence suggests that multiple sources contribute to near surround suppression (LGN, V1, extrastriate cortex), whereas far surround suppression arises exclusively from extrastriate feedback. This information may help determine the likely anatomical underpinnings of increased surround suppression consistently reported foveally in older observers. Here, we measured near and far surround effects on the perceived contrast of a horizontal grating target (1 cyc/deg, 2° diameter, 6° eccentricity) in 19 younger (aged 24-35) and 18 older (aged 62-78) observers using a discrimination task. Near (group difference: p=0.01) but not far surround suppression (p=0.81) was affected by age. In a subgroup (10 younger, 9 older), older observers showed less suppression parafoveally but more suppression foveally (group x eccentricity: p=0.01). Foveal suppression did not predict parafoveal suppression (Spearman r=0.05, p=0.38). These perceptual findings, considered analogues of neuronal centre-surround interactions, suggest that extrastriate feedback contributions to far surround suppression are unaffected by normal ageing. Furthermore, the measured effects of ageing on contextual processing differ between central and peripheral viewing.

Constant velocity bias in perception of tactile motion

Elizabeth Nguyen, Janet L. Taylor, Jack Brooks, and Tatjana Seizova-Cajic  
*The University of Sydney*  
elizabeth.nguyen@sydney.edu.au

In sensory saltation (cutaneous rabbit effect), quick, successive stimulation of two remote skin patches leads to gross underestimation of distance between them (Geldard, 1972), as if the object has moved at a lower speed. A low-speed prior has been proposed to explain the illusion (Goldreich, 2013). We asked if the illusion is modulated by the context, in particular by the velocity of motion felt along the same motion path. We moved a brush up and down the forearm at 7.5, 15 and 30cm s⁻¹, with a 10cm gap in the middle of the motion path. Gap traverse time was equal in all conditions; 100ms (thus traverse velocity was 100cm s⁻¹, mimicking the rabbit stimulus). The brush stopped at several locations during the brushing, and participants pointed to its felt location. Distance between responses on the two sides of the gap was underestimated at all speeds, consistent with the cutaneous rabbit effect. However, the effect scaled with speed (response distance was 54, 65 and 75mm for 7.5, 15 and 30cm s⁻¹ speeds, respectively (F(1,12) = 30.35, p < 0.0001)), suggesting a constant velocity constraint: when object velocity is known, spatial and/or temporal percepts are biased to minimise deviations from it.
Liking Asians influences perception of Asian-accented vowels.

Nhung Nguyen, Jason Shaw, Michael Tyler, Rebecca Pinkus, Catherine Best
The MARCS Institute, University of Western Sydney
nhung.nguyen@uws.edu.au

Previous studies have shown that speech perception can change in association with cognitive beliefs about the speaker, but little is known about affective attitudes in speech perception. In our study, we investigated how affective attitudes towards Asians relate to the perception of Vietnamese-accented vowels by native Australian English listeners. Affective attitudes were assessed with the Scale of Anti-Asian American Stereotypes, modified for the Australian context, and vowel categorisation was tested. Regression results show that the degree of dislike towards Asians negatively correlates with listeners’ accuracy in vowel categorization. To our knowledge, this is the first demonstration that affective attitudes towards a group are associated with speech perception behaviour. We also found that participants who indicated on the survey that they had tried Vietnamese cuisine categorized the Vietnamese-accented vowels significantly more accurately than those who had not. These results are discussed in the context of exemplar models and resource models of self-regulation and executive control.

Asymmetries for searching within an array

Mike Nicholls, Amelia Hobson & Owen Churches
Flinders University
mike.nicholls@flinders.edu.au

When asked to indicate the midpoint of a horizontal line, most people perceive the midpoint slightly to the left of true centre. This mis-bisection is thought to reflect a bias of attention towards the left hemispace, also known as pseudoneglect. While pseudoneglect is commonly explored with tasks such as line bisection, it has not been applied to other common attentional tasks. The current study explored whether targets on the left side of an array are detected better during a search task. Participants (n=24) searched a 60-item array for an inverted triangle. To investigate the effect of overt eye movements, the arrays were presented for either 200 or 4000ms. Targets on the left side were detected more accurately and faster than targets on the right for long presentations, but not for short presentations. The possible contribution of asymmetries in attention or reading habits is discussed.

Eye movement patterns mirror variability in acoustic cue distribution patterns: effects of cue informativity and statistical noise during Cantonese segment and tone perception

Jessie Nixon, Jacolien van Rij, Peggy Mok, Harald Baayen & Yiya Chen
MARCS Institute, University of Western Sydney
jess.s.nixon@gmail.com

Determining a speaker’s message requires discrimination between discrete alternatives based on inherently noisy, non-discrete acoustic cues. But little is known about how changes in the amount of variation affect perceptual processing. Two ‘visual world’ eyetracking experiments investigated how the degree of within-category acoustic variation affects Cantonese listeners’ perception of sound contrasts. Participants saw pictures of word pairs that were identical except for initial consonants (Experiment 1: unaspirated bou2, ‘treasure’; aspirated pou2 ‘shop’) or tones (Experiment 2: high (jin1, ‘carpet’; mid jin3, ‘arrow’). Auditory stimuli were continua of increasing VOT (Experiment 1) or pitch (Experiment 2) presented in bimodal distributions. Amount of acoustic variation varied between conditions: high-variance versus low-variance. Fixations on the clicked object were analysed using non-linear mixed modelling (GAMM). In low-variance conditions, late fixations reflected the shape of the cue distribution - differential eye movement patterns for category means, category boundaries, peripheries. In contrast, in high-variance conditions, eye movement behaviour was much flatter – i.e., there was a smaller effect of VOT/pitch value. This indicates listeners are highly sensitive to the discriminative value of acoustic cues. The degree to which a cue dimension is utilised depends on its variance. This has implications for both acquisition and native speech processing.
Automatic activation of context-specific speech variants in lexical tone processing: a non-linear mixed effects model of ERPs

Jessie Nixon, Jacolien van Rij, Xiaqing Li & Yiya Chen
MARCS Institute, University of Western Sydney
jess.s.nixon@gmail.com

Production of speech sounds varies systematically depending on phonetic context. But the neural and cognitive processes involved in producing such variation are not known. To investigate, ERPs were recorded from 24 Beijing Mandarin native speakers as they read aloud words preceded by a brief (48 ms) masked prime. Mandarin Tone 3 (T3) has two variants: low (low T3) and rising (sandhi). The sandhi contour is similar to another tone, Tone 2 (T2). We investigated whether naming of T2 targets was facilitated by matching rising contour, but mismatching tone category (contour-match; sandhi primes), compared to a mismatch in both (mismatch; low-T3 primes). The initial character of the prime was identical between prime conditions. Only the context provided by the following character differed between conditions. Data were analysed using non-linear mixed effects modelling (GAMM) in R. Full random effects structure for subjects and items, and prime and target frequency were included. Results showed ERP amplitude depended on the interaction between prime frequency and target frequency, but only in the contour-match condition. This indicates a) even briefly presented masked primes are processed in their context-specific phonetic form, b) cross-category priming: phonetic similarity influenced processing, even though prime and target were different tone categories.

Integrating and segregating self and other during dynamical interpersonal coordination. Evidence from a dual-EEG study with piano duos.

Giacomo Novembre, Daniela Sammler, Peter E. Keller
The MARCS Institute, University of Western Sydney, Australia & Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany.
g.novembre@uws.edu.au

Interpersonal shared knowledge and coordination are prerequisites for most forms of social-collaborative behavior. However, cognitive vs. dynamical approaches to joint action have confined these capacities to separate constructs such as co-representation and self-other entrainment. Here we used a musical joint action paradigm to show that co-representation and self-other entrainment rely on a shared neural process – indexed by EEG alpha oscillations – regulating the balance between self-other integration and segregation in real time. Pairs of pianists performed short musical items while reciprocal action familiarity and interpersonal synchronization accuracy were manipulated within a 2x2 factorial design. Enhancing both action familiarity and self-other synchronization led to an external focus on others’ actions during co-representation, resulting in higher self-other integration, as indexed by alpha suppression over right-centro-posterior brain regions. Conversely, action familiarity in conjunction with weaker self-other synchronization encouraged greater reliance on internal knowledge and thus led to self-other segregation, indexed by alpha enhancement. These findings illuminate a gating function played by alpha oscillations in coordinating the processing of information about self and other depending on the compatibility of internal (knowledge) and external (environmental) information. Alpha oscillations thus provide a common neurophysiological ground upon which dynamical and cognitive approaches to social-collaborative behavior may be linked.

Motion aftereffects for car-following scenes: the role of visual motion sensitivity

Nye, Isobel Louisa; Lacherez, Philippe; Lay, Doris; Carrol, Patricia
Queensland University of Technology
isobel.nye@connect.qut.edu.au

The motion after effect (MAE) is a well-established phenomenon wherein the prolonged exposure to visual motion in one direction elicits an illusory response in the opposite direction. One question which has not been extensively investigated is whether those with reduced motion sensitivity, due to age or other factors, experience equivalent adaptation to visual motion. Previous research has demonstrated that time-to-contact (TTC) judgments while driving are affected by age-related declines in motion sensitivity. Using video footage of real driving scenes, we measured the TTC judgments of twenty-five participants aged between 24 and 77 with and without adaptation to expanding radial flow motion. Motion sensitivity thresholds were determined for (i) a 3 Hz drifting Gabor pattern, (ii) second order (contrast modulated) grid pattern, and (iii) an expanding sinusoidal 1.5Hz radial pattern. Findings show preliminary
support for the hypothesis that motion aftereffect magnitude in the time-to-contact task are correlated with motion sensitivity thresholds.

Daddy's cuute baby: The acoustic and affective characteristics of father's speech to infants

Karen Mattock, Scott A. O'Loughlin, Shevera Gunasekera, Daniel Hochstrasser, Adiba Icho, Nicholas Lo Russo, Danielle Makarious, Sarah Rees
University of Western Sydney
k.mattock@uws.edu.au

The acoustic and affective characteristics of mother's speech to infants (IDS) are well described. We investigated whether fathers modify their speech to the same extent as mothers, when speaking to their infant. Seven fathers and 7 mothers were audio recorded in separate interactions with their 9-month-old infant using ‘sheep’, ‘shoe’ and ‘shark’ toys, and with an adult (adult-directed speech, ADS). Tokens of ‘sheep’, ‘shoe’ and ‘shark’ were extracted from the recordings and Praat was used to analyse the acoustical characteristics of vowels, including mean pitch, pitch range, vowel duration, and vowel hyperarticulation. Tokens were then gender-neutralised, low pass-filtered, and rated by 60 students on two Likert scales for perceived Arousal and Emotion, respectively. Like mother’s IDS, father’s IDS contained a wider pitch range, and more hyperarticulated vowels, and was rated higher in perceived arousal and perceived emotion than their ADS. However, these characteristics were exaggerated to a lesser degree than in mother’s IDS. Results are discussed in terms of the roles that fathers play in aiding infant language development.

Implicit and Motivational Influences of Incidental Physical Activity

Stacey Oliver & Eva Kemps
School of Psychology, Flinders University
stacey.oliver@flinders.edu.au

Insufficient participation in physical activity, and a more sedentary lifestyle, has resulted in an energy imbalance, contributing to the current obesity epidemic. Incidental physical activity is a major factor of energy expenditure and even a slight increase in daily activity can benefit health. It is therefore important to understand the influences of this behaviour. This study investigated motivational aspects and implicit processes that influence incidental physical activity. Participants initially recorded a seven-day step-count. Subsequently, implicit attitudes and attentional bias for daily activities were measured using a SC-IAT and dot probe task, respectively. Trait motivational orientation was also assessed using the Self-Determination Scale. Preliminary data suggest that trait motivational orientations moderate the relationship between attentional bias, implicit attitudes and incidental physical activity. Specifically, the relationship between a greater attentional bias for activity-related images, more positive implicit attitudes towards daily activities and a higher step-count was stronger for participants with a task motivational orientation than an ego motivational orientation. These findings support Cognitive Evaluation Theory, and are consistent with previous research that has found a task motivational orientation to be associated with participation in physical activity. Results also support dual process theories which suggest that implicit processes can guide behaviour.

The role of dynamic acoustic intensity and timbral complexity in auditory spatial localisation

Kirk N. Olsen & Lisa McCarthy
The MARCS Institute, University of Western Sydney, Australia
k.olsen@uws.edu.au

Continuous rises and falls of acoustic intensity are associated with looming (approaching) and receding auditory motion. Results from experiments measuring perceived changes of loudness in response to these dynamic stimuli have led to a hypothesised ‘adaptive perceptual bias for rising intensity’ (Neuhoff, 1998) that may facilitate fast and appropriate action in response to a looming and potentially threatening stimulus. Neuhoff argues that tonal/harmonic stimuli (pure-tone, vowel) are associated with single sound-sources and also elicit ‘perceptually salient’ responses relative to dispersed sound-sources associated with white-noise (rain, wind). The present study investigated these hypotheses in the context of auditory spatial localisation. Participants (N=27) were presented with three levels of intensity change (rise, fall, steady-state, associated with looming, receding, stationary motion) and three levels of timbre (white-noise, vowel, 1kHz pure-tone) using a 180° horizontal nine-loudspeaker array. If rises of intensity
demand ‘perceptual priority’, then sound-source localisation will be faster and more accurate than responses to stimuli with falling and steady-state intensity profiles. Results supported this hypothesis. Contrary to the second hypothesis, white-noise was localised significantly faster and more accurately than pure-tones and vowels. Results are discussed in the context of auditory/visual theories of real and implied motion and spectral causes of spatial ambiguity.

Musical pitch categories are acquired using distributional learning
Jia Hoong Ong & Denis Burnham
The MARCS Institute, University of Western Sydney
jia.ong@uws.edu.au

Just as different languages have different phonemic categories, different music scales divide the octave differently and to appreciate or play music listeners must learn which musical pitch categories are used in their musical systems. Previous research suggests that we acquire linguistic categories (such as those for consonants and vowels) from the distributional structure of the input (distributional learning) by tracking the frequency of items to be learned. This study examines whether distributional learning applies in the music domain by investigating whether non-musicians are able to learn novel musical pitch categories following exposure to one of two distribution conditions: Unimodal, which should induce the participants to form a single category, or Bimodal, which should induce the participants to form two separate categories. Participants’ performance was assessed using a discrimination task before and after training. The results indicated that the Bimodal group, but not the Unimodal group improved significantly on the discrimination of the novel musical pitch categories at post-test relative to pre-test. This suggests that learners acquire musical pitch categories using the same mechanism involved in linguistic (consonants and vowels, and possibly even lexical tones) category acquisition, in line with the Shared Sound Category Learning Mechanism hypothesis (Patel, 2008).

Crossmodal binding in cluttered tactile displays shows crude spatial and temporal resolution
Orchard-Mills, E., Van der Burg, E. and Alais, D.
University of Sydney
emily.orchardmills@sydney.edu.au

The brain optimally integrates signals from multiple modalities in order to provide the most reliable estimate of environmental events. Temporally cluttered environments pose a greater challenge for sensory binding than the simple stimuli often used in experimental settings and yet these instances are when redundancy across modalities has the potential for the most benefit (e.g. a crowded noisy room). When a changing visual item is synchronised with a repeated auditory pulse, it is rapidly segregated from other changing visual items, regardless of how many items present, a striking example of multisensory enhancement. In contrast, when the cluttered display is presented in the tactile domain (using buzzers attached to each of the fingers), we find search for a vibration pulse synchronised with an auditory pulse is impaired by the addition of vibrations to other fingers. We show that the spatial and temporal limits of binding and segregation of the audiovisual domain are different to that of the audiotactile domain, with touch demonstrating poorer resolution in both cases. The results are discussed in the context of the spatial and temporal capacities of vision and touch.

Sources of Interference in Item and Associative Recognition Memory
Adam F. Osth and Simon Dennis
University of Newcastle
adamosth@gmail.com

A powerful theoretical framework for exploring recognition memory is global matching, in which a cue’s memory strength reflects the similarity of the retrieval cues being matched against the contents of memory. Contributions at retrieval can be categorized as matches and mismatches to the item and context cues, including the self match (match on item and context), item noise (match on context, mismatch on item), context noise (match on item, mismatch on context), and background noise (mismatch on item and context). We present a model that directly parameterizes the matches and mismatches to the item and context cues, which enables estimation of the magnitude of each interference contribution. The model was fit to ten recognition memory datasets that employ manipulations of
strength, list length, list strength, word frequency, study-test delay, and stimulus class in item and associative recognition. Estimates of the model parameters revealed at most a small contribution of item noise that varies by stimulus class, with virtually no item noise for single words and scenes. Background noise estimates dominated at retrieval across nearly all stimulus classes. These results suggest that the majority of interference in recognition memory stems from experiences acquired prior to the learning episode.

Effects of acute and chronic methamphetamine on habits and cognitive control

Hector Palada, Andrew Neal, Anita Vuckovic, Russell Martin & Andrew Heathcote

University of Tasmania

Hector.Palada@utas.edu.au
Andrew.Neal@utas.edu.au
Anita.Vuckovic@utas.edu.au
Russell.Martin@utas.edu.au
Andrew.Heathcote@utas.edu.au

Deficits in response inhibition and executive function have long been observed as side-effects of chronic methamphetamine use. However, the mechanism of these deficits is not yet fully understood and causality remains to be determined. In rats, chronic exposure to methamphetamine causes structural changes to the brain, a phenomenon referred to as "structural plasticity". Specifically, increases spine density are found in brain areas that are involved in habits (dorsolateral striatum), whereas decreases are observed in areas involved in voluntary, goal-directed behaviour (dorsomedial striatum). There is also evidence for drug-dependent structural plasticity in brain areas that are involved in more complex cognitive control tasks such as the medial prefrontal cortex. The current experiments used instrumental learning, outcome devaluation, and response-conflict paradigms in rats to characterize the effects of acute and chronic methamphetamine administration on habits and cognitive control, and their relationship to structural changes in the striatum and frontal cortex.

Spatiotemporal evolution of feature-based selection during visual search

David R. Painter (1), Tsukasa Funane (2), Takusige Katura (2), Hiroki Sato (2), Jason B. Mattingley (1,3)
1 The University of Queensland, School of Psychology, St Lucia, Queensland 4072, Australia; 2 Hitachi, Ltd., Central Research Laboratory, Hatoyama, Saitama 350-0395, Japan; 3 The University of Queensland, Queensland Brain Institute, St Lucia 4072, Australia
d.painter1@uq.edu.au

During visual search, observers can prioritize items on the basis of elementary features such as color and shape. Such feature-based selection is assumed to involve coordinated interactions between frontoparietal areas and early visual cortex, but it remains unclear how this selection evolves across time and cortical regions. Here, we combined a rapid event-related design with high-density functional near-infrared spectroscopy (fNIRS) to examine hemodynamic responses elicited by task-irrelevant target- and distractor-colored probe stimuli during visual search. Compared with target-colored probes, distractor-colored probes increased oxygenated hemoglobin within right hemisphere frontoparietal regions previously linked with feature-based selection. Feature-based selection within early visual cortex showed the opposite pattern: decreases in oxygenated hemoglobin for distractor-colored probes compared with target-colored probes. Feature-based selection occurred earlier in frontoparietal cortex compared with early visual cortex, and functional connectivity between frontoparietal and visual cortices predicted perceptual sensitivity. Together, the results indicate a delayed suppressive influence of right hemisphere frontoparietal regions over visual cortical responses to distractor features during visual search.

Evidence accumulation in a complex task: Making choices about simultaneously appearing multi-attribute stimuli under time pressure.

Hector Palada, Andrew Neal, Anita Vuckovic, Russell Martin & Andrew Heathcote
University of Tasmania

Hector.Palada@utas.edu.au
Andrew.Neal@utas.edu.au
Anita.Vuckovic@utas.edu.au
Russell.Martin@utas.edu.au
Andrew.Heathcote@utas.edu.au

Accumulation models transform observed choices and their associated response times into psychologically meaningful constructs such as the strength of evidence on which choices are based and the degree of caution exercised in making them. Standard versions of these models were developed for rapid (~ 1 second) choices about simple stimuli, and have recently been elaborated to some degree to address more complex stimuli and response methods. However, these elaborations can be difficult to use with designs and measurements typically available in applied settings. We
apply two standard accumulation models – the diffusion (Ratcliff & McKoon, 2008) and the LBA (Brown & Heathcote, 2008) – to the detection of heterogeneous multi-attribute targets in a simulated unmanned-aerial-vehicle operator task. Despite responses taking two seconds or more and complications added by realistic features such as a complex target classification rule, interruptions from a simultaneous navigation task and time pressured choices about several simultaneously available potential targets, these models performed well descriptively. They also provided a coherent psychological explanation of the effects of decision uncertainty and workload manipulations. Our results support the wider application of standard evidence accumulation models to decision-making in applied settings.

How distinct is the coding of face identity and expression? Evidence for some common dimensions in face space

Romina Palermo, Stephen Pond, Nichola Burton, Nadine Kloth, Linda Jeffery, Jason Bell, Louise Ewing, Andrew J. Calder, Gillian Rhodes
ARC Centre of Excellence in Cognition and its Disorders, School of Psychology, University of Western Australia
romina.palermo@uwa.edu.au

The processing of face identity has traditionally been considered to be distinct from the processing of face expression. However, recent evidence suggests that brain areas that code for identity may also code expression, and vice versa. Moreover, individual differences studies have shown associations between the ability to recognise face identity and expression. In this study we use perceptual aftereffects to demonstrate the existence of dimensions in perceptual face space that code both identity and expression, further challenging the traditional view. Specifically, we find a significant positive association between face identity aftereffects and expression aftereffects, which dissociates from face (gaze) and non-face (tilt) aftereffects. Importantly, individual variation in the adaptive calibration of these common dimensions significantly predicts ability to recognise both identity and expression. These results highlight the role of common dimensions in our ability to recognise identity and expression, and show why the high-level visual processing of these attributes is not entirely distinct.

Walking without visual motion reduces subsequent vection

Palmisano, S., Seno, T., Riecke, B.E., & Nakamura, S.
University of Wollongong
stephenp@uow.edu.au

Compelling illusions of self-motion can be induced in physically stationary observers by visual stimulation alone. These illusions are known as vection. Here we examined the effect of walking without optic flow on subsequent vection induction. Participants walked for 5 minutes around campus before they were exposed a series of vection-inducing displays. One group walked while wearing Ganzfeld goggles (which prevented them from seeing any details of the outside world; resulting in no optic flow). The other group walked with normal vision (i.e. with optic flow). Directly after walking, we measured the latency and strength of vection induced by the radially expanding patterns of optic flow. We found that walking without optic flow both delayed vection onset and reduced vection strength. These findings suggest that walking without optic flow triggered a sensory readjustment, which reduced the ability of optic flow to induce self-motion perception.

Some distraction may be a good thing

Kristen Pammer; Rosy Allen; Hannah Korrel; Vanessa Beanland; Jason Bell
The Australian National University
kristen.pammer@anu.edu.au

Distraction generally refers to an additional stimulus or task that draws attention away from a primary task, indeed a key function of attention is to filter out distracting stimuli. This provides a challenge for attentional mechanisms: how and why are some stimuli “bounced” from early processing, while others reach conscious awareness? We used a dynamic inattentional blindness paradigm to explore how distraction affects conscious recognition of unexpected objects. Participants were required to track moving objects over a number of sequential trials. During critical trials an unexpected object moved horizontally across the screen. We demonstrated a significant increase in the detection of the unexpected object when participants experienced a transient, irrelevant distractor. In Experiment 1, the distractor was a tone set within music, and in the second experiment the distractor was a visual screen flicker. These results
suggest that task-irrelevant distractions, regardless of modality, have the potential to facilitate conscious processing of unexpected stimuli. We propose that distraction can optimise attentional capture of unexpected stimuli by disrupting the attentional set and forcing the observer to distribute their attention more broadly. These results have important implications for models of attention where the effect of distraction on attention may reflect a U-shaped function.

**Taste aversion and satiety engage dissociable mechanisms in Pavlovian outcome devaluation**

Marios C. Panayi & Simon Killcross
University of New South Wales
m.panayi@unsw.edu.au

Learning about predictive relationships between cues and rewards is fundamental to guiding behaviour that is adaptive. When rewards are no longer valuable, it is important to update cued behaviours to reflect the new value of the predicted reward. Two major ways reward value is manipulated experimentally are devaluation by pairing the food with nausea and consuming the reward to satiety (sensory specific satiety). These two forms of devaluation are commonly used interchangeably, and are generally considered to involve identical associative mechanisms. The orbitofrontal cortex (OFC) in rats is involved in devaluation by nausea and has been argued to represent the current value of cue-outcome expectancies. Using excitotoxic lesions of the OFC in rats we found that devaluation by nausea was disrupted (Experiment 1), but not devaluation by satiety (Experiment 2). This finding suggests that the mechanisms underlying the two forms of devaluation are dissociable. Follow up experiments found that OFC lesions did not affect nausea devaluation in action-outcome learning (Experiment 3), nor did they affect ability to represent and use the sensory properties of the outcome (Experiment 4). These findings will be discussed in terms of modern associative learning theories.

**Are drivers’ judgements at intersections affected by the relative opacity of their eyes? The Pulfrich effect applied**

Parker, Marcella; Lacherez, Philippe
Queensland University of Technology and The University of Queensland
p.lacherez@qut.edu.au

The Pulfrich effect describes the phenomenon in which a laterally moving object can appear to move through a curved path when viewed dichoptically with a neutral density filter placed over one eye, a situation comparable to that of an older adult with monocular cataract. In the ‘Enright phenomenon’ a neutral density filter also alters the perceived speed of a vehicle when the driver looks out of the side window. In this study we investigated whether the perceived path of another vehicle would be changed by the presence of a neutral density filter. Twenty participants aged between 19 and 54 viewed videos of real driving scenes in which the camera car and a laterally moving car approached the same intersection, and indicated the moment they believed the laterally moving car would cross the center of the scene. The same videos were presented with participants wearing no filter, two matched neutral density filters, or a neutral density filter over one eye. The estimated time was greater in both single-filter conditions, irrespective of the eye filtered or the direction of travel of the vehicle. The effect, though small, could have implications for driving safety among those with untreated cataract.

**Examining the Temporal Dynamics of Attention’s Effect on Visual Word Recognition**

Samantha Parker
Macquarie University
samantha.parker@students.mq.edu.au

Words presented in the right visual field (RVF) are consistently processed more accurately and efficiently than words presented in the left visual field (LVF). Recently however, the visual fields have been found to be differentially sensitive to spatial attention. Word recognition performance in the LVF is particularly sensitive to cueing. Accuracy and efficiency of word detection improves with the aid of a valid spatial cue and suffers when attention is invalidly cued. In contrast, the RVF appears largely insensitive to manipulations in spatial attention. Here we investigated the nature of the cueing effect in the LVF by exploring the time course of its development using the reach-to-touch paradigm. We presented participants with a target letter string in either visual field, preceded by a valid or invalid
spatial cue. Participants classified each target as a word or a nonword by reaching either forwards or backwards from a central start position. A motion-capture system rapidly sampled the position of the participant’s hand throughout this movement. Interestingly, results indicated that the LVF cueing effect emerged early and resolved quickly. These results suggest that the hemisphere’s comparative word recognition abilities diverge during initial stages.

A bias-free measure of the tilt illusion
Matthew L. Patten & Colin W.G. Clifford
UNSW Australia
m.patten@unsw.edu.au

The perceived orientation of a central test grating is influenced by the orientation structure of the surrounding image. Measurement of this “tilt illusion” traditionally requires subjects to report the orientation of the test relative to a cardinal reference (e.g., clockwise or anti-clockwise of vertical). Given that the test is presented within a surround that is itself oriented clockwise or anti-clockwise from vertical, there is obvious potential for the orientation of the surround to bias the subject’s response irrespective of any perceptual effects. To avoid this bias, we ran a two temporal interval forced-choice experiment. Each interval contained opposite surround orientations (±15°) and we manipulated the orientation of the centre gratings. Participants (n=4) were asked to judge which of the test gratings was closer to vertical. We found no significant difference between measurements of the tilt illusion using the traditional and 2-interval procedures. We then examined inter-individual differences in a larger sample (n=20) and found a significant correlation between the magnitude of the tilt illusion measured using the two procedures. Our experiments demonstrate an unbiased method for measuring the tilt illusion and indicate that response biases are unlikely to factor significantly in prior tilt illusion experiments.

Cultivating resilience and willpower among university students: An experimental study
Aileen M. Pidgeon, PhD (Clin) and Renee Morrison, BPsychSc (Hons)
Bond University
rmichellemorrison@gmail.com

University students experience higher levels of psychological distress compared to the general population due to the myriad of stressors faced at university, in particularly achieving the goal of high academic grades. Therefore, cultivating resilience and willpower among university students is important. Resilience is the ability to adapt successfully in the face of stress and adversity, while willpower is the ability to resist short-term temptations in order to meet long-term goals. This experimental study examined the efficacy of utilising brief innovative willpower strengthening exercises to enhance resilience, self-control, and reduce psychological distress among university students. Forty-six university students were randomly allocated to one of two groups: willpower strengthening exercise group or a control group. Results of a two-way repeated MANOVA revealed. University students in the willpower strengthening group reported significantly higher levels of resilience and self-control, and significantly lower levels of psychological distress. The positive feedback and compliance reported by participating students to complete the exercises as per instructions, i.e. every hour, for six hours per day, over seven days, supports the feasibility of using willpower strengthening exercises in programs aimed at increasing resilience.

Unfamiliar Faces Engaged in Non-Rigid Motion are Processed Holistically
Daniel W. Piepers, Darren C. Burke, Simone K. Favelle, Catherine J. Stevens, & Rachel A. Robbins
School of Social Sciences and Psychology, University of Western Sydney
d.piepers@uws.edu.au

Faces constitute a special type of stimulus in that they are perceived on the basis of their individual parts as well as more ‘global’ information derived from holistic processing. When we see faces in real life, they are usually engaged in motion, however there is a tendency to use static faces in face perception research. In the current experiment, the composite task was used to compare holistic processing for static and non-rigidly moving (feature shape variant) unfamiliar faces. A two-tailed ‘configural variation hypothesis’ predicted that changes in feature shape (a proposed marker for calculating configural information) during holistic integration would either strengthen or impair holistic processing for moving faces relative to static. However, similar sized composite effects were found for both moving
and static faces counteracting the proposed hypothesis. These results suggest that similar levels of holistic and part-based processing are used in the perception of identity from still and non-rigid moving unfamiliar faces, and support the use of feature centre-points as a marker for calculating configural information.

In vivo Gamma Aminobutyric Acid (GABA) concentration assessed using 1H Magnetic Resonance Spectroscopy (MRS) and its relationship with contrast suppression, motion suppression and binocular rivalry in young adults

Kabilan Pitchaimuthu*, Qizhu Wu**, Gary F Egan**, Olivia Carter***, Bao N Nguyen*, Allison M McKendrick*
*Department of Optometry and Vision Sciences, University of Melbourne, Parkville, VIC, Australia, **Monash Biomedical Imaging, Monash University, Clayton, VIC, Australia, ***Melbourne School of Psychological Sciences, University of Melbourne, Parkville, VIC, Australia

kpitchaimuth@student.unimelb.edu.au

GABA is the principal inhibitory neurotransmitter in the brain. Despite the low concentration of cortical GABA, several studies using MRS techniques have reported in vivo GABA measurements in visual cortex and their relationship with visual function. We investigated the relationship between visual cortical GABA concentration and centre-surround contrast suppression (CSCS), suppression of high contrast motion (Tadin’s task, Tadin et al, 2003) and binocular rivalry. These behavioural tasks are hypothesised to be mediated, at least in part, by GABAergic inhibitory connections. GABA level was estimated using MEGA PRESS sequence in a Siemens Skyra 3T scanner with 32-channel head coil, in fifteen participants (aged 18-35). Suppression indices from the CSCS (Slcscs) and Tadin’s task (Sitadin) and the binocular rivalry switch rate (SRBR) were estimated using standard procedures. Spearman correlation analyses revealed no significant relationship between the behavioural measures (SlcscsvsSitadin: r=-0.37, p=0.17, SlcscsvsSRBR: r=-0.19, p=0.52, SitadinvssRBR: r=0.05, p=0.86) and no significant relationship between GABA and behavioural measures (Slcscs: r=0.18, p=0.52, Sitadin: r=-0.2, p=0.48, SRBR: r=-0.13, p=0.65). One interpretation of our data is that GABA levels and behavioural performance in young adults are relatively uniform, and that identifying a relationship between measures requires the study of individuals with a predicted GABAergic disorder.

Seeing a picture of a talker’s face affects speech processing in noise

Sonya Prasad, Vincent Aubanel, Jeesun Kim, & Chris Davis

MARCS Institute, University of Western Sydney

j.kim@uws.edu.au

In speech perception, familiarity with the talker helps (a talker familiarity effect). This effect suggests that listeners create a model of the talker’s speech in memory and this can play a role in speech processing. The current study investigated whether a picture of a familiar talker’s face can trigger access to a talker model and affect speech processing. In the experiment, participants were familiarized with the faces and voices of three talkers in a face-voice matching task until performance reached 85% accuracy or higher in the second half of the session. Participants were then given a speech in noise identification task that had four conditions: familiar voice with familiar or unfamiliar face; unfamiliar voice with a familiar or unfamiliar face. The results showed that compared to the unfamiliar voice (& face), the familiar voice led better speech perception but only when the familiar talker’s picture was presented. Further, the intelligibility of unfamiliar speech was worse when presented with a familiar compared to an unfamiliar face. In short, a familiar talker’s picture facilitated/interfered speech processing for the matched/mismatched voice. The results will be discussed in terms of how a talker model is accessed via memory cues.

Disentangling stimulus-driven and strategic effects in lexical decision

Melissa Prince, Andrew Heathcote, Colin Davis, Sally Andrews

University of Sydney

melissa.prince@sydney.edu.au

Recent research has aimed to disentangle the cognitive mechanisms underlying lexical decision (LD) performance, rather than assuming it provides a veridical reflection of the ease of lexical access. In this study we simultaneously examine two manipulations widely used to probe lexical processing; namely using a masked repetition priming paradigm and varying (between-lists) the nature of the nonword distractors. In particular we use the Linear Ballistic Accumulator (LBA) model to tease apart whether these effects are stimulus-driven or mediated by strategic decisional
processes. If the facilitatory effect of an identity compared to unrelated prime is driven by the stimulus properties being encoded more easily (e.g., a ‘savings effect’), this effect should manifest on the LBA’s nondecision time parameter (ter). In contrast, if the relative ease of making a word/nonword response is influenced by the difficulty of the list environment, this effect should manifest on parameters relating to the decision threshold and the quality of evidence obtained from a stimulus. Results and their implications for current models of lexical access will be discussed.

A computational model of the self-teaching hypothesis based in the dual-route model of reading

Stephen C Pritchard, Max Coltheart, Eva Marinus, Anne Castles
ARC Centre of Excellence in Cognition and its Disorders (CCD) and Macquarie University
stephen.pritchard@mq.edu.au

The self-teaching hypothesis is a well-regarded and psychologically plausible account of how children progress from early phonological recoding reading strategies to skilled sight-word reading. In this work, we describe a new computational implementation of the self-teaching hypothesis within an existing computational account of reading: the dual-route cascaded (DRC) model of reading aloud. This is the first time that reading skill acquisition has been investigated in the DRC framework. The new self-teaching model (ST-DRC) makes use of DRC’s sub-lexical route and its interactivity with the lexical route at the phoneme level to simulate phonological recoding in accordance with the self-teaching hypothesis. Successful activation of a spoken word representation triggers an opportunity for orthographic learning, which is the basis for skilled sight-word reading. ST-DRC also includes new computational mechanisms for simulating the use of ambiguous contextual information to aid word recognition, and provides a working example of how partial decoding and ambiguous contextual information interact to facilitate irregular word learning. ST-DRC was able to effectively demonstrate orthographic learning and model the self-teaching hypothesis, and informs new avenues for empirical research regarding difficult word classes such as homographs and potentiophones.

Hemifield Effects in Subitizing

Campbell G. Pryor and Piers D. L. Howe
University of Melbourne
c.pryor2@student.unimelb.edu.au

Performance on a range of visual processing tasks has been shown to improve when information is split bilaterally across the left and right visual hemifields rather than being restricted to a single visual hemifield. However, a recent study by Delvenne, Castronovo, Demeyere, and Humphreys (2011) found no such bilateral advantage for subitizing, which is our ability to rapidly and accurately enumerate small quantities of objects. This finding is particularly surprising as it contradicts the prediction of FINST theory that subitizing should benefit from bilateral presentation (Trick & Pylyshyn, 1994). Our study investigated the issue by determining if there are any circumstances where a bilateral advantage for subitization occurs. Contrary to Delvenne et al. (2011), we found that subitizing could show bilateral advantages, but only when the display was backward-masked. We discuss these findings in relation to how the rate of encoding and the time available for this encoding can affect bilateral advantages in subitizing. We propose a general model under which bilateral advantages could be explained.

Vertical Meridian Asymmetry for Faces: The Upper-Hemifield Advantage

Genevieve L. Quek & Matthew Finkbeiner
Université catholique de Louvain
genevieve.lauren.quek@gmail.com

Visual capabilities are not uniform across the visual field. For example, performance on tasks of contrast sensitivity, visual acuity, and motion perception is reliably better in the lower visual field (LVF) than the upper visual field (UVF). Where vertical asymmetry has been well-documented for a range of low-level stimuli, the impact of vertical hemifield presentation on the perception of higher-level objects is relatively unknown. We present two studies which suggest that, unlike many other stimulus types, perception of human faces may enjoy an upper-hemifield advantage. We combine masked priming with a behavioural reaching paradigm to show that i) masked faces affect target-categorisation earlier when presented in the UVF than the LVF, and ii) masked-face processing depends on attention
in the LVF but not the UVF. Finally, we test and refute the possibility that this UVF advantage for face-perception is driven by an upward bias in voluntarily directed spatial attention.

Latent inhibition in human nausea learning
Veronica Quinn, Ben Colagiuri & Evan Livesey
The University of Sydney
nicky.quinn@sydney.edu.au

The role of conditioning in the experience of nausea has been well documented both in the laboratory and clinic, but less is known about how this maladaptive conditioning can be prevented. One successful method of preventing conditioned associations from forming in animals is the latent inhibition procedure. Latent inhibition refers to the phenomenon whereby pre-exposing a subject to a stimulus retards subsequent learning about that stimulus. Replicating this effect in human learning has been difficult due to the inability to reproduce certain parameters present in the animal latent inhibition paradigm, with learned irrelevance and demand characteristics presenting alternative explanations for any latent inhibition like effects observed. The human nausea learning paradigm using Galvanic Vestibular Stimulation (GVS) solves many of these problems, and an experiment was conducted to determine if pre-exposure to placebo-GVS could reduce conditioned nausea to GVS on test. Self-report, physiological and behavioural correlates of nausea were assessed, as well as expectancies and contingency awareness. We observed conditioning to the GVS that was attenuated through pre-exposure to stimulation, but differentially across different dependent variables, and we present a role for expectancies and contingency awareness in predicting the nauseous response.

Colour Induction in Isoluminant Space
Sivalogeswaran Ratnasingam and Barton L. Anderson
School of Psychology, University of Sydney, Sydney, Australia
siva.singam@sydney.edu.au

An object’s perceived colour depends on both the spectral content of the light it reflects and its context. One example of this is colour induction, in which a target’s apparent colour is modulated by the colour of its surround. Numerous models have been proposed to account for colour induction but they were derived from experiments that either held the target achromatic or surround colour varied along the cardinal colour axes. One such theory is Kirschmann’s fourth law which proposes that colour induction increases with surround saturation. But, the law was only proposed to hold for achromatic targets. We investigated this law with chromatic targets and the results show that this law also holds for chromatic targets given the surround is higher in saturation than the target. However, this law is only applicable to targets and surrounds differ only in saturation. Here, we propose a hypothesis to predict the relative size of colour induction for any given isoluminant target and surround. The hypothesis states that colour induction is large if the target colour can be represented as a linear summation of the two surrounds with positive weights. Experimental results show that the hypothesis is valid under all the tested conditions.

The cost of parallel consolidation of orientation and motion direction into visual short-term memory
Reuben Rideaux; Mark Edwards
Australian National University
reuben.rideaux@anu.edu.au

A growing body of evidence indicates that information can be consolidated into visual short-term memory in parallel. We recently demonstrated that both orientation and motion direction items can be consolidated in parallel, but with different levels of accuracy. We suggested this finding was due to a reduction in resolution occurring when items are consolidated in parallel, coupled with a difference in the perceptual space size of these features (smaller for orientation). Here we explicitly examine whether there is a cost associated with parallel consolidation of orientation and direction information by comparing performance, in terms of precision and guess rate, on a target recall task where items are presented either sequentially or simultaneously. The results show that there is a two-fold cost of parallel consolidation: both the probability of failing to consolidate one (or both) item/s increases and the resolution at which representations are encoded is reduced. Furthermore, we demonstrate that orientation is encoded at a
lower (relative) resolution than direction at the early stages of processing, consistent with the explanation proposed for the divergent performance observed for these features during parallel consolidation.

Holistic processing of attractiveness in faces and bodies.

Rachel A. Robbins & Andrew W. Jerovich
University of Western Sydney
dr.r.robbins@gmail.com

Deciding who someone is involves integrating information across multiple parts of the body and/or face. Recent evidence suggests such holistic processing also occurs for attractiveness in faces. One factor which increases attractiveness in faces and bodies is bilateral symmetry. Logically this requires integrating information across two halves. We tested whether preference for symmetry and detection of symmetry are holistically processed for faces and bodies using an inversion task. Results showed that preference for symmetry was above chance for faces, but there were no effects of inversion, contrary to previous results. However, there were inversion effects for detection of symmetry, again contrary to some previous results, but consistent with others. This suggests little effect of holistic processing on decisions of attractiveness, as related to symmetry, but effects of detection of symmetry. Note that detection effects were larger overall than preference. Our new results for bodies showed that although symmetry was preferred in both orientations, as for faces, detection of symmetry was better for inverted bodies than upright. We suspect that how stimuli are created and presented may have a large influence on findings and suggest that in future more direct measures of holistic processing are needed to answer such questions.

Reading requires spatial attention: Resolving a decade of debate.

Robidoux, Serje; Besner, Derek
ARC Centre of Excellence in Cognition and its Disorders (CCD), Macquarie University
serje.robidoux@mq.edu.au

Some theorists assert that word identification can occur in the absence of spatial attention whereas others argue that there is no word identification without spatial attention. The conflicting results are closely tied to different choices for the primary task: When subjects are asked to read attended words aloud, there is no evidence that unattended words influence processing (Besner, Risko, & Sklar, 2005; Lachter, Forster, & Ruthruff, 2004; Lien, Ruthruff, Kouchi, & Lachter, 2010; Waechter, Besner, & Stolz, 2011). However, when asked to name colours, supposedly "unattended" distractor words induce a Stroop effect (Brown, Gore, & Carr, 2002; Lachter, Ruthruff, Lien, & McCann, 2008; Waechter et al., 2011). Robidoux, Rauwerda, and Besner (2014) confirmed Waechter et al.’s hypothesis that the two tasks are not matched on their demand for spatial attention (that is, word identification requires focussed attention while colour naming allows attention to be more widely distributed). Here we further demonstrate that the apparent conflict in the literature disappears when the attentional demands of colour and word processing are appropriately matched. The results resolve the debate: Broadbent was right - there is no identification without attention.

Constraining hallucinations: A novel method for the objective assessment of flicker-induced hallucinations

Sebastian L Rogers, Rocco Chiou, Joel Pearson
University of New South Wales
s.rogers@unsw.edu.au

Since Purkinje’s discovery of dynamic, multistable hallucinatory patterns produced by flickering light, many have attempted to characterize and identify their origin. Allefeld et al (2011) demonstrated that particular flicker-frequencies are differentially associated with specific percept classes. Billock and Tsou (2007) found that the forms of flicker-induced hallucinations were biased by presentation of adjacent stimuli. In this study we employed a flickering annulus, thereby constraining the structure and motion of induced patterns, resulting in numerous shadowy hallucinatory shapes rotating around the annulus. To measure the strength of these hallucinations, participants compared the contrast of hallucinations to a concurrently-presented perceptual annulus composed of sinusoidal contrast modulations around the ring mimicking the hallucinations. Using the method of constant stimuli, we estimated the point of subjective equivalence between the perceptual annulus and the hallucination. The mean effective contrast of the hallucination was 42%, peaking at a flicker-rate of 10.6Hz and reducing with higher or lower
frequencies. Our results demonstrate that limiting the form of subjective perceptual phenomena allows objective measurement of their phenomenological qualities. This method can be used to assess the neurological underpinnings of elementary hallucinations, and may have implications for research into pathological hallucinations and consciousness research.

Defining objective signatures of face categorization with fast periodic visual stimulation of natural images

Bruno Rossion, Talia Retter, Adélaïde de Heering, Corentin Jacques, Katrien Torfs, Joan Liu-Shuang

University of Louvain, Belgium
bruno.rossion@uclouvain.be

Despite intensive research in human vision, identifying an objective signature of face categorization, incorporating both visual discrimination (from nonface objects) and generalization (across widely variable face exemplars) in natural images remains a challenge. We recorded scalp electroencephalogram (EEG, 128 channels) while observers view natural images of objects at a rate of 5.88 images per second for 60 seconds. Natural images of highly variable faces are interleaved every 5 stimuli (5.88 Hz / 5 = 1.18 Hz). Face-selective responses are identified objectively by a high signal-to-noise ratio response at the 1.18 Hz stimulation frequency and its harmonics, localized over the right occipito-temporal cortex. Despite the use of natural images, this face-selective EEG response is free of low-level visual confounds and is significant in single participants, even for one stimulation sequence. This approach reveals face-selective responses over the right hemisphere in 4-6 month old infants, and a succession of differential face-selective EEG components between 120-400 ms after face image onset, progressing from right lateral occipital to anterior temporal regions. Fast periodic visual stimulation go a long way towards understanding implicit face categorization of natural images in the human brain, paving the way for investigating its neural basis and relationship to categorization behavior.

The role of dopamine in Pavlovian conditioned approach

Stephanie Roughley, Prof. Simon Killcross

UNSW Australia
stephanie.kelly@unsw.edu.au

Recent research into the involvement of dopamine in different forms of Pavlovian conditioned responding has suggested that while it appears to be important for both the learning and expression of a sign-tracking response, this is not the case for goal-tracking responses. Under non-specific dopamine antagonists, the expression of goal-tracking responses is impaired while learning remains intact. The present experiments aimed to further these findings by investigating whether involvement could be isolated to specific dopamine receptors. Here, rats were trained for 12 days on one of two basic Pavlovian conditioning paradigms with pellet reinforcers. The CS was either a 10-s sec lever presentation or a 10-s train of clicks. These different stimuli are shown to result in the development of sign-tracking (lever-pressing) or goal-tracking responses (entry to food magazine) respectively. Half the rats in each experiment received injections of either the non-specific dopamine antagonist Flupenthixol (0.3mg/kg) or the D1 specific antagonist SCH39166 (0.03mg/kg) prior to each of the first 7 sessions of training. Results indicate that although learning of a goal-tracking response may be comparatively preserved under non-specific dopamine blockade, when this is restricted to D1 receptors only, learning and performance are equally impaired in both types of conditioned responding.

Surface lightness in complex centre-surround displays: The important role of interreflections

Alexandra Schmid, Bart Anderson

University of Sydney
asch9222@uni.sydney.edu.au

Interreflections are reflections of light between surfaces and can significantly contribute to the illumination of surfaces hidden from a direct light source (e.g. concavities). White surfaces reflect up to 90% of incident light, meaning that more light is available to indirectly illuminate other surfaces compared to darker surfaces, which reflect less light. Thus after many interreflections the amount of “filling-in” of concavities or shadowed regions may provide information about the lightness of a surface (how light or dark the surface’s pigment is). Although the number of
interreflections in real scenes is immense, laboratory experiments typically render computer-simulated 3D scenes with at most 1 interreflection, which could result in missing information about surface lightness. We conducted an experiment to directly assess how the number of interreflections affects perceived lightness. Flat, matte test patches embedded in 3D rocky surrounds were rendered in a natural illumination field with 1-4 interreflections. The results showed that lightness judgments were more reliable when scenes were rendered with 3+ (matte surfaces) or 2+ (glossy surfaces) interreflections. A control condition ruled out explanations of the results based purely on the contrast in the rocky surrounds. This suggests that the “filling-in” of shadows provides important information about surface lightness.

An acceptance-based strategy can reduce chocolate cravings: A test of the Elaborated-Intrusion Theory

Sophie Schumacher, Eva Kemps and Marika Tiggemann
Flinders University
sophie.schumacher@flinders.edu.au

According to the Elaborated-Intrusion (EI) theory, cravings consist of initial intrusive thoughts, followed by imagery-based mental elaborations. The present study compared cognitive defusion (targeting initial intrusions) and guided imagery (targeting mental elaborations) as potential chocolate craving reduction techniques to test the prediction of EI theory that they interfere at different stages of the craving process. Undergraduate women (N = 68; 18-26 years) were randomly assigned to a cognitive defusion condition in which participants were taught to distance themselves from their thoughts, a guided imagery condition in which participants engaged in alternative imagery, or a control condition in which participants received non-directive mind-wandering instructions. Before and after the craving reduction or control technique, participants engaged in ten-minute thought probe periods to measure occurrence of chocolate-related thoughts. Subjective chocolate cravings were also measured at these time-points. Following this, chocolate consumption was measured in a taste test. Results showed that cognitive defusion reduced chocolate-related thoughts, craving and chocolate consumption to a greater extent than the guided imagery or control techniques. Theoretically, results suggest that interfering with cravings at the initial intrusion stage may be more beneficial than at a later stage. Findings have practical implications for the development of effective craving reduction techniques.

Using expert CCTV operator’s eye movement behaviour in the control room to inform CCTV experimental research in the laboratory.

Kenneth C Scott-Brown1, Matthew J Stainer2, David La Rooy1 & Benjamin W Tatler2
1. Abertay University, Dundee, Scotland, UK
2. University of Dundee, Dundee, Scotland, UK
k.scott-brown@abertay.ac.uk

CCTV control rooms, in which multiple scenes are displayed simultaneously, present the human visual system with a number of challenges, particularly in terms of the extreme visual load that commonly accompany multiplex displays. Accordingly, research has begun to address this perceptually interesting task. In an effort to better understand the CCTV task we recorded eye-movements in experienced operators during live surveillance operation and interviewed the operators. While multiplex use was observed in all but one of the recording epochs, operators predominantly view the world through their single spot monitor. Where excursions are made into the multiplex, these are typically brief and strategic, in order to inform the selection of the next scene for the spot monitor. This serves to reduce the moment-to-moment visual load, but means that operators must have a sophisticated internal representation of the surveilled world; incorporating predictions of where crimes are likely to occur across different locations at different times of the day. Observation is a relatively underused technique in experimental psychology (Kingstone, Smilek & Eastwood, 2008), but here provided insights into the task that could not be gained from a purely lab-based approach. This technique furnishes future experimental work with ecologically valid research questions.
Identification expertise and family resemblance categorisation

Rachel Searston and Jason Tangen
The University of Queensland
rachel.searston@gmail.com

As a novice categoriser becomes an expert, they develop specific knowledge allowing them to quickly and accurately resolve novel instances. Sorting visual categories at more specific levels of abstraction—such as classifying a bird at the species level rather than at the family level—helps novices to better integrate new instances (e.g., a new encounter with an old bird species), as well as new categories (e.g., a new encounter with a new bird species; Tanaka et al., 2005). But does this specific expertise transfer upwards to more general categorisations of the same stimuli? Fingerprint experts are a particularly interesting group of visual experts who have extensive, specific domain experience. These experts can quickly and accurately categorise fingerprints as belonging to the same finger, or different fingers (Thompson & Tangen, 2014). We tested their ability to categorise fingerprints at the person-level of abstraction, where the “matching” fingerprints came from the same person but different fingers, and “non-matching” fingerprints came from different people and different fingers. To our surprise, experts could accurately categorise the prints based on the family resemblance between a person’s fingers. It seems these experts have developed conceptual knowledge that extends beyond matching easily articulable features.

Head tilt may act to increase the Tilt Illusion in healthy participants, but reduces it in Schizophrenia.

K Seymour, M Coltheart, A Zeman, and R Langdon
ARC Centre of Excellence in Cognition and Its Disorders and Department of Cognitive Science, Macquarie University.
kiley.seymour@mq.edu.au

We used the Tilt Illusion (TI) to examine potential links between disruptions of early visual processing in Schizophrenia and anomalies of self-awareness theorized to be the basis of the disorder. It has been previously shown that Schizophrenic patients perceive stronger TIs compared to controls. In healthy participants, similar increases in TI magnitudes have been observed when internally generated vestibular and proprioceptive cues about upright body position are perturbed. We examined the effect of head tilt on the TI in Schizophrenia. We hypothesized that, if self-monitoring deficits accounts for larger TIs in Schizophrenia, TI magnitude will be unaffected by changes in head tilt. Our preliminary results indicate that changes in head tilt affect TI magnitudes differently in patients and controls. Surprisingly, while controls experience stronger TIs when the inducing tilt and head tilt are in the same direction, patients experience weaker TIs under these conditions (almost nulling the illusion completely). These results suggest patients with Schizophrenia misuse internally generated information to guide perception.

Reward induced motivation and its attentional bias

Myoungju Shin, Jennifer Lynn
Charles Sturt University
jshin@csu.edu.au

Rewards modify performance so that attentional priority is given to stimuli associated with a higher probability of reward. This study explored whether this attentional bias toward a previously reward associated stimulus can be suppressed if there is an incentive to do so. Four groups of 12 participants completed a spatial cueing task involving two phases, in which the cue associated with target location changed from Phase 1 to Phase 2. Attentional bias effects toward a previously rewarded cue were demonstrated when the rewarded cue from Phase 1 interfered with the orienting toward a non-rewarded but valid cue in Phase 2. Associating the Phase 2 cue with a higher reward than that used in Phase 1 resulted in a rapid orientation of attention to the new cue. Findings suggest pathologies characterized by maladaptive attentional biases (e.g. addiction) may be counteracted by treatments that manipulate motivation by enhancing the subjective relevance of rewards that are less harmful.
Learned predictiveness and the attentional blink

Lauren Shone, Irina Harris, and Evan Livesey
The University of Sydney
lsho0771@uni.sydney.edu.au

Learned predictiveness (LP) is a bias in learning towards cues with prior predictive utility. In a typical LP experiment, predictive validity is first manipulated such that cues are either predictive or non-predictive of a set of outcomes. In a subsequent and seemingly unrelated task involving novel outcomes, new learning is biased in favor of the previously predictive cues. This bias has been interpreted as a shift in attention that operates according to the mechanisms of associative competition. However, it is unclear which of the variety of cognitive mechanisms associated with selective attention best characterise the effect. This study examines the LP effect using the attentional blink paradigm, a cognitive task that involves competition for stimulus processing. The results suggest that the predictive utility of cues influences visual detection in the attentional blink indirectly, by altering the salience of critical distractors.

Impacts of Prior Beliefs on Causal Reasoning with Ambiguous Information

Yiyun Shou and Michael Smithson
The Australian National University
yiyun.shou@gmail.com

To date, little is known about how people treat and estimate ambiguous observations in causal reasoning. One possible source is one’s prior knowledge about causal associations. Numerous studies have demonstrated that prior beliefs play an essential role in reasoning. Prior knowledge guides human reasoning about the causal structure and estimations of the strength of causal links. Do people rely on prior beliefs during causal reasoning with ambiguous information? The present study investigated how the treatment of ambiguous information was influenced by prior beliefs, and how the impact may interact with the probability of the effect. A mixed design experiment was conducted. Subjects were randomly assigned to one of two prior causal valence conditions. The within-subject conditions varied the levels of ambiguity and the levels of the probability of the effect. Subjects seemed to treat the ambiguous observations as not supporting the prior causal valence provided in the reasoning context. The effects of ambiguity on causal strength were mostly independent of prior belief and the observed evidence. This latter finding implies that the treatment of ambiguous observations may occur prior to causal strength estimates, or may be a process that is independent of reasoning about causal strength.

Age-related decline in the recognition of emotional auditory, visual, and auditory-visual spoken expressions

Simone Simonetti, Jeeseun Kim, Chris Davis
University of Western Sydney, The MARCS Institute
s.simonetti@uws.edu.au

Older adults are reported to have problems in emotion recognition. The current study examined this by presenting emotional expressions that varied in terms of (1) emotion type (anger, happy, sad, surprise, disgust, and neutral), (2) signal clarity (well vs less-well recognised emotions based on a previous study), and (3) presentation modality, i.e., auditory only (AO), visual only (VO), and auditory-visual (AV) conditions. These stimuli were presented to older (n = 19) and younger (n = 24) participants for a forced-choice emotion judgement. Older adults showed poorer performance for all emotion types regardless of signal clarity for all presentation modalities; except for VO clear expressions where performance was at similar levels as younger adults. Younger adults showed an AV benefit (AV > VO) which did not interact with signal clarity; older adults showed an AV benefit only for the unclear expressions. These findings demonstrate that the problems older adults have in emotion recognition interact with presentation modality and that signal clarity plays a role in integrating information.
**Collaborative Searchers Rely on the Most Accurate Observer’s Responses in a Joint Decision**

Alison Simpson and Jason McCarley  
*Flinders University*  
ali.simpson@flinders.edu.au

Visual search is commonly a collaborative process that requires searchers to reach a joint decision. However, groups in collaborative cognitive tasks rarely match performance predicted by normative models in decision-making (Bahrami et al., 2010). What decision-making strategies do collaborative searchers rely on? We compared the empirical performance of two person teams in a signal-detection based visual search task to various decision-making models’ predictions of optimal performance. In a simulated medical decision-making scenario, 12 pairs of adults had to decide whether displays contained a target or not. In Experiment 1, targets were presented for either short or longer exposure durations to see how groups performances might change over time. Group performance matched a model that assumed the performance was dominated by the more sensitive member of each team. There was no evidence to suggest that exposure durations influenced group performances. Experiment 2 replicated this result in a free viewing search task.

**EEG spectral power density changes associated with illusory self-motion (vection)**

Alex Smith, Tara Spokes, Dr Stephen Palmisano, Dr Deborah Apthorp  
*Australian National University*  
u5015173@anu.edu.au

Vection is an illusion of self-motion that occurs when a stationary observer is presented with visual cues to self-motion. The current understanding of vection from a functional perspective is that the illusion arises from interactions between visual and vestibular sensory cortices, however the nature of such interactions are not clear. We conducted an EEG study to determine spectral power density correlates of vection to further understand the interaction between visual and vestibular processing of sensory information during the illusion and identify potential electrophysiological markers of vection onset. Participants were presented with visual stimuli that produce the illusion after several seconds of viewing, and would allow comparison between vection and non-vection experiences occurring during identical visual stimulation. Stimulus conditions were manipulated to explore the effects of differing visual-vestibular conflict on spectral power density. Results showed significant spectral power decreases in the beta (13-35Hz) band during periods of vection when compared to non-vection periods. This presents both a possible technique for determining the onset of vection that is not based on self-report, and also has implications on the visual-vestibular interaction account of vection.

**Working Memory Load in the Parity Task Reflects Stimulus Topology**

Philip Smith, Simon Lilburn, Elaine Corbett, David Sewell  
*The University of Melbourne*  
philips@unimelb.edu.au

We have shown that the working memory load in tasks using oriented Gabor patches is well described by a sample-size model. The model provides a parameter-free metric for working memory capacity that predicts how report accuracy declines as a function of display size. Here we investigated working memory performance in a cognitively-demanding parity task, in which stimuli are defined by the spatial relationship between members of a feature pair. Visual search for such stimuli is inefficient and likely serial. We found that the working memory load for parity stimuli exceeds that predicted by the sample size model, but is less than is predicted by a model in which load depends on the number of independent, pairwise feature contrasts in the display. It was well described by a model in which load depends both on the number of items in memory and on the number of links needed to define the stimulus as a single, closed, arcwise-connected figure, that is, on its topology. We speculate that the additional configural load imposed by parity stimuli may reflect the cost associated with solving the binding problem, which is needed to avoid illusory conjunctions.
ABNORMAL LOW BETA MODULATION IN NON-FLUENT CHILDREN: A MAGNETOENCEPHALOGRAPHIC STUDY OF ENTRAINMENT TO ISOCRONS BEATS

Paul F Sowman, Andrew C Etchell and Blake W Johnson
Macquarie University
paul.sowman@mq.edu.au

Stuttering, a disorder of speech fluency has been proposed to result from disordered timing mechanisms in the brain. Recently, it has been shown that passive tracking of isochronous beats recruits auditory motor networks that are manifest in entrainment of the beta envelope. In control subjects, beta power is shown to peak around the time of the beat in response to isochronous stimulation, an observation that supports the existence of predictive encoding of rhythm. In the current study we used magnetoencephalography (MEG) to examine activity from sensors overlying auditory regions of the brain in stuttering and non-stuttering children aged 3-9 years. For typically developing children, we found that brain oscillations in the beta band responded to rhythmic sounds with a peak in power near the time of stimulus onset. In contrast, stuttering children showed an opposite phase of beta band response, with a trough of activity at stimulus onset. These results suggest that stuttering may result from abnormalities in predictive brain responses which are reflected in abnormal entrainment of the beta band envelope to rhythmic sounds.

Ownership-induced affective responses to objects in social contexts

Samuel Sparks (presenting), Andrew Bayliss, and Ada Kritikos
Samuel Sparks and Ada Kritikos: School of Psychology, The University of QueensLand; Andrew Bayliss: School of Psychology, University of East Anglia
samuel.sparks@uq.net.au

Objects become meaningfully connected to the self via ownership, and this implicitly affects both cognitive and motor interactions with owned objects. We investigated whether viewing self-owned objects elicits rapid, involuntary affective responses. Additionally, we tested whether these responses are robustly positive regardless of context, or whether these are modulated based on social cues. In Experiment 1, participants received a coffee mug to use for 6-10 days before completing an affective priming task. On each trial, a task-irrelevant prime image (100, 352, or 1000 ms duration) appeared before participants rated a randomly-generated dot pattern as ‘pleasant’ or ‘unpleasant’. Primes were photos of the participant’s mug or a stranger’s mug, which appeared in a neutral context versus a negative social context (a stranger drinking from them). Participants were biased toward positive responses when primed with the self-owned mug compared with the other-owned mug, especially for brief primes (100 ms), but context did not modulate the effect. In Experiment 2, participants complete a preliminary task aimed to associate the stranger with either disgusting and unhygienic images or neutral images. Results so far indicate that associating the stranger with disgusting images does modulate the ownership effect.

Neural Computations Underlying Confidence in the Mind’s Eye

Morgan L. Spence, Paul E. Dux & Derek H. Arnold
The University of Queensland
morgan.spence@uqconnect.edu.au

Humans intuitively evaluate their decisions by forming different levels of confidence. It has been established that confidence and accuracy are well-correlated, but are also separable. Understanding of the computations underlying confidence, and how these differ from those that limit sensitivity, is lacking. We have found that confidence and accuracy are separable because the variability of a sensory signal undermines confidence to a greater extent than it does sensitivity. Stimuli consisted of dots moving in a uniform distribution of different directions about a global mean, with people making left/right judgments regarding the global direction. The critical manipulation was the range of stimulus directions. Prior to the experiment, we calibrated stimuli to equate sensitivity, by varying the magnitude of the global direction offset from vertical. This failed to equate confidence - despite constant sensitivity, people were less confident when judging stimuli containing more different direction signals. When we instead calibrated stimuli to equate confidence, people were more sensitive when judging such signals. These complementary results reveal a differential weighting of the degree of signal variance in computations that limit sensitivity and confidence. This means that the precision of perceptual decisions, and inferences made in those decisions, rely on independent transformations of sensory input.
Hierarchical Bayesian analysis of a week discrimination memory pattern
Vishnu Sreekumar (Ohio state University), Simon Dennis (University of Newcastle), Per Sederberg (Ohio State University)
University of Newcastle
simon.dennis@newcastle.edu.au

To understand how people reconstruct the temporal source of real-world memories, we recruited participants who wore a smartphone in a pouch around their necks during an experience sampling phase of 2 weeks. The phone automatically captured images and other sensor data. After a retention interval of 5 days, participants performed a week discrimination task in which they were shown an image and were asked to identify which week it belonged to: week 1 or week 2. The serial position curve of the median P(correct) shows an elevated performance across week 1 and at the end of week 2 but a significant decrement in performance at the beginning of week 2. This pattern can be explained by a model that assumes that 1) participants match the retrieved context elicited by the probe image to the reinstated end of week 2 context, and 2) the function describing the mean match is a decaying function of the time difference from the end of week 2. Model selection favored an exponential match function. Furthermore, most participants adopt an optimal criterion that maximizes performance across both weeks.

Solving the Problem of View-Invariant Object Processing: An Upper-Hemifield Advantage
Daniell Steinberg, Genevieve Quek, and Matthew Finkbeiner
Macquarie University
daniellsteinberg@mq.edu.au

Manipulating the angle of rotation of faces has significant effects on recognition performance (Hill, Schyns, & Akamatsu, 1997). Recent evidence suggests that face processing may also be superior in the upper visual field (UVF), compared to the lower visual field (LVF, Quek & Finkbeiner, 2014). We asked how this vertical asymmetry would interact with viewpoint variance in object recognition. We aimed to determine whether the visual system is better able to cope with such variation in the UVF, compared to the LVF. Participants made left and right reaching movements to classify the sex of faces, which appeared immediately above or below central fixation. To simulate changes in viewpoint, we manipulated the degree of rotation along the yaw plane from which the faces were shown. We found that rotation affected sex-discrimination accuracy differently along the vertical meridian. When faces appeared above fixation, participants’ accuracy was high and unaffected by rotation. However, when faces appeared below fixation, sex-discrimination accuracy was strongly affected rotation. LVF faces were categorised correctly significantly more often when they appeared at 6-degrees, relative to 30-degrees. These findings suggest that the visual system is better able to reconcile viewpoint variation for faces in the UVF than in the LVF.

Binding and Attention in Working Memory for Whole-Body Actions
Catherine Stevens, Ashleigh Mills, Yvonne Leung, and Josephine Terry
MARCS Institute and School of Social Sciences & Psychology, University of Western Sydney, Australia
kj.stevens@uws.edu.au

Are human actions and features such as direction bound or stored independently in visual working memory (VWM)? Binding was investigated using a recognition task that compared intact and recombined test probes. Intact test probes were action-direction feature pairs presented as they were in the study sequence; recombined test probes consisted of previously seen action-direction features presented in new combinations. Participants were given either cued instructions (cue) or no attentional instruction (no cue). 1) If direction and action are integrated/bound in VWM then accuracy is greater and reaction time (RT) faster in recognizing intact probes compared with recombined test probes. 2) If feature integration/binding is obligatory then instruction to attend to either feature during retention does not affect the intact (over recombined) probe advantage. As hypothesized, there was an intact advantage in accuracy with recognition significantly greater and RT faster for intact than recombined probes. Probe type and attention interacted with greater accuracy for intact than recombined probes but only in the no cue condition. An interaction between probe type and attention revealed significantly faster RT for intact than recombined probes but only in the cued condition. Dynamic features action and direction appear to be integrated in VWM.
A Linear Ballistic Accumulator Model of Event-based Prospective Memory

Luke Strickland, Shayne Loft, & Andrew Heathcote

University of Western Australia, University of Tasmania
20360482@student.uwa.edu.au

Event-based prospective memory (PM) tasks require participants to substitute an atypical PM response for more routine ongoing task responses when presented with targets. We fit the Linear Ballistic Accumulator model (LBA) to an event-based PM task to predict the RT distributions and accuracies of both ongoing task responses and PM responses. The LBA model assumes that, upon stimulus presentation, evidence for competing responses accumulates, and that the first response to reach a threshold of evidence is made. In Experiment 1, PM accuracy was lower and non-target trial response times (RTs) were slower under nonfocal PM conditions compared to focal PM conditions. In Experiment 2, PM accuracy was higher and non-target trial RTs were slower when participants were told that the PM task was important. LBA model fits indicated that the effects of focality and importance on PM accuracy were due to a shift in threshold to make PM responses, rather than a shift in the level of moment-to-moment PM task response-relevant processing. Differences in non-target trial RT’s between conditions were due to an increased threshold to make ongoing task responses. These findings disagree with the theories of PM, which propose that differences in PM demands cause shifts in resource allocation.

Of meat and men: sex differences in attention to meat

Danielle Sulikowski; Hamish J Love
Charles Sturt University
danielle.sulikowski@ymail.com

Many studies have used visual search tasks to show that especially relevant stimuli (including threatening, but also positively valenced, stimuli) are given priority visual attention. In the current study we combined a visual search task with an IAT (implicit association test) and explicit self-reports to investigate how men and women respond to meat and non-meat foods. Meat has sex- and age-specific nutritional benefits - it is important for adult males building muscle mass and for early brain development in babies and children. Successful hunting may also have once served as a signal of a male’s physical prowess and/or their ability to provide important nutrients for future offspring. Our study revealed that, in the visual search task, men located meat more quickly, and searched for it more cautiously, than non-meat foods, with the opposite pattern appearing for women. Differential responding to meat and non-meat foods was more pronounced for both sexes in participants that reported being hungrier at the time of the task. Men also implicitly associated meat with the concept of health and vitality more strongly than did women. These implicit measures dissociated from explicit self-reports.

Musical syntax and linguistic syntax processing in congenital amusia

Yanan Sun, Xuejing Lu, Hao Tam Ho, Blake Johnson, and William Forde Thompson
Macquarie University
yanan.sun@mq.edu.au

Congenital amusia is a neurodevelopmental disorder in fine-grained pitch perception. Recent study showed that amusics also had difficulty detecting out of key tones in a tonal melody. This suggests that the congenital amusia may extend beyond a fine-grained pitch perception deficit, and may include music syntactic processing. The “Shared syntactic Resource Integration Hypothesis” (Patel, 2003) suggests that the music-syntax difficulty might extend to language-syntax processing. We propose that congenital amusics might also have syntax-based deficits in both music and language domains, and that these might be reflected in the abnormal pattern of brain responses. To test this hypothesis, spoken sentences with linguistic syntactic violation and melodies with music syntactic violation were presented separately in two sessions. Amusic and normal participants were introduced to do probe tasks (detecting the timbre change for the melodies and answer relevant questions for the sentences) rather than response the violations. Meanwhile, their brain activities were recorded using MEG and concurrent EEG. The preliminary result showed that syntactic violations in both music and language elicited similar brain responses in normal controls (ERAN and N5 for melodies and ELAN for the sentences), however, amusics showed impairments in these event-related brain responses in both music and language tasks.
Correcting misinformation and the familiarity backfire effect

Briony Swire-Thompson & Ullrich Ecker
The University of Western Australia
briony.swire-thompson@research.uwa.edu.au

People continue to use information in their reasoning even after they have been explicitly told that the information is not true. Ironically, under some circumstances, a retraction can even lead to an individual increasing their belief in the very misconception the retraction is attempting to correct; this is known as a backfire effect. It has previously been assumed that the repetition of the misconception within the retraction partially accounts for this phenomenon, as the myth’s repetition will inadvertently make the myth more familiar. The present studies investigated whether increased familiarity does lead to a backfire effect in undergraduate (study 1) and older adult populations (study 2). Participants rated their belief in various statements of unclear veracity. Facts were subsequently affirmed and myths were retracted. Participants then re-rated their belief either immediately or after a delay. Results indicate that over the course of one week, affirmations of facts led to sustained belief change yet the retraction of myths led to only temporary belief change. However, participants’ belief in the myths never exceeded pre-manipulation belief levels. This absence of a backfire effect suggests that increased familiarity alone does not lead to an inadvertent strengthening of misconceptions.

The chemistry between us: attraction, withdrawal and electrodermal activity

Ancret Szpak, Tobias Loetscher, Owen Churches, Nicole A. Thomas, and Michael E.R Nicholls
Flinders University
ancret.szpak@flinders.edu.au

The close proximity of strangers can increase physiological arousal and decrease cognitive performance. Previous research suggests these reactions are modulated by the perceived discomfort of a social situation. Most people try to avoid crowded situations; however, in some instances close interpersonal proximity is unavoidable. In these cases, people seek to withdraw their attention from others and retreat into their own personal space. This study investigated the relationship between physiological discomfort and the attraction/withdrawal of spatial attention. Shifts in spatial attention were measured by a line bisection task and physiological discomfort was measured by an electrodermal activity wrist monitor. Participants performed a radial line bisection task in two conditions: alone or facing a stranger. We observed a relationship between physiological discomfort and spatial attention. Participants with high arousal displayed attentional withdrawal (away from the other person), whereas participants with low arousal demonstrated an attentional attraction (towards the other person). One’s perceived level of social discomfort can shift spatial attention either towards or away from the other person. Those who feel uncomfortable in close proximity to a stranger exhibit attentional withdrawal, which serves to increase the perceived distance between themselves and others.

Parsing processes in reading: Interference to nonword classification from the presence of embedded words.

Marcus Taft
UNSW Australia
m.taft@unsw.edu.au

If the classification of a nonword in a lexical decision experiment is delayed by the presence of a real word embedded within it, this indicates that the letters forming that word were fed into the lexical processing system. Therefore, by manipulating the position of the embedded word, it can be established how letter-strings are parsed during word recognition. A left-to-right parsing process would be supported by interference from an initial embedding (e.g., cleart vs gleart) concomitant with no interference from a final embedding (e.g., claugh vs craugh). However, the sparse literature that exists on this question is inconsistent with regard to whether the position of embedding makes a difference. The present study provides a more thorough examination of this question and finds greater interference from an embedded word at the beginning of a nonword compared to its end, though the latter is nevertheless significant. In addition, an “outer” embedding (e.g., ghoust vs gloust) also generates interference. The results are interpreted within a model of word parsing that incorporates onsets and rimes, with priority given to initial letters.
Memory amplification for traumatic experiences: A laboratory analogue
Melanie Takarangi, Jacinta Oulton, Deryn Strange, Sasha Quayum
Flinders University
melanie.takarangi@flinders.edu.au

Trauma victims often remember their experience as being more traumatic later, compared to immediately after, the event took place. This pattern—termed “memory amplification”—is associated with more re-experiencing (intrusive thoughts) of the trauma, a symptom that is characteristic of posttraumatic stress psychopathology. However, this relationship has primarily emerged in field research, and potential mechanisms underlying it remain untested. Our main aim in the current study was to determine whether memory amplification would also occur in the laboratory. Our secondary aim was to examine the proposed explanations for memory amplification. We randomly assigned subjects to either a multiple-test or one-test condition so that we could study memory amplification in two ways: we wanted to observe how memory accuracy changed over time within-subjects, and compare this pattern to subjects who developed false trauma memories in the absence of prior testing. Subjects viewed traumatic photographs and recorded intrusive thoughts, voluntary rehearsal and analogue symptoms relating to the photographs. We tested memory for the photographs on one or two occasions, one week apart. As expected, overall, having more false memories for traumatic photographs was associated with having more re-experiencing symptoms. Our data suggests that a motivation to justify distress contributes to this relationship.

Lexical competition as an indicator of orthographic learning in children
Niina Tamura, Anne Castles, and Kate Nation
University of Oxford
niina.tamura@psy.ox.ac.uk

Two experiments investigated lexical competition as an indicator of orthographic learning in children aged 9 to 11. Lexical competition was indexed by a prime-lexicality effect in masked form priming. Children were exposed to rare English target words embedded in stories on three separate days. Each target word was the only orthographic neighbour of a high-frequency base word. Prior to training, target words were expected to behave like nonwords when used as form primes for their base words in a lexical decision task. After training, they were expected to behave like real words in the same task, i.e. engage in lexical competition. In both experiments, a prime-lexicality effect emerged after training, with newly learned words inhibiting the processing of existing neighbours. Children also showed good explicit learning of target word meanings and spellings. The pattern and magnitude of priming was not influenced by a depth of processing manipulation at training in Experiment 1 or repeated vs. diverse encounters at training in Experiment 2. These findings show that relatively few exposures to new words (18 in Experiment 1, 12 in Experiment 2) in natural reading initiates orthographic learning, such that newly learned words begin to engage in lexical competition.

It’s not all in the rhythm: The attentional blink requires a match between entrainment items and targets
Matthew F. Tang, David R. Badcock, James T. Enns & Troy A.W. Visser
The University of Western Australia
matthew.tang@uwa.edu.au

The attentional blink (AB) refers to the ubiquitous failure to detect the second of two items presented in a rapid serial visual presentation (RSVP) task. Notably, RSVP items are generally presented at 10 Hz, mirroring the alpha rhythm that underlies awareness and attention. Because of this correlation, it has been suggested that RSVP presentation rate causes the AB rather than limitations in selective attention [Zauner, et al. (2012). Alpha entrainment is responsible for the attentional blink phenomenon. Neuroimage]. We tested this possibility by comparing AB magnitude following an RSVP preceded by items similar (digits, pseudo-letters) or dissimilar (filled rectangles) to targets. As predicted by selective attention accounts, we found that the AB disappeared when the RSVP was preceded by rectangles and that it was robust when preceded by target-similar digits. However, a robust AB was still obtained when target-similar digits preceded the RSVP. But consistent with a role for entrainment, an RSVP preceded by rectangles presented at a different frequency (6.25 Hz) caused the AB to return. These interactions between stream rhythm and distractor identity imply that both entrainment and selective attention play central roles in the AB.
Reading Chinese Pseudo-Character: An account of word recognition models

Mr. Mark Tang, Dr. Ran Shi
Australian College of Applied Psychology
m.tang@live.com.au

The study of Chinese psycholinguistics is of great interest to researchers investigating the types of information represented in the mental lexicon. Previously studied models of word recognition have been developed from English and other alphabetic writing systems. Studies the drastically different orthography in Chinese have produced a number of important and interesting findings that have implications for models of language processing. Most psycholinguists concur that Chinese characters have a unique representation at lexical level, but whether there are sub-lexical levels of representation (potentially containing radicals, strokes and features), and how these representations are involved in lexical accesses is still under debate. For example, the Lexical Constituency Model (LCM) suggests that radicals contained in compound characters would activate its own standalone character pronunciation, whereas the Hierarchical Interactive Activation Model (HIAM) suggests that radicals do not have direct access to phonological activation. Therefore, an experimental study of native Chinese speakers, in a pseudo-character naming paradigm will be used to validate predictions based on said models. Where the LCM predicts the generation of stem-pronunciations and the HIAM advocates type-pronunciations. Additionally the properties of Character structure will be examined by comparing horizontal and vertical pseudo-characters. Results will be analysed using a 2x2 within-subjects ANOVA.

The functional organisation of monkey IT cortex: Are the face patches important?

Jessica Taubert, Goedele Van Belle, Wim Vanduffel, Rufin Vogels, Bruno Rossion
KU Leuven / UC Louvain
jessica.taubert@kuleuven.be

In the monkey brain, “face patches” are comprised of a high proportion of face cells, however, such cells can be found outside these functionally defined patches and throughout the inferior temporal (IT) cortex. It is not known whether the face cells outside of the face patches behave the same way as the face cells inside the face patches. Here, we asked whether inversion has a differential impact on the responses of face cells depending on anatomical position. We first localized the patches in IT that responded more to faces than other objects. Then, we recorded single cell responses in two of these patches (ML and AL) in addition to control positions between ML and AL. We searched for cells using face and non-face stimuli, presented either in their canonical orientation or upside down. Face cells that were recorded in ML responded more strongly to upright than inverted faces. This was somewhat true for face cells in AL. For face cells that were found outside the face patches, however, there was evidence of a strong search bias. These data yield differences between cell populations that offer vital clues about the functional organisation of IT.

Improving Eyewitness Monitoring: Increasing Knowledge of the Differences Between Correct and Incorrect Memories Via Training

Stacey Taylor-Aldridge, Nathan Weber
Flinders University, South Australia
stacey.taylor-aldridge@flinders.edu.au

When providing memory reports, eyewitnesses often find it difficult to maximise both the quality and amount of information they provide. This is partly due to errors made when distinguishing between correct and incorrect memories (i.e., monitoring). In four studies, we aimed to develop and test a training technique designed to improve this ability by highlighting differences in memory cues associated with correct and incorrect memories. Our first study (N = 63) identified the content to be used in the training, while studies two (N = 120) and three (N = 90) implemented the training and assessed its effects on monitoring (i.e., Type-2 Signal Detection Theory discrimination). Although the training did not have any impact on monitoring, this may have been due to the cued-recall format of the questions. In study four (N = 80), we compared monitoring abilities in cued- and free-recall. Findings showed that, compared with free-recall, cued-recall elicited (i) poorer monitoring, and (ii) retrieval of a higher proportion of incorrect information. In order for the training to be effective for cued-recall questions, it may also need to include information about the limitations of memory (i.e., that incorrect memories are more likely to be retrieved during cued-recall).
Mapping human V4: Correcting artefact reveals hemifield organisation

Harriet Taylor, Alexander Puckett, Zoey Isherwood, Mark Schira

University of Wollongong
ht380@uowmail.edu.au

Ongoing difficulties in mapping the human visual area hV4 have resulted in the existence of two main theories as to its retinotopic organisation. These are i) the full hemifield model, which states the entire hemifield of hV4 is located ventrally, and ii) the split hemifield model, which posits hV4 is mostly a ventral area, but with a small portion located dorsally. An explanation for the apparent variation between subjects was suggested with the discovery of the venous eclipse artefact (Winawer et al. 2010), caused by signal distortion in the region of the Transverse Sinus, potentially obscuring parts of hV4 in some subjects. Puckett et al., 2014, suggested that voxel responses in and near the venous eclipse are reliably inverted rather than randomly distorted. Here we tested whether correcting such voxels could restore a full, ventral hemifield in hV4 in all subjects. The procedure was partially successful, with the complete restoration of a full hemifield in one subject, and improvements in the hV4 maps of others. In summary we found complete hemifield representations for hV4 in 9 of 16 hemispheres. Additionally, consistent clustering of inverted voxel responses was seen in the region of the venous eclipse in all subjects.

Ranking Judgments in Visual Working Memory

Rob Taylor, Mike Le Pelley, & Chris Donkin

University of New South Wales
taylor.rt17@gmail.com

A major debate in modeling Visual Working Memory (VWM) is whether item storage is best described by a discrete (e.g., slots) or continuous (e.g., resources) process. Historically, the slots account has received most support. Usually, the merit upon which the relative fit of each model are gauged depend upon parametric approaches. However, there are issues in simply comparing deviance indices (e.g., AIC, BIC) which may lead to erroneous conclusions regarding the likely data generating model. Instead, we use ranking judgements which require minimal parametric assumptions and permit model based predictions to be compared without the need for model fitting. We present data from a series of experiments that manipulate load on VWM.

Both-edges letter position in word recognition errors

Schubert, Teresa and McCloskey, Michael

Study done: Johns Hopkins University. First author currently: ARC Centre of Excellence in Cognition and its Disorders, Macquarie University
teresa.schubert@mq.edu.au

Much recent research has investigated letter position coding with behavioural tasks such as lexical decision and same/different judgments. In this study we developed a new paradigm to elicit letter identification errors from unimpaired readers in a word recognition task. Of particular interest are letter perseveration errors, which reflect the residual activation of letters from previous trials. When letters perseverate into the same position they occupied in a previous response, the errors reveal the position code used by the identification system: The position code that successfully accounts for the position of the perseverations is assumed to be employed in word recognition. We compared the ability of position schemes based on the word-beginning, word-end, both-edges, midpoint, as well as closed- and open-bigrams to account for the position of over 15,000 perseveration errors in our corpus. Results indicate that their position is best described by a graded-both-edges position scheme. In such a scheme letter position is represented by distance from both the beginning and end of the word, with similar representations for adjacent positions. This study builds upon recent work that posited the both-edges scheme in reading based on the illusory word paradigm with normal readers and analysis of error data from acquired dyslexia.
Going through the emotions on the space-time continuum
Nicole A. Thomas & Melanie K. T. Takarangi
Flinders University
nicole.thomas@flinders.edu.au

Humans experience mental time travel by reliving past experiences and visualising potential future events. These visualisations are represented linearly, on a mental timeline, with past events on the left and future events on the right. Valence also influences how an event is remembered/imagined. Interestingly, valence is lateralised, such that negative information is associated with the left, whereas positive information is associated with the right. We investigated whether valence effects occur when only one side of the mental timeline is represented. In Experiment 1, participants generated positive and negative events, associated with a keyword, occurring in either the past or future. They indicated, using a horizontal slider, when each event occurred, ranging from present to birth/death. Consistent with previous research, negative events were placed further from present and most events occurred in the near past/future. In Experiment 2, the timeline was reduced to the past/next 5 years. Negative events were placed to the left of positive events for both past and future. This result contrasts prior research wherein future negative events are temporally distant (to the right of positive events), to maintain psychological distance. The horizontal slider enabled events to be individually placed, allowing the underlying left-negative association to emerge.

The gist of a match: Fingerprint expert decision making in the blink of an eye
Thompson, M. B. & Tangen, J. M.
The University of Queensland
mbthompson@gmail.com

A hallmark of genuine expertise is the ability to accurately perform a domain relevant task quickly. Stimuli for which people have lots of experience can be categorised accurately within a few hundred milliseconds, such as natural scenes (Potter & Faulconer, 1975; Greene & Oliva, 2009) and medical images (Evans et al., 2013). We set out to test the limits of what expert fingerprint examiners can achieve with brief stimuli presentation times. Pairs of matching (target) and non-matching (distractor) fingerprints were presented to experts and novices, for 250, 500, 1000, and 2000 milliseconds. Experts were more conservative than novices, but still more accurate overall. With rapid presentation times in particular, experts were much better able to discriminate matching and non-matching prints. It seems that fingerprint experts are able to, very quickly, get the “gist” about whether two fingerprints match or not. They have developed a fast and accurate method of categorisation based on their vast experience, a finding that supports an instance-based account of expert reasoning (Brooks, 1978; 2005). Our conclusion is at odds with general wisdom in fingerprint identification practice and formal training, and at odds with the claims and explanations that are offered in court during expert testimony.

Determining the Role of Spectral and Duration Cues in Vowel Perception
Gabriel Tillman, Titia Benders, Scott Brown, & Don van Ravenzwaaij
University of Newcastle
gabriel.tillman@newcastle.edu.au

Speech perception research aims to understand how humans perceive spoken language. What is fundamental to perceiving spoken language is the ability to identify basic linguistic units, such as phonemes, in the acoustic signal of speech. Two important acoustic cues are spectral cues and duration cues. When Dutch listeners categorize vowels as the long and open /a:/ versus the short and closed /A/, behavioral categorization data suggests that spectral quality is weighed more heavily than duration when classifying these phonemes. But unlike spectral information, duration information is only completely available at the offset of the stimulus. Therefore, listeners’ processing of duration may be underestimated in behavioral categorization data. To disentangle the contributions of spectral quality and duration in vowel categorization, we use reaction time data from a vowel categorization task. We then model this data with a Bayesian hierarchical Linear Ballistic Accumulator model. Spectral cues, but not duration cues, appear to influence the speed of processing of individuals. Duration cues did, however, have a strong influence on non-decision processes.
Cross-modal phase influences the steady-state EEG response and perceptual sensitivity to amplitude modulated auditory and vibrotactile stimulation

Timora, J. R., & Budd, T. W.
University of Newcastle
justin.timora@uon.edu.au

The steady-state EEG response (SSR) reflects oscillatory cortical activity entrained at the rate of periodic stimulation and is thought to subserve temporal processing of sensory stimuli. Prior research reveals that temporally congruent cross-modal stimulation increases the phase coherence of oscillatory responses across modality which has been proposed as the neural basis for multisensory integration. In this study, we explored how the cross-modal phase of amplitude modulated (AM) acoustic and vibrotactile stimuli influenced across-trial phase coherence (i.e. PLV) of the SSR and perceptual sensitivity. Psychophysical thresholds and EEG activity were measured for 27 and 40 Hz AM stimuli across three cross-modal phase conditions: Unimodal (AM stimuli in one modality alone); In-phase (same cross-modal phase) and Out-of phase (180° cross-modal phase difference). Auditory sensitivity decreased when cross-modal stimuli were out of phase while vibrotactile sensitivity decreased for both bimodal AM conditions. Phase coherence for 27 Hz SSR activity increased for both in and out of phase bimodal AM conditions relative to unimodal conditions. Phase consistency of 40 Hz SSR activity was greater when cross-modal stimuli were out of phase. These results question the involvement of oscillatory activity underlying the SSR in multisensory integration and its relationship to perceptual sensitivity.

Can you rub your tummy and tap your head? A fine motor movement analysis of how writing like movements reduces serial verbal recall.

Richard Tindle & Dr Mitchell G. Longstaff
Southern Cross University
Richard.Tindle@scu.edu.au

To investigate the role of attention in working memory and writing we established an experiment that would incrementally increase the attentional load of a concurrent task while completing a serial verbal recall task. Participants completed three working memory tasks; they listened to words while concurrently producing writing like movements (tracing inverted loops; drawing condition); listened to words while tracing loops and simultaneously producing finger taps with a single finger (single tap condition) or with two fingers (double tap condition), with their non-dominant hand. Our hypothesis was supported showing that recall was significantly lower in the double tapping condition compared to the drawing and single tapping conditions. No other differences reached significance, despite the recall in the single tap condition falling in-between the drawing and double tap conditions. A decrease across all DV’s (recall, kinematics and RT) was shown between the double tapping condition compared to the drawing and single tap conditions, with no differences occurring between the drawing and single tap conditions. This shows an effect of attentional demand rather than a dual task effect. Evidence for a trade-off between writing fluency, tapping RT and recall is presented, offering evidence to support a general attention capacity of working memory.

Parafoveal processing of contextually predictable words: Effects of reading proficiency

Aaron Veldre, Sally Andrews
University of Sydney
aaron.veldre@sydney.edu.au

This study investigated whether reading proficiency modulates the extraction of parafoveal information from contextually predictable words. Sentences were constructed in which constraining contextual information came either before or after a critical target word, such that the target was highly predictable or not predictable when it was encountered in first-pass reading. The parafoveal preview of the target was also manipulated using the gaze-contingent boundary paradigm to be identical, orthographically related, or unrelated. In order to capture individual differences in lexical precision, participants were assessed on measures of reading comprehension and spelling ability. In the average data, the benefit from a valid preview was greater for predictable than unpredictable words. However, analyses including the individual difference measures revealed that this effect was principally restricted to low proficiency readers. Higher proficiency readers showed equivalent preview benefits for predictable and unpredictable words. There was also evidence that the precision of skilled readers’ lexical representations affected the probability of
skipping contextually predictable words. These results suggest that readers with imprecise lexical knowledge are more likely to rely on contextual information to supplement word identification during reading.

Minimum time for changes in response strategies
Rachael Vickery, George Kachergis, Andrew Heathcote & Scott Brown
University of Newcastle
Rachael.Vickery@newcastle.edu.au

Decision making models have largely assumed that changes in decision thresholds cannot occur on a trial-to-trial basis. However, such assumptions are unsubstantiated within the literature. Research suggests that decision thresholds can be adjusted in under 1500ms. We investigated the time course of changes in response strategies in a brightness discrimination task with a speed accuracy tradeoff manipulation. Participants were cued for either fast or accurate responding on each trial with the interval between the presentation of the cue and trial manipulated (0ms, 50ms, 100ms, 200ms, 400ms). Analysis of the data indicates that participants were able to adjust response strategies given relatively small intervals between presentation of cue and stimulus. We conclude that participants are able to change decision thresholds on a trial-to-trial basis in response to stimulus.

Temporal cues derived from statistical patterns can overcome resource limitations in the attentional blink.
Troy A.W. Visser, Jeneva L. Ohan & James T. Enns
University of Western Australia (Visser, Ohan, Enns), University of British Columbia (Enns)
troy.visser@uwa.edu.au

Previous studies have shown that humans are sensitive to statistical patterns indicating the likely locations, identities, and timings of visual targets. Here we test whether participants can also use this kind of information to ameliorate the attentional blink (AB) – a reduction in accuracy for the second of two targets (T1, T2) presented at brief inter-target intervals (lags). In particular, we asked whether participants can use patterns arising from differential distributions of inter-target lags across trials to predict the arrival of T2. We tested this by comparing the AB in an aging vs. non-aging distribution of trials, where aging refers to the increased likelihood of T2, given that it has not yet occurred, when lags occur with equal frequency. Experiments 1 and 2 showed that the aging condition yielded greater T2 accuracy at longer lags than the non-aging condition. Experiment 3 used a more sensitive response time measure to show faster T2 discrimination at shorter lags in the non-aging condition. These results demonstrate that participants can predict the likely onset of T2 using statistical patterns present in the AB task, and use this to more effectively direct limited processing resources.

How much you are willing to spend on consumable goods is systematically shaped by past decisions
Katharina Voigt, Carsten Murawski, Nicole Stefancic & Stefan Bode
The University of Melbourne
katharina.voigt1@gmail.com

Previous studies have provided evidence that choices do not merely reveal preferences, but also shape them. To date, these choice-induced preference changes have been investigated exclusively in hypothetical choice scenarios. The present study examined whether the impact of choice on preference extends to non-hypothetical choice conditions in combination with incentive-compatible measures of preferences, i.e. willingness-to-pay for food items that were available for consumption after the experiment. Participants completed either a hypothetical or non-hypothetical version of a free-choice paradigm in which they i) valued snack foods, ii) made binary choices between equally-valued snacks, and iii) valued the snack foods again. Only in the non-hypothetical condition did participants actually receive items later on. The effect of choice on value was measured as the difference between the first and second valuation. Value increased for items that were chosen before, and decreased for items that were not chosen, in the non-hypothetical version, but not in the hypothetical version of the free-choice paradigm. This finding suggests distinct decision-making strategies for hypothetical choices compared to decisions involving real incentives. Moreover, contrary to the assumption of stability of preferences in standard decision theory, this demonstrates that the value of goods can change as a function of choice.
When more doesn’t help: Learning categories with multiple features

Wai Keen Vong, Andrew T. Hendrickson, Amy F. Perfors, Daniel J. Navarro
University of Adelaide
waikeenvong@gmail.com

How does the number of feature dimensions impact category learning? There are two different views on how more features should affect categorization. From a statistical learning perspective, more features should be helpful if they provide additional information about the underlying category structure. On the other hand, from a rule learning perspective more features should hinder performance as the search space dramatically increases. Past research has shown support for both theories, with some studies finding better or equal classification performance with more features (Hoffman & Murphy, 2006; Minda & Smith, 2001), yet other work has found that additional irrelevant features decreased performance (Edgell et al., 1996), suggesting different category structures may drive strategy and performance in learning with many features. We conducted a category learning experiment where stimuli consisting of up to 16 binary features were used, and investigated learning across two category structures, both of which had a single feature that was a strong predictor of category membership, but one had no other predictive features while the other had many slightly predictive features. Results showed that more features lead to a decrease in performance in both category structures, and this will be discussed with simulations from category learning models.

Threat compels attention, but not automatically: Current goals modulate attentional capture & disengagement

Joyce M. G. Vromen, Ottmar V. Lipp, Roger W. Remington, and Stefanie I. Becker
The University of Queensland
j.vromen@uq.edu.au

Threat distractors compel our attention. Yet there is controversy about whether they automatically capture attention (initial orienting) or delay disengagement (prolonged dwell time). While there is some evidence that delayed disengagement is subject to attentional control, it remains unexplored whether the initial orienting towards threat is automatic or subject to top-down attentional control. The current study assessed whether the same photorealistic spider distractors captured attention and delayed disengagement when they were goal-relevant (Experiment 1) or goal-irrelevant (Experiment 2). We employed a novel modified spatial cueing paradigm that is the first to successfully disentangle capture and disengagement by cueing attention towards or away from the threat distractor on each trial. Both capture and disengagement were found to be modulated by the threat stimuli’s goal-relevance. Most interestingly, attentional capture by spider distractors was observed over the entire response time distribution when spiders were goal-relevant, but was almost entirely eliminated when they were goal-irrelevant. Therefore, the current study provides evidence that not only disengagement from, but also capture by threat, is subject to attentional control.

Further evidence that women dress to impress: naturalistic observations, and relationship to hormone levels and mating motivation

Danielle L Wagstaff, Joshua Makin, Darren Burke
University of Newcastle, Australia
c3148892@uon.edu.au

A host of previous research has demonstrated changes in women’s preferences for masculine faces, behaviour, sexual attitudes, etc., as a function of proximity to ovulation. However, until now, evidence of a change in skin exposure across the menstrual cycle (as measured within subjects), has only been inferred through independent ratings of attractiveness, and perceived and self-reported effort put into appearance. Our aim was to determine whether we could demonstrate naturalistic changes in skin exposure across the menstrual cycle in a sample of Australian women, and the relationship to various other measures related to mating. Once during the fertile, and once during the non-fertile phase of the menstrual cycle, 31 non-hormonal contraceptive using women were presented with masculinised and feminised male faces, and asked to indicate which faces they found more attractive as a short-term or long-term partner. They also posed for a full-length photograph, provided a saliva sample, and indicated their desire for a short-term or long-term relationship. We have demonstrated a change in the proportion of exposed skin as a function of proximity to ovulation, and discuss how these changes relate to women’s preferences for masculine/feminine faces, their levels of progesterone and estradiol, and their self-reported mating motivation.
Can other-race face recognition be so poor that it qualifies as "prosopagnosia"?
Lulu Wan, Kate Crookes, Elinor McKone
Research School of Psychology, The Australian National University, Australia; School of Psychology and ARC Centre of Excellence in Cognition and its Disorders, University of Western Australia
lulu.wan@anu.edu.au

The other-race effect (ORE) is well known to exist, yet the question of how severe its effects might be in everyday life has received little attention. Laboratory studies (e.g. old-new recognition, CFMT task) typically find only a fairly modest mean decrement in recognition (e.g., 10% reduction in accuracy), suggesting perhaps it might be fairly trivial problem in everyday life. On the other hand, failures of eyewitness testimony leading to long-term incarceration of the wrong other-race offender (e.g., for rape or murder) suggest the ORE might have severe real-world implications, at least in some cases. Here, we examine whether large individual differences in ability can resolve this apparent conflict. We focus on individuals who are so bad at other-race face recognition that they would qualify as being "prosopagnostic" (but are not genuinely prosopagnostic, i.e., they are not in the bottom 2% of the population for recognising own-race faces). For Caucasian and Asian participants (n=444), we report that approximately 7-8% display this "pseudo-prosopagnosia" for the other-race. We examine the extent to which this can be explained by: being at the low-end of face recognition abilities even for own-race faces; and/or having low levels of contact with the other race.

The role of sleep in novel written word learning
Hua-Chen Wang; Greg Savage; Tamara Paulin; Anne Castles
Macquarie University; Centre of Excellence in Cognition and its Disorders
huachen.wang@mq.edu.au

Recent research in spoken word learning suggests that sleep contributes to the consolidation of new memory representations (e.g., Gaskell & Dumay, 2007). To date, little research has addressed whether these findings can be extended to the learning of written words. This study examined whether sleep contributes to novel written word learning in skilled readers. Forty-nine undergraduates attended two sessions at 12 hour intervals. To manipulate sleep, half of the participants learned 20 novel words at 8 a.m. (AM Group) and half learned the words at 8 p.m. (PM group). A free recall and a semantic categorisation task (to measure lexical competition as an index of consolidated memory representations; Bowers, 2005) were measured once immediately after learning, and once after a period of 12 hours delay, (with sleep intervening between the two measuring times for the PM group but not the AM group). No difference between groups was found for the free recall task. However, a lexical competition effect was found in the PM group, where sleep had taken place after learning, but not in the AM group. The findings suggest that sleep assists in the consolidation of learning written word representations. Implications for reading acquisition and memory models are discussed.

Uncertainty and bias in estimation of the sex and age of faces.
Tamara L. Watson, Yumiko Otsuka, Colin W.G. Clifford
University of Western Sydney, UNSW
T.Watson@uws.edu.au

Prior expectation may influence our perception of people at the first meeting. For example, it has been shown that we are more likely to categorise a person as 'male' or to estimate their age as closer to our own. This could be due to perceptual effects and/or cognitive response bias. Here we use a forced choice task to reduce cognitive influence and a Bayesian modelling approach to estimate perceptual biases inherent in our decisions about the sex and age of faces. Under conditions of increasing uncertainty participants were more likely to respond 'male' and 'older'. This is consistent with the operation of a Gaussian prior with a peak towards male and older faces and with the prior becoming more influential as certainty about the stimulus decreased. This finding was supported by the results of a rating task. This demonstrates a biased expectation, operating at a perceptual level, that faces will be male and older. As this effect is not due to cognitive response bias, it represents a true inaccuracy in the experienced percept which we anticipate will be impenetrable to cognitive control.
Processing efficiency for symmetry depends upon the visual mechanism

Shannon Webb (1,2), Kristen Pammer (1), Andrew Isaac Meso (3), Jason Bell (1,4)
(1) Research School of Psychology, The Australian National University, Canberra, Australia; (2) School of Psychology, The University of Sydney, Sydney, Australia; (3) Institut de Neurosciences de la Timone, CNRS/Aix-Marseille Université, Marseille, France; (4) School of Psychology, The University of Western Australia, Perth, Australia
sweb3303@uni.sydney.edu.au

Humans are highly sensitive to visual symmetry; a ubiquitous feature in natural and man-made environments. We investigated whether the reported right-hemisphere advantage for symmetry processing is present at multiple levels of the visual-processing hierarchy. Participants (N=24) discriminated between four classes of horizontally symmetrical and asymmetrical stimuli: 2 x object-parts (contours and curves), and 2 x whole-objects (inverted and upright faces). Stimuli were randomly presented 6° to the left or right of a central fixation cross for 160ms. Response time (RT) and accuracy were recorded. Performance differences were observed between sets of tasks: curves were processed significantly faster and more accurately than contours, and upright faces were faster but not more accurate than inverted faces. The latter speed difference could not be explained by stimulus characteristics. When comparing symmetry conditions, a symmetry advantage (faster RT, lower error) was found for contours, an asymmetry advantage for curves, a symmetry advantage for inverted faces, and no effect of symmetry for upright faces. No systematic right-hemisphere advantage was found. Together, our findings argue against a common low-level computation of symmetry. Instead, the difference in processing performance, and relationship between symmetry and asymmetry across our stimulus categories suggests the computation occurs at multiple processing stages.

Evaluative conditioning is larger when the unconditioned stimuli are more intense.

Gabrielle Weidemann, Josephine Terry, Kate Stevens
University of Western Sydney
g.weidemann@uws.edu.au

The pairing of an initially neutral conditioned stimulus (CS) and with a liked or disliked unconditioned stimulus (US) can induce changes in evaluation of the CS, a process known as evaluative conditioning. Cross experiment comparisons suggest that changes in liking are larger when the unconditioned stimulus is more intense but there is little direct evidence for this. Across two experiments pictures of faces were paired with positive or negative images which were either moderate or extreme in intensity, as determined by the participant’s own ratings. In Experiment 1 each face was paired with the same affective picture multiple times and in Experiment 2 each face was paired with multiple different pictures of the same affective category. Both experiments showed evidence for shifts in explicit evaluations of the faces which reflected the valence and intensity of the images they were paired with. Experiment 1 but not Experiment 2 showed changes in a trial-by-trial facial electromyography (EMG) of the corrugator supercilii muscle, a physiological measure of affective responding, to the faces, but only for those paired with extremely negative and positive images.

Foveal feedback is critical for peripheral perception of object form and colour

Kimberly B. Weldon, Alexandra Woolgar, Anina N. Rich, Mark A. Williams
Macquarie University
kim.weldon@mq.edu.au

Evidence from neuroimaging indicates that information about visual objects in the periphery is fed back to foveal retinotopic cortex. In this series of experiments, we developed a behavioural paradigm to explore the nature of this feedback mechanism. First, participants performed a difficult shape discrimination task on novel objects in the periphery while fixating centrally. A visual distractor presented at fixation 100ms after the peripheral stimuli impaired discrimination more than at other stimulus onset asynchronies. A control experiment showed that a visual distractor presented elsewhere in the visual field did not impair discrimination performance. In a third experiment, participants performed a similar colour-discrimination task. In this task, a visual distractor presented at the fovea 100ms after stimulus onset impaired peripheral colour discrimination. These results suggest that feedback to the fovea confluence is not simply an artifact of peripheral stimulation, but a component of visual processing supporting perception of both object form and colour.
Does Materialist More Likely to Buy Taboo Goods?

Annabelle Wenas  
*Universitas Indonesia*  
anbellawenas@gmail.com

This study aims to examine the moderating impact of materialism level on the type of goods and type of relations effect on willingness to pay and moral outrage. Variations of type of goods are taboo and regular. Moreover, variations of type of relations are communal sharing and market pricing. Participants of this study are 145 students from Faculty of Psychology and Faculty of Economics Universitas Indonesia. As predicted, level of materialism moderates type of goods influence on willingness to pay and moral outrage. Participants with high materialism level (materialists) show higher willingness to pay and less moral outrage on taboo goods transaction compared to participants with low materialism level. However, materialism level doesn’t moderate type of relations influence on willingness to pay and moral outrage. Additional analysis shows significant correlation between willingness to pay and moral outrage.

Choosing face: The social cost of self-selecting profile images

David White, Amy L. Burton & Clare A. M. Sutherland  
*UNSW (Authors 1 & 2), University of York (Author 3)*  
david.white@unsw.edu.au

People make trait inferences from facial appearance rapidly and effortlessly and these judgments can have important social outcomes. However, research on facial first impressions assumes that a single image is representative of a person’s appearance. Recent studies show that this oversimplifies the problem because different photos of the same face produce different impressions. Here we tested subjects’ ability to choose images of their own face that engender favourable first impressions. In two large-scale experiments, subjects selected images for social, professional and romantic networking profiles. We then asked a separate set of unfamiliar viewers to rate these images on key social dimensions. Results show that image choice accentuated socially desirable impressions that were specific to networking context. Surprisingly, selections made by unfamiliar people conferred more favourable impressions than self-selected images. We conclude that people are sensitive to image variance that is predictive of desirable impressions, but that this sensitivity is attenuated when selecting images of our own face.

Judging Aperture Passability: Giving the Skinny on Body Representation

Sophie J. Wignall, Tracey Wade, Michael E. R. Nicholls  
*Flinders University, South Australia*  
sophie.wignall@flinders.edu.au

The body schema is an internal representation of the body’s spatial configuration, and is essential to our successful navigation through space. There are situations, however, when a person’s body schema and actual body size are mismatched. This research explored how body schema integrity affected the perceived spatial requirements for navigating horizontal and vertical apertures. Ninety-eight participants imagined passing through a series of projected doorway-like apertures. The apertures varied in either width or height, and participants judged whether they could successfully pass through without turning their bodies or ducking their heads, respectively. Both males and females judged that they required significantly more space for successful passage through horizontal than through vertical openings. The correlates of participant buffer values, however, revealed interesting sex differences. For horizontal apertures, a significant negative relationship between shoulder width and buffer values was observed for females. That is, thinner women overestimated their width. Similarly, for the vertical apertures a significant negative correlation between body height and buffer values was observed only in males. Namely, shorter men perceived themselves to be taller than they really were. The findings raise the intriguing possibility that the bodily dimensions susceptible to distortion in the body schema differ for males and females.
Anodal Transcranial Direct Current Stimulation Enhances Facial Expression Recognition
Megan L. Willis, Jillian M. Murphy, Nicole J. Ridley, and Ans Vercammen
Australian Catholic University
dr.megan.willis@gmail.com

The capacity to recognise facial expressions is essential for effective social communication and deficits in this capacity can have devastating social consequences. The orbitofrontal cortex (OFC) is one structure implicated in the capacity to accurately recognise facial expressions. Here we used a mild brain stimulation technique called transcranial direct current stimulation (tDCS) to target the neural activity of the right OFC in healthy adults. It was anticipated that anodal tDCS targeting the right OFC would enhance facial expression recognition, compared to the sham condition. Across two counterbalanced sessions of tDCS (i.e., anodal and sham), 20 undergraduate participants (18 female) completed a forced choice facial expression labelling task comprising angry, disgusted, fearful, happy, sad and neutral expressions. Responses were scored for accuracy, median reaction time, and overall efficiency (i.e., combined accuracy and reaction time). Findings revealed that anodal tDCS targeting the right OFC enhanced facial expression recognition, as reflected in greater efficiency and speed of recognition across all emotions, compared to participants’ performance in the sham condition. These findings provide a solid foundation for further research to examine the potential efficacy of this technique as a means to treat facial expression recognition deficits, particularly in those with OFC damage or dysfunction.

Neural correlates of amodal visual completion revealed using frequency tagging
Lisa Wittenhagen (1), David R. Painter (2), Peter de Weerd (3,4), Jason B. Mattingley (1,2)
(1) The University of Queensland, Queensland Brain Institute, St Lucia, QLD 4072, Australia; (2) The University of Queensland, School of Psychology, St Lucia, QLD 4072, Australia; (3) Faculty of Psychology and Neuroscience, Maastricht University, 6229 MD Maastricht, The Netherlands; (4) Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, 6525 EN Nijmegen, The Netherlands
l.wittenhagen@uq.edu.au

Under naturalistic viewing conditions, it is common for objects situated closer to an observer to partially occlude those located further away. Despite the absence of a portion of the more distant stimulus from the retinal image, our subjective experience of such occluded objects is of a continuous whole, a phenomenon termed amodal completion. Single-cell recordings have revealed that some neurons in early visual cortex fire in response to occluded stimuli. To date, however, it has proven difficult to isolate a neural signature of amodal completion in humans. Here we employed unique flicker frequencies to tag occluded objects in stereoscopic displays, and used electroencephalography (EEG) to measure steady-state visual evoked potentials (SSVEPs) over occipital cortex. Using Fourier analyses to extract neural responses at the tagged frequencies, we observed robust enhancement of SSVEP amplitudes for displays in which visual probes were amodally completed behind a static occluder, relative to identical displays in which the probes appeared in front of the occluder, thus vetoing completion. Subsequent time-frequency analyses revealed the temporal evolution of the oscillatory response to amodally completed probe stimuli. Our novel frequency-tagging paradigm offers a new approach to measuring the neural correlates of a range of perceptual phenomena.

Age of acquisition and reading level modulate neural representation differently during the second language syntactic grammaticalization
Jin Xue1, Jie Yang2, Jie Zhang1
1. School of English Language, Literature and Culture and Center for Language and Cognition, Beijing International Studies University, Beijing, China; 2. Department of Cognitive Science, Macquarie University, Sydney, Australia
xuejin@bisu.edu.cn

Grammaticalization is a process of instantiating rule-based knowledge into real-time language processing system. For the second language (L2) grammaticalization, age of acquisition and reading level (RL) are traditionally regarded as the two most influencing factors. The present study examined the relative contributions of AOA and RL to modulating neural representation during L2 syntactic grammaticalization. The ERPs were collected when Chinese-English participants performed English grammatical judgment on syntactic rules unique in L2 English. It was found AOA was significant correlated with the N400 effects in the left frontal lobe. Whereas, both RL and AOA were correlated with the N400 effects in the right frontal lobe. Regression analysis showed the AOA marginally explained the N400 effects
Reality/fiction distinction and fiction/fiction distinction during sentence comprehension: ERP evidence

Jie Yang 1, Xue Jin 2
1. ARC center of Excellence in Cognition and its Disorders, Department of Cognitive Sciences, Macquarie University, Australia; 2. School of English Language, Literature and Culture and Center for Language and Cognition, Beijing International Studies University, China
j.yang@mq.edu.au

People live in one real world but can have representations of multiple fictional worlds. Although distinguishing reality from fiction, and distinguishing one fictional world from another are very common in daily life, the related cognitive mechanism is still unclear. The current study examined reality/fiction distinction and fiction/fiction distinction using event-related potentials. Participants read information about a fictional world, and then a real famous person or an imaginative character belonging to another fictional world was introduced. Results showed that participants had better performance in a semantic plausibility judgment on sentences containing reality/fiction mismatch relative to sentences containing fiction/fiction mismatch. Furthermore, reality/fiction mismatch elicited both a N400 effect and a late positivity relative to correct sentences, whereas fiction/fiction mismatch only induced a reliable N400 effect. These results suggest that reality/fiction distinction and fiction/fiction distinction have different cognitive mechanisms. Fiction/fiction distinction is based on semantic knowledge and the mismatch can cause difficulty in semantic integration. Reality/fiction distinction, on the other hand, may rely on certain basic principles about the real world, and the mismatch can cause processing difficulty at a late stage during sentence comprehension.

The Crow and the Fox vs. The Little Prince: Speech-gesture entrainment for reciting poems and stories and the influence of the imagined listener

Gregory Zelic, Jeensun Kim, Chris Davis
The MARCS Institute, University of Western Sydney, Sydney, NSW, Australia.
g.zelic@uws.edu.au

Mutual entrainment between speech and manual gesture has been extensively demonstrated in non-communicative tasks consisting of finger tapping and uttering CV or CVCV nonsense syllables at certain rhythms. To date however, it is still unclear whether speech and manual gesture mutually entrain in daily life situations, e.g., when the speech rhythm is constrained both by the structure of a sentence and by speech style. The present experiment addressed the spontaneous coordination between speech and manual gesture when reciting a story or a poem. The task consisted of reading aloud either a story (The Little Prince) or a poem (the Crow and the Fox) while moving the right-hand index finger in continuous flexion-extension. Our prediction was that the strong rhythmic constraints of the poem in comparison to the story would weaken speech-gesture coordination. In addition, the story or poem was read as if directed either to an infant, to a young adult, or to an elderly person. We expected the speech to be emphasized when infant- or elderly-directed, and that this would reinforce the spontaneous speech-gesture coordination. The coordination results are discussed in terms of the twin influence of speech style and the structure of speech.

Low level motion characteristics do not account for perceptions of stream-bounce stimuli

Mick Zeljko and Philip M. Grove
University of Queensland
mirko.zeljko@uq.net.au

Two moving targets on intersecting paths can be perceived to either stream past or bounce off one another. In simple displays streaming dominates, but the addition of transient stimuli can induce bouncing. Bertenthal et al (1993) proposed a directional recruitment hypothesis to account for perception of these displays. This involves a process of spatiotemporal integration of local motion filters. Streaming dominates when similarly tuned filters are sequentially
recruited, facilitating perception in that direction. Disrupting this integration induces perceived bouncing. Bertenthal et al observed increased bouncing for targets that decelerated on approach. Sekuler and Sekuler (1999) tested the prediction based upon this hypothesis that accelerating targets should yield the same pattern of results and found this was not the case. We identified and tested three factors that may explain the discrepancy between these studies: the presence/absence of an apparent pause at coincidence; speed differences across conditions; acceleration discontinuities at coincidence. We found that deceleration induces bouncing when the targets seemingly pause at coincidence. At matched coincidence speeds without a pause or acceleration discontinuity, neither deceleration nor acceleration induces bouncing; Our results favour Sekuler and Sekuler and argue against the idea that low level motion signals drive perception in stream-bounce displays.

**Does emotion-induced blindness spread according to the perceived structure of the environment?**

Jenna L. Zhao, Briana L. Kennedy, & Steven B. Most
UNSW
jenna.zhao@unsw.edu.au

Emotional stimuli can capture attention and impair perception of subsequently presented targets, a phenomenon termed emotion-induced blindness (EIB). EIB occurs when targets and emotional distractors appear in close spatial and temporal proximity, and we examined whether this spatiotemporal competition is restricted to specific locations or spreads instead in an object-based manner. In two experiments, participants searched for targets within four simultaneous rapid streams of images, with each stream placed on the corner of an imaginary square. Two rectangles each enclosed two streams, such that any two streams could appear within the same “object” or across different objects. Emotional distractors appeared two items before targets, either within the same stream as the target or in a different stream. EIB occurred when targets and distractors appeared within the same stream. EIB did not occur when they appeared across different streams within the same object, but did when they appeared the same distance apart across objects. We conclude that EIB in this task resulted from two parallel mechanisms: spatiotemporal competition that does not spread in an object-based manner and the diversion of spatial attention, which was more difficult to reorient to the target location when targets and distractors appeared across different objects.

**Age of Acquisition Effect on L2 Syntactic Grammaticalization: An ERP Study**

Qian Zhao, Jin Xue
School of English Language, Literature and Culture and Center for Language and Cognition, Beijing International Studies University, Beijing, China
mannman114@163.com

The present study investigated the impact of age of acquisition effects on the second language (L2) syntactic grammaticalization. Specifically, this study examined differences of brain region activation and hemispheric lateralization when early and late second language learners processed sentences. ERPs data were collected when participants performed grammatical judgment of English subject-number-verb agreement type sentences. We performed repeated-measures ANOVAs with sentence type, hemisphere, lobe as within-subject factors, and age of acquisition as between-subject factors. An P600 effect was found in the frontal lobe and an obvious left-lateralization occurred in the early L2 learners. Whereas an N400 effect was observed in the temporal lobe and a tendency of right-lateralization was found for the late L2 learners. Our findings show that L2 age of acquisition can differentially impact learners’ brain region activation and hemispheric lateralization during L2 syntactic grammaticalization.

Acknowledgements: This work was supported by a grant from Social Science Foundation of Beijing, China (14WYC042)

**A multivariate analysis of brain networks involved in facial gaze and emotion processing**

Maryam Ziaei, William von Hippel, Julie D. Henry, Natalie C. Ebner, Hana Burianova
University of Queensland
maryam.ziaei@uqconnect.edu.au

Gaze direction plays a fundamental role in social interaction and it influences the perception of facial features and particularly the processing of facial emotion expressions. Yet, the neural mechanisms that underlie the integration of gaze and emotional cues in faces are not well understood. Given the complexity of the involved higher cognitive
processes, it is reasonable to assume that large-scale brain networks are recruited, rather than discrete regions. The objective of this study was to delineate the brain networks that subserve processing of emotional expressions with direct and averted gaze. Twenty healthy adults participated in a functional magnetic resonance imaging experiment in which they were asked to identify the emotional expressions of happy, angry, or neutral faces, displayed with direct or averted gaze. The results that the functional networks engaged during the identification of angry faces were different depending on gaze, whereas the same functional network was recruited for direct and averted happy faces. Angry averted gaze recruited a network that comprised bilateral amygdala, striatal nucleus, and superior temporal gyrus, whereas angry direct gaze recruited bilateral insula and anterior cingulate gyrus. Our findings provide novel insights on the impact of gaze on the brain networks engaged during processing emotional expressions.

Nobody feels the same: variability in visuotactile temporal perception predicts susceptibility to multisensory bodily illusion

Regine Zopf and Hannah Morgan
Perception in Action Research Centre, ARC Centre of Excellence in Cognition and its Disorders, Department of Cognitive Science, Faculty of Human Sciences, Macquarie University, Australia
regine.zopf@mq.edu.au

Multisensory processing shapes body perception; a compelling demonstration is the rubber hand illusion (RHI). In the RHI, body ownership is manipulated by the application and integration of visual stimuli on an artificial hand, and tactile stimuli to the participant’s hidden hand. Individual differences in illusion susceptibility are large and mostly unaccounted for. Furthermore, individual differences exist for the maximal range of temporal asynchronies between multisensory signals that is allowed for processing these as unified. We hypothesised that the width of this temporal binding window (TBW) predicts multisensory integration and body ownership in the RHI. We anticipated that when visuotactile stimuli in the RHI are slightly asynchronous (as in commonly used manual brushstroke stimulations), then a wider TBW (increased likelihood for unified percept of slightly asynchronous stimuli) is related to stronger RHI. In contrast, when stimuli are completely synchronous (computer-controlled), then a narrower TBW (increased temporal precision) is related to stronger RHI. We expected no significant TBW-RHI relationship for completely asynchronous stimulation. We estimated individual TBWs employing a visuotactile simultaneity judgement task and separate participant groups completed RHI trials varying in temporal synchrony. Our findings are in line with our predictions and we discuss their implication for multisensory and body perception.