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Welcome to the *40th Australasian Experimental Psychology Conference*. The first such meeting was held at Monash University in 1974 and had 53 papers. Four decades later, EPC remains a dynamic forum for research: this year we have almost 200 presentations from a diverse range of interests in experimental psychology. Talks and posters will be staged over four days at the National Wine Centre, located in Adelaide's Botanic Gardens. We hope you find that the presentations are stimulating, the company is good and the setting is relaxing.

EPC 2013 Organising Committee

Ross Day Plenary Address: Wednesday 18:00, Stream 1 (Hickinbotham Hall)

Visual processing in Migraineurs: What happens between the headaches?

Migraines are experienced by a substantial proportion of the population and, appropriately, the focus of discussion is usually on the headache phase. There are often visual sequelae associated with the headache but our research has been directed at visual performance in the period between headaches. The talk will describe a number of quite long-lasting changes in visual performance. I will outline the details of those changes, outline our investigation of what other migraine and cognitive characteristics they are associated with, examine and describe our effort to ascertain what aspects of the visual pathways and visual performance are affected, how long the effects last, and describe a re-assuring study examining potential impact on driving behavior.

Speaker

Winthrop Professor **David Badcock**, FAPS, FASSA
ARC Australian Professorial Fellow
Telephone: 6488 3243
Email: david.badcock@uwa.edu.au

Winthrop Professor David Badcock is an ARC Australian Professorial Fellow at the University of Western Australia in the School of Psychology. He received his D.Phil in Experimental Psychology at Oxford University as a Rhodes Scholar, and then held post-doctoral appointments at UC: Berkeley and Durham University before returning to Australia to Melbourne University. In 1996 he was appointed Professor at the University of Western Australia and served a period as Head of School. Throughout he has maintained an active research programme with more than 100 journal publications and has been recognized with Fellowships of both the Australian Psychological Society and the Academy of Social Sciences of Australia and is currently an Honorary Professor of Vision Science at the University of Nottingham and President of the Psychology Foundation of Australia.

The focus of his research is on behavioural measurement of human visual performance in both normal and abnormal groups of observers. Currently the laboratory group is running long-term projects examining 1) how humans integrate signals across space and time to perceive both the speed and direction of object and self-motion, 2) the processes that allow us to determine the location of objects within the environment and 3) the processes that help us to integrate local signals to determine object shape. This work is also being applied to determine the nature of the long-lasting changes in visual performance that arise as a consequence of migraine headaches, to early detection and functional understanding of the losses associated with Glaucoma and to an investigation of the unusual pattern of strengths and weaknesses of the visual processing in Autism

Re-defining the hallmarks of exogenous attention by non-conscious cues

Shahd Al-Janabi (shahd.al-janabi@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Matthew Finkbeiner (matthew.finkbeiner@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

Recent studies have shown that non-conscious, abrupt onset cues can produce exogenous attentional capture. The results of those studies, however, are in conflict when it comes to determining whether or not this attentional capture effect is followed by inhibition of return. The purpose of the present study was to investigate this question. In Experiment 1, we show that a non-conscious, abrupt onset cue can capture attention at a short cue-target interval. This non-conscious, abrupt onset cue, however, did not lead to inhibition of return at a long cue-target interval. The lack of an inhibition of return effect by non-conscious cues was confirmed in Experiment 2, which used an intermediate cue-target interval. Our findings, therefore, indicate that exogenous attentional capture and inhibition of return are driven by different processes. Specifically, our results suggest that inhibition of return, unlike attentional capture, may depend on conscious awareness of the abrupt onset cue.

Visual search driven by audiovisual synchrony shows a right visual field bias

David Alais (david.alais@sydney.edu.au), School of Psychology, University of Sydney

John Cass (j.cass@uws.edu.au), School of Social Sciences and Psychology, University of Western Sydney

Erik van der Burg (vanderburg.erik@gmail.com), School of Psychology, University of Sydney

Visual search for a modulating target in a modulating array is much easier when synchronized with an auditory transient. Here we show an asymmetry in synchrony-driven search efficiency across the visual field. Participants viewed a ring of 19 luminance-modulating discs while hearing a modulating tone. The modulating discs had unique temporal phases (−380 to +380 ms; 40 ms steps), with one synchronized to the tone. Participants did a speeded visual search for the synchronized disc, with modulations (auditory and visual) both sinusoidal or both square at 1.3 Hz. Target position was randomized and spatial distributions of search efficiency were compiled. Results show that sine modulations did not facilitate search (chance performance at all target phases), but square-wave modulations did: the target (phase = 0 ms) was frequently chosen, with tight error distributions (~120 ms wide) around zero-phase lag. Spatially, visual search varied over the visual field: error distributions were more tightly tuned temporally on the right side, especially the upper-right quadrant. These results show that synchrony-driven visual search: (i) requires synchronized transient signals, (ii) has a narrow integration window (± 60 ms), and (iii) is spatially biased to the right visual field, suggesting a hemispheric specialization for synchrony-driven visual search.

Top-down and bottom-up processes in skilled sentence reading: What makes predictable words easier to read?

Sally Andrews (sally.andrews@sydney.edu.au), School of Psychology, University of Sydney

Steson Lo (steson@psych.usyd.edu.au), School of Psychology, University of Sydney

This experiment investigated whether the ‘division of labour’ between top-down and bottom-up processing during sentence reading, as reflected in eye movements, is modulated by individual differences in reading comprehension and spelling ability amongst skilled readers. Carefully matched sentence pairs, in which the same target word was either highly predictable or unpredictable from the preceding context, were presented in a ‘gaze-contingent boundary paradigm’. In this task a mask of random consonants replaces the target word until the subject’s eyes leave the word immediately preceding it, so that any observed effects of predictability cannot arise from parafoveal preview of the target word. Linear mixed analyses showed that the effect of target predictability interacted with spelling ability: better spellers’ initial fixations on the target word were more optimally located and shorter for targets that were predictable from preceding context. Unexpectedly, poorer spellers showed the opposite context effect – shorter fixations on unpredictable words, probably reflecting the heavier processing demands of predictive than unpredictable contexts. Comparisons of the impact of correct, neighbour, and unrelated ‘fast primes’ presented for the first 40 ms of the fixation on the target word provided insight into the source of the predictability benefit shown by better spellers.

Pacmen in the brain: An illusory distortion of moving form driven by motion deblurring

Derek H. Arnold (d.arnold@psy.uq.edu.au), School of Psychology, University of Queensland

Welber Marinovic, School of Psychology, University of Queensland

Many visual processes integrate information over protracted periods – temporal integration. One consequence is that retinal movement can generate blurred form signals, similar to the motion blur captured in photographs by slow shutter speeds. Subjectively, retinal motion blur signals are invisible. One suggestion is that this is due to humans being unable to distinguish focussed from blurred moving objects. We have noticed a novel illusion that seems to challenge this view. The apparent shape of circular moving objects can be distorted when their rear edges lag leading edges by ~60ms. We also found that sensitivity for detecting blur, and for discriminating between blur intensities, is uniformly worse for physical blurs added behind moving objects, as opposed to in-front. It was also easier to differentiate slight from slightly greater physical blurs than it was to distinguish slight blur from the absence of blur, both behind and in-front of moving edges. These ‘dipper’ functions suggest that blur signals must reach a threshold intensity for detection, and that the relevant threshold is elevated for signals trailing behind moving contours. These data suggest that moving objects look sharply defined, at least in part, because of an active inhibitory process targeting signals trailing behind moving contours.

Differentiating between metacognition and meta-metacognition: Confidence in an answer versus a decision

Michelle Arnold (michelle.arnold@flinders.edu.au), School of Psychology, Flinders University

In the current experiment the typical own-race bias face recognition paradigm was modified so that participants had to strategically regulate their accuracy (i.e., report/withhold) and type-2 signal detection measures could be used to directly measure metacognitive monitoring at retrieval. One of the main goals of the experiment was to explore whether self-reported confidence ratings differed depending on whether they were directed at answer accuracy (e.g., judging a face as “studied” or “new”) versus at decisions about that answer (e.g., volunteering vs. withholding that answer). Overall the results demonstrated that metacognition does contribute to the own-race bias; for example, participants were better at monitoring their memory for own-race faces. Further, there was a significant difference between the two confidence measures, and the pattern of this difference depended on whether responses had been volunteered or withheld.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Updating auditory but not visual perceptual representations is related to reading

Nicholas A. Badcock (nicholas.badcock@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Louise Ewing (louise.ewing@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Kathryn A. Preece (kathryn.preece@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Genevieve McArthur (genevieve.mcarthur@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

We investigated whether perceptual updating deficits in children with dyslexia reflect a problem across modalities or within the auditory modality specifically. Twenty-four dyslexic and 19 typically reading children completed auditory and visual updating tasks. In an auditory frequency discrimination task, children judged which of two tones (reference and test) was higher in frequency under two conditions: one in which the frequency of the reference tone was fixed, and one in which the reference tone varied across trials. For typical readers, scores were lower in the fixed condition than the varied condition, consistent with ‘perceptual anchoring’ to the repeated fixed reference. This effect was reduced for the dyslexic group, indicating impaired perceptual updating in the auditory modality. In a figural face adaptation task, we measured shifts in ‘what appeared normal’ following adaptation to faces with ‘squashed’ or ‘stretched’ features. Results indicated significant adaptation overall, consistent with calibration of face representations with experience in both groups. Importantly, the magnitude of the face aftereffect was not diminished in the dyslexic group. Evidence of intact updating of visual, but not auditory, perceptual representations suggests that atypical updating might be restricted to the auditory modality in children with dyslexia.

Non-word reading and repetition predicts auditory perceptual anchoring in dyslexia

Nicholas A. Badcock (nicholas.badcock@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Louise Ewing (louise.ewing@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Kathryn A. Preece (kathryn.preece@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Genevieve McArthur (genevieve.mcarthur@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

We investigated auditory perceptual anchoring in dyslexia using a frequency discrimination (FD) task (see Ahissar et al., 2006, *Nature Neuroscience*, doi:10.1038/nn1800). We recruited 24 6- to 13-year-old children with dyslexia (poor with regular, irregular, or non-word reading) and 19 children with age-appropriate reading. In two FD conditions, children were presented with two tones between 1000 and 1500 Hz and asked to judge whether the first or second tone was higher in pitch. In the ‘standard’ condition one of the two tones was always 1000 Hz. In the ‘no standard’ condition, one tone was randomly chosen between 1000 and 1400 Hz. Dyslexic children performed more poorly (i.e., higher thresholds) overall and did not show the same degree of expected benefit in the standard condition. An examination of individual data revealed two subgroups within the dyslexic group: one with poor thresholds in both the ‘standard’ and ‘no standard’ condition and another group with good thresholds in the ‘standard’ condition and poor thresholds in the ‘no standard’ condition. Further analyses revealed that the latter group had relatively good non-word repetition abilities. Overall, frequency discrimination was related to phonological abilities. The direction of relationship between auditory perceptual anchoring and reading is discussed.

Perceptions of warmth and competence and community attitudes to people with autism

Johanna C. Badcock (johanna.badcock@uwa.edu.au), School of Psychology, University of Western Australia

Milan Dragovic (milan.dragovic@health.wa.gov.au), Clinical Research Centre, North Metropolitan Health Service, Perth, WA

Research on public stigma towards mental illness has mostly focussed on disorders common in adults, such as depression and schizophrenia, rather than disorders appearing in childhood. In this study, we used the Stereotype Content Model (SCM; Fiske, Cuddy, Glick, & Xu, 2002. *Journal of Personality and Social Psychology*, 82, 878–902) to examine how attitudes to autism – a neurodevelopmental disorder - compare against a range of societal in- and out-groups. Participants (N = 210) were recruited for an online survey and rated 5 general social groups (e.g. flying doctors, teenagers) and 6 clinical groups - including the target group ‘people with autism’ - in terms of the SCM dimensions of ‘warmth’ and ‘competence’. A two-step cluster analysis was employed and five clusters, with distinct stereotype content, were identified. Contrary to predictions, people with autism were found to be strongly, negatively stereotyped as lacking in warmth (cold) and competence (incompetent), with ratings on both dimensions significantly lower than all other groups except drug addicts. The results suggest that recent community initiatives have not successfully translated into more positive public attitudes to autism. Future interventions need to be more targeted to improve perceptions of warmth and competence in people with autism.

When to cut your losses: The influence of goal framing on decision-making patterns when taking repeated gambles

Timothy Ballard (timothy.ballard@uwa.edu.au), Business School, University of Western Australia

Simon Farrell (simon.farrell@bristol.ac.uk), School of Experimental Psychology, University of Bristol

When simultaneously pursuing two goals, individuals often use decision-making strategies that involve balancing resources between goals in an attempt to achieve both. However, the optimal strategy may often be to abandon one goal in order to ensure the other is achieved. Decision-making strategy may also depend on goal framing. The risk-seeking behaviour associated with threat of loss may make individuals less likely to abandon a goal when failure involves loss rather than non-gain. A formal model was tested using a sequential gambling task, where the aim was to select gambles that would enable participants to accumulate points in an attempt to meet two separate targets. On each decision step the participant chose between two probabilistic pay-off schemes that each favoured one target at the expense of the other. Results showed that individuals tended to make decisions that favoured the goal closest to being achieved when faced with gains/non-gains, but the goal closest to being failed when faced with losses/non-losses. These findings suggest that individuals may be less likely to abandon goals in the latter context. Discussion will focus on comparing the mathematical optimality of these two decision-making patterns and the implications for theories of goal striving and choice.

The inverse set size effect in visual search: New insights from eye movements

Stefanie I. Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Christian Valuch (christian.valuch@univie.ac.at), Faculty of Psychology, University of Vienna

Ulrich Ansorge (ulrich.ansorge@univie.ac.at), Faculty of Psychology, University of Vienna

Current models of visual search propose that items with high local feature contrasts are visually more salient and can be found faster in visual search. In line with this view, Bravo and Nakayama (1992) reported that a red target among green nontargets could be found faster when the number of nontargets increased. Curiously, this inverse set-size effect occurred only when the target and nontarget colors varied randomly (i.e., such that the target could be either red among green nontargets or vice versa). Here, we examined set-size effects in color pop-out search when participants had to make an eye movement to the target. Intertrial analyses showed an inverse set-size effect only when the colors of the target and nontarget switched, compared to the previous trial, and no set-size effect when the target and nontarget colors were repeated. Moreover, the inverse set-size effect was eliminated when a word cue validly indicated the target color prior to each trial. These results indicate that an enhanced feature contrast of the target aids visual selection only when the target cannot be selected in virtue of its known or expected feature value, offering new insights into the interplay of bottom-up and top-down processes in attention.

Hemispheric specialization for symmetry processing is complexity dependant

Jason Bell (jason.bell@anu.edu.au), Research School of Psychology, Australian National University

Anne Wentworth-Perry (u4309997@anu.edu.au), Research School of Psychology, Australian National University

Andrew Isaac Meso (andrew.meso@univ-amu.fr), Institut de Neurosciences de la Timone, CNRS & Aix-Marseille Université

Ben S Thompson (b.thompson@auckland.ac.nz), Department of Optometry and Vision Science, University of Auckland

Symmetry is a fundamental characteristic of objects and scenes, one that human observers are highly sensitive to. Moreover, observers are faster and more accurate in detecting symmetrical stimuli compared with asymmetric versions, in the left visual field but not in the right (Wilkinson & Halligan, 2002). This has been taken as evidence for a right hemisphere advantage in symmetry processing. The present study investigated whether this hemispheric advantage is affected by the complexity of the visual feature. Stimuli were familiar block shapes and random walk contour paths constructed from Gabor patches. The former are likely to tap mid-level form processing mechanisms while the latter are thought to be processed in V1. Stimuli were randomly presented 6° to the left or right of a central fixation cross, for 160ms. The observer responded as to whether the stimuli were horizontally symmetrical or asymmetrical. Fourteen participants were tested in each experiment. Experiment 1 replicated a left visual field symmetry advantage for familiar shape stimuli. Interestingly however, for contour paths a significant symmetry advantage, (faster RTs & lower error) was present in both visual fields. Experiment 2 showed that the symmetry advantage persisted for vertical and diagonal contour paths, judged relative to horizontal and oblique symmetry axes, respectively. Finally, Experiment 3 found that for paths composed of either: a) Gaussian blobs or, b) hard-edged discs, the symmetry advantage was drastically reduced. This suggests that the composition of the elements mediates performance. Our findings reveal that symmetrical contours are preferentially processed in both visual hemispheres. This holds for cardinal and oblique axes but is mediated by the spatial-frequency profile of the path elements. Taken as a whole our findings imply that symmetry is bilaterally advantaged in early visual processing while for more complex stimuli, this symmetry advantage is right hemisphere specific.

Breaking the silence: The motion silencing illusion is disrupted by luminance transients

Kevin R. Brooks (kevin.brooks@mq.edu.au), Department of Psychology, Macquarie University

Terri Katz, Department of Psychology, Macquarie University

Monique Linssen, Department of Psychology, Macquarie University

The Motion Silencing Illusion is a dramatic demonstration of the visual system's inaccuracy in perceiving changes to moving stimuli compared with stationary displays. When an annulus of dots, each changing in luminance with a random phase, begins to rotate, the apparent temporal frequency (TF) of these dots is reduced, occasionally to levels below detection threshold ("silencing"). We investigated the dependence of this illusion on temporal parameters in three experiments. In experiment 1, motion silencing for sinusoidal variations of dot luminance was increased at higher rates of annulus rotation, but was abolished for square-wave modulations. Experiment 2 manipulated the TF of sine- and square-wave dot luminance changes. Again, silencing was abolished for square-waves, while for sine-waves motion silencing decreased as TF increased. In experiment 3, we independently manipulated TF and the maximum slope of luminance changes to see which was responsible for the previous reductions in silencing. While increasing slopes of luminance change caused a decrease in silencing, increasing TF caused moderate increases. These results imply that the presence of abrupt changes in luminance, causing strong transient signals, are responsible for breaking the phenomenon of motion silencing, and allowing a more accurate percept of the rate of change of dot luminance.

Rise time as a predictor of phonological awareness: An auditory, visual, or central phenomenon?

Denis Burnham (d.burnham@uws.edu.au), The MARCS Institute, University of Western Sydney

Usha Goswami (ucg10@cam.ac.uk), Centre for Cognitive Developmental Neuroscience, University of Cambridge

Natalie Pascual, The MARCS Institute, University of Western Sydney

Benjawan Kasisopa (b.kasisopa@uws.edu.au), The MARCS Institute, University of Western Sydney

Amanda Reid (amanda.reid@uws.edu.au), The MARCS Institute, University of Western Sydney

Goswami and colleagues (e.g., Richardson et al., 2004) suggest that deficiencies in auditory rise time (AudRT) perception predict reading problems such as dyslexia. Here we examined whether AudRT perception is a modality-specific or a more centrally-based predictor of reading-related tasks. 4-year-old, 6-year-old, and adult participants with no reported history or risk of dyslexia were tested on (i) AudRT (ii) visual rise time (VisRT), (iii) non-linguistic tasks (rhythmic reproduction, rapid automatized naming (RAN), (iv) speech-based tasks (rhyme oddity, and for 6-year-olds and adults, phoneme deletion, phoneme reversal), and (v) text-based tasks (letter identification, and for 6-year-olds and adults, word and non-word reading). There were no correlations at any age between AudRT and VisRT performance. Regression analyses showed: for 4-year-olds, AudRT was predicted by rhyme oddity and RAN, whereas there were no significant predictors of VisRT; for 6-year-olds there were no significant predictors of AudRT or VisRT; and for adults non-word reading predicted VisRT but not AudRT. Results suggest that AudRT and VisRT are not related to a common central mechanism, and that AudRT might be an early and specific predictor of phonological and pre-reading skills, while VisRT perception may be related to later alphabetic decoding skills once reading is in place.

A role for stereo in face judgements?

Darren Burke (darren.burke@newcastle.edu.au), School of Psychology, University of Newcastle

Simon Bailey, School of Psychology, University of Newcastle

Emma McMillan, School of Psychology, University of Newcastle

Danielle Sulikowski, School of Psychology, Charles Sturt University

Stereoscopic information has been shown to improve our ability to recognise individuals across depth rotations, but to not affect our ability to match faces shown at different sizes (Burke et al, 2007). This is presumably because viewpoint generalisation (but not size generalisation) is facilitated by using whatever structural information can be derived from the images being matched. In the current set of studies we examined the role of stereoscopic information in two situations where subtle structural information might be expected to be of assistance. In one task, participants made identity matches under different lighting conditions, and when facial features were obscured by sunglasses and hats, and in a second task we examined the influence of stereoscopic information on judgements of attractiveness with and without makeup. Surprisingly, stereoscopic information did not help in making identity matches under viewing conditions in which structural information was impoverished by unusual lighting or head apparel, but it did influence attractiveness ratings.

Repetition blindness: Does a repeated target benefit from priming by the first presentation?

Jennifer Burt (j.burt@psy.uq.edu.au), School of Psychology, University of Queensland

In Experiment 1 repetition blindness (RB) was found in RSVP streams with up to 3 word targets separated by random-letter distractors. RB was larger for high than low-frequency words, consistent with a differential priming benefit for low-frequency words. In Experiments 2 and 3, we examined the controversy about priming effects when only the second target (C2, repeated vs. control) has to be named. The duration of C2 and the prime (C1) were varied. In the prime display, C1 was followed by a random letter string. When C1 had a duration of 120 ms, there was no priming cost or benefit when the target duration also was 120 ms, suggesting that the differential RB for high frequency words was not caused by priming effects. When the target duration was reduced to 72 ms there was a repetition priming benefit in accuracy. When C1 was 480 ms and C2 was 72 ms, the accuracy benefit was negligible and there was a repetition cost in latencies. The priming results indicate a role for the post-prime distractor, token confusions and task demands in repetition priming effects.

A mathematical model of the cognitive reflection test

Guillermo Campitelli (g.campitelli@ecu.edu.au), School of Psychology and Social Science, Edith Cowan University

Paul Gerrans (paul.gerrans@uwa.edu.au), UWA Business School, University of Western Australia

The cognitive reflection test (CRT, Frederick, 2005) aims to measure the ability or disposition to resist reporting the response that first comes to mind, it contains three problems, and is typically completed in less than ten minutes. We used a mathematical modelling approach, based on a sample of 2,019 participants, to investigate properties of this test. Given that the test contains three mathematical problems, is this test just a numeracy test? We found that the models that include a critical thinking parameter (i.e., the probability of inhibiting an intuitive response), as well as a numeracy parameter (i.e., the probability of using an adequate mathematical procedure), fitted the data better than a model that only included a numeracy parameter. We also found that the critical thinking parameter in males is best explained by both a critical thinking ability and a critical thinking disposition, whereas in females this parameter was better explained by only a critical thinking ability.

Visual and auditory perception deficits suggest altered neural integration function in psychosis

Olivia Carter (ocarter@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Daniel Bennett, School of Psychological Sciences, University of Melbourne

Tabitha Nash, School of Psychological Sciences, University of Melbourne

Sara Arnold, School of Psychological Sciences, University of Melbourne

Lydia Brown, School of Psychological Sciences, University of Melbourne

Ru Ying Cai, School of Psychological Sciences, University of Melbourne

Zexi Allen, Melbourne Medical School, University of Melbourne

Amy Dluzniak, School of Psychological Sciences, University of Melbourne

David Burr, Department of Psychology, University of Florence

Ken McAnally, Defence Science and Technology Organisation

Suresh Sundram The Florey Institute of Neuroscience & Mental Health, Northern Psychiatry Research Centre

Sensory dysfunction in schizophrenia underlies complex cognitive and affective symptoms of the disorder. Evidence suggests that this dysfunction results from impairment in integrating low-level neural signals into complex cortical representations. However, while this integration deficit is assumed to be specific to schizophrenia, performance on these tasks has rarely been tested in other comparison populations. It is similarly unknown whether observed deficits generalise to modalities other than vision. This study assessed a broad sample of psychiatric patients on visual contrast detection, visual motion integration, auditory tone detection, and auditory tone integration. We tested 269 participants, including participants with a schizophrenia spectrum disorder (104), bipolar affective disorder (38), depression (32), other psychiatric conditions (33), and healthy control participants (62). Across diagnosis and sensory modalities, patients with psychosis were impaired on tasks requiring sensory integration, and unimpaired in simple visual contrast and tone detection. Impairments were correlated with the severity of positive psychotic symptoms. Our results demonstrate that impaired functional connectivity is not specific to vision, nor is it limited to schizophrenia but is closely related to the presence of psychotic symptoms independent of diagnosis. These findings are consistent with a generalised deficit of neural integration in psychotic disorders.

Talk: Thursday 14:10, Stream 3 (Gallery)

Remote temporal camouflage: Contextual flicker disrupts perception of time's arrow

John Cass (j.cass@uws.edu.au), School of Psychology, University of Western Sydney

Erik Van der Burg (erik.vandenburg@sydney.edu.au), School of Psychology, University of Sydney

What factors determine our perception of time? The resolution with which we can process temporal sensory information depends upon stimulus modality. Compared to auditory and somatosensory systems, the visual system is sluggish. We are, however, capable of making fine-scaled (sub-second) visual timing judgments as evidenced psychophysically via measurement of just noticeable difference (JND) thresholds of 20-40ms for judgments of both simultaneity and temporal order. Here we show that the mere presence of flicker elsewhere in the visual field disrupts our ability to both differentiate and to sequence the order of visual events in time by more than a factor four. This effect we refer to as Remote Temporal Camouflage (RTC) occurs even when the location of target elements are separated from distractor events by large spatial and temporal distances. These interference effects have a unique spatial distribution conforming to neither the predictions of attentional capture by transient events, nor by stimulus dependencies associated with other contextual phenomena such as crowding, object-substitution masking or motion-induced blindness. These dependencies combined with the absence of RTC under cross-modal (audio-visual) target conditions points to it being a form of motion-silencing driven by interactions between and/or compulsory integration within long-range motion-selective mechanisms.

The effects of colour imagery on perception

Shuai Chang (shuai.chang@unsw.edu.au), School of Psychology, University of New South Wales

David E. Lewis (david.lewis@unsw.edu.au), School of Optometry and Vision Science, School of Psychology, University of New South Wales

Joel Pearson (jpearson@unsw.edu.au), School of Psychology, University of New South Wales

Mental imagery is thought to have some similar functional effects as perception. Previous research on colour imagery has focused on compound images of both colour and form e.g. whole objects. However, little is known regarding the characteristics of pure colour imagery without form structure. In experiment 1, participants were asked to imagine pure colours with dark background (condition 1), bright background (condition 2), and passively view weak colour patches (condition 3) prior to a binocular rivalry display of pure Gaussian colour patches. Results showed that dominance in binocular rivalry was significantly biased by prior colour imagery or perception. The presence of background luminance attenuated this effect for imagery. In Experiment 2, we tested whether colour imagery was location-specific in visual space. It is found that colour imagery only primed subsequent rivalry when imagery and rivalry occurred at the same retinotopic location. This study demonstrated that imagery of pure colour without form structure can have similar priming effects on subsequent rivalry displays as colour perception, and the strength of this bias effect was location specific in visual space. These results are consistent with mental imagery studies using compound visual stimuli, demonstrating the potential to investigate mental imagery of different visual features.

No need for maps: Searches for conjunction targets can be guided relationally

Jessica K. Choi (jessica.choi@uqconnect.edu.au), School of Psychology, University of Queensland

Anthony M. Harris (anthony.harris1@uqconnect.edu.au), School of Psychology, University of Queensland

Stefanie I. Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Visual search literature has been dominated by feature-map theories, such as Feature Integration Theory and Guided Search, which assume that an item must be similar to the target in order to capture attention. Yet studies in recent years have provided support for a relational account of attentional guidance, which posits that attention is biased to the relational attributes of the target (e.g. larger, bluer, darker), so that items matching the relational properties of the target can capture attention. The current study employed a spatial cueing paradigm to investigate whether attention can be guided by feature relationships in conjunction search. Our results demonstrate that singleton cues defined by feature conjunctions can capture attention, but only when the relational properties of the cue in the cueing context match the feature relationship between the target and non-targets. Importantly, cues that were featurally different but had the same relational properties as the target still captured attention; yet a cue that was featurally identical to the target but had different relational properties in context did not capture attention. These findings demonstrate that attention is biased to feature relationships even in conjunction search, challenging the long-held belief that visual attention is guided by specific feature values.

The role of headmotion on emotion recognition

Chee Seng, Chong (l.chong@uws.edu.au), The MARCS Institute, University of Western Sydney

Jeesun, Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

The expression of emotion not involves face motion but also head motion cues. Studies have predominantly focused on facial cues and so relatively little is known about the contribution made by cues from head motion, e.g., whether by such cues are, by themselves, sufficient for recognizing an emotion and the degree to which such cues supplement facial ones. To investigate these questions, we developed a method in which videos of face or head emotion cues were presented either separately or in conjunction (in the latter case, face cues were displayed within a head motion context). For each video, participants identified an emotion, and accuracy and error patterns (confusion matrices) were examined across three conditions. The results will be discussed in terms of how face and head motion cues work together in emotion recognition, and the different roles played by each in disambiguating emotions.

Reading the mind in the emoticons

Owen Churches (owen.churches@flinders.edu.au), School of Psychology, Flinders University

Mark Kohler (mark.kohler@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Myra Thiessen (myra.thiessen@unisa.edu.au), School of Art, Architecture and Design, University of South Australia

Hannah Keage (hannah.keage@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

It is now common practice, in screen based writing, to use the character combinations “:-)” to convey happiness. This set of characters is known as an emoticon and illustrates a smiling face. It is unclear however, to what extent emoticons are perceived through configural strategies which are a hallmark of face perception. A measure of the neural systems involved in configural perception is the change in the N170 event-related potential component produced by inverting stimuli. Inverting faces produces a larger and later N170 while inverting objects that are perceived featurally rather than configurally reduces the amplitude of the N170. We presented 20 participants with images of upright and inverted faces and emoticons while collecting electroencephalography. Analysis of the N170 showed that faces produced the characteristic increase in amplitude and latency due to inversion while emoticons showed a decrease in amplitude when inverted. These results indicate that although emoticons are perceived as faces when upright, they are perceived featurally rather than configurally. It appears that the perception of emoticons as a face relies on a learnt association rather than face specific mechanisms.

What place the database in Australian language research?

Bernadine Cocks (bcocks2@myune.edu.au), School of Behavioural Cognitive and Social Sciences, University of New England

Jana Smith (jsmith40@myune.edu.au), School of Behavioural Cognitive and Social Sciences, University of New England

Graham Jamieson (gjamieso@une.edu.au), School of Behavioural Cognitive and Social Sciences, University of New England

To assess the practice of using normative database values to control for confounds in language research, six separate surveys gathered normative data from a contemporary Australian population on a corpus of 140 English language words. After averaging across participants, these individual word values were then compared with values retrieved from CELEX, the BNC and the MRC. Contrary to predictions, there were significant mean corpus differences between all four sources for familiarity/frequency, as well as significant differences between the current study and the MRC for concreteness and imageability. Furthermore, significant differences were found between written and spoken presentations in both the current study's surveys and the BNC. This suggests that although the use of databases may be common, the practice should be approached with caution.

In the palm of your hand: The influence of functional hand representation on visuotactile integration in perihand space

Hayley Colman (h.colman@uq.edu.au), School of Psychology, University of Queensland

Roger Remington (r.remington@psy.uq.edu.au), School of Psychology, University of Queensland

Ada Kritikos (a.kritikos@psy.uq.edu.au), School of Psychology, University of Queensland

Previous studies have found that visuotactile integration is greatest in the space within 30cms of the hands (perihand space) (Spence, Pavani & Driver, 2004; Rizzolatti, Scandolara, Matelli & Gentilucci, 1981). The way we use our hands to interact with objects further influences how we integrate visual and tactile inputs (Brozzoli, Pavani, Urquizar, Cardinali & Farné, 2009). In the present study we examined visuotactile integration in different regions of perihand space. Participants completed a crossmodal congruency task in which they responded to visual targets either presented unimodally or paired with either a congruent or incongruent tactile distractor. In blocked trials, hands were held at the midline, directly in line with the shoulder and crossed across the midline. Targets could appear adjacent to the palm/ back of hand or distant from the palm/ back of hand. For unimodal trials, participants were fastest to respond to targets that were palm-adjacent compared with back of hand adjacent, irrespective of hand posture. For bimodal trials, the location of the hand in relation to the body, modulated the difference between congruent and incongruent trials suggesting that visuotactile integration is modulated by the graspable properties of the hands.

Separating the effects of preference from ownership in hand-object interactions

Merryn Constable (merryn.constable@uqconnect.edu.au), School of Psychology, University of Queensland

Andrew P. Bayliss (apbayliss@gmail.com), School of Psychology and School of Social Work, University of East Anglia

Ottmar V. Lipp (o.lipp@psy.uq.edu.au), School of Psychology, University of Queensland

Ada Kritikos (a.kritikos@psy.uq.edu.au), School of Psychology, University of Queensland

Recently, the concept of ownership over objects has received a burst of attention within the cognitive domain. The role of preference – specifically, choosing one object over another – however, has not been addressed. That is, simply owning an object results in a preference for that object (‘mere-ownership’ effect, Beggan, 1992). As a result, research purporting to demonstrate ownership-related effects in attention, memory, and kinematics may, in fact, simply reflect on preference. Here I present two studies demonstrating kinematic patterns associated with preference for and ownership over three different mugs during a natural lift. I report on three critical measures of interest taken during upward movement: rightward drift, towards-body drift, and peak acceleration. When the three mugs differed in terms of ownership we observed a greater rightward drift associated with the experimenter’s mug compared with the participant’s and the unowned mug. We also observed the greatest towards-body drift and peak acceleration when participants lifted their own mugs. When the three mugs differed in terms of preference, but not in ownership, only the effect in towards-body drift remained. These results suggest that preference can account for some of the previously reported kinematic patterns associated with ownership but there are distinct patterns linked exclusively with ownership.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Source monitoring during hypnotic olfactory hallucinations

Rochelle E. Cox (rochelle.cox@mq.edu.au), Department of Cognitive Science, Macquarie University

Robyn A. Langdon (robyn.langdon@mq.edu.au), Department of Cognitive Science, Macquarie University

Olfactory hallucinations can occur in schizophrenia, epilepsy and migraine but they are difficult to investigate experimentally because they cannot be produced on demand. Arguedas and colleagues (Arguedas et al., 2012) proposed that olfactory hallucinations involve a source monitoring impairment where imagined odours are misattributed as real. However, some researchers argue that this is unlikely because odours are difficult to imagine (Herz, 2000). In this experiment we examined whether hypnotic suggestions could produce olfactory hallucinations and whether subjects misattributed these hallucinations as real. We gave high and low hypnotisable subjects a hypnotic induction, followed by a suggestion that whenever the hypnotist tapped her pen, they would smell a flowery odour. Next, we presented odours that were sometimes real, sometimes imagined, and sometimes hypnotically hallucinated (via pen tapping). After a short delay, we asked subjects how many times they had really smelled each odour. We found that all subjects overestimated the number of times they smelled each odour. However, high (but not low) hypnotisable subjects made more of these source errors for imagined and hallucinated odours than for real odours. We discuss the value of using hypnosis to model hallucinations and suggest ways in which our approach can test alternative theories.

Inter-person and emotion contexts determine the influence of poser gender on emotion categorisation

Belinda M. Craig (b.craig@uq.edu.au), School of Psychology, University of Queensland

Ottmar V. Lipp (o.lipp@psy.uq.edu.au), School of Psychology, University of Queensland

The Happy Categorisation Advantage (HCA) describes the finding that happy facial expressions are categorised faster than neutral or negative expressions. This effect is influenced by the gender of the face, however, it unclear whether this influence is due to characteristics of the faces themselves or dependent on the experimental contexts in which the faces appear. A series of experiments was designed to investigate this. Participants categorised happy and angry emotional expressions on male and female faces. Poser gender was varied either within or between tasks. Additionally, the happy and angry expressions were either contrasted with each other or with neutral faces. The typical HCA was reversed for male but not female posers when male and female faces were present with in the same task. Additionally, no HCA emerged for either gender when happy faces were contrasted with neutral. However, when angry faces were contrasted with neutral, an angry categorisation advantage emerged for male posers and a neutral categorisation advantage emerged for female posers. Results demonstrate that the influence of face gender on emotion categorisation depends not only on the gender and emotion of the target face itself, but also on the other faces with which it appears.

On the nose: Cultural differences in eye movements to three-quarter view faces

Kate Crookes (kate.crookes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Junpeng Lao (junpengl@psy.gla.ac.uk), Department of Psychology and Centre for Cognitive Neuroimaging, University of Glasgow

Roberto Caldara (roberto.caldara@unifr.ch), Department of Psychology, University of Fribourg

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

William Hayward (whayward@hku.hk), ARC-CCD and Department of Psychology, University of Hong Kong

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

Much research has shown that when people look at faces they tend to concentrate their fixations on the eyes. However a number of recent studies have revealed a cultural difference in fixation patterns to faces. While Caucasian participants focus on the eye region with some looks to the mouth, Asian participants fixate more centrally on the nose region. However, these previous studies have all used front-view faces where the nose is confounded with the centre of the image. The present study investigated whether cultural differences are also present for three-quarter (mid-profile) view faces. Chinese and Caucasian participants’ eye movements were recorded during the study and test phases of a recognition memory task for Asian and Caucasian faces. Caucasian participants showed a strong preference to fixate the central eye (i.e., eye closest to the observer) whereas Chinese participants made more fixations to the nose region than Caucasians. These differences in eye-movement patterns between Asian & Caucasian participants mirror those previously observed for front-view face recognition. These results argue that previous findings of cultural difference are not an artefact of viewing front view faces, but instead represent different strategies for acquiring face information by Asians and Caucasians.

The estimation of short durations and an objective measure of observer confidence

Simon J Cropper (scropper@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Alan Johnston (a.johnston@ucl.ac.uk), Division of Psychology and Language Sciences, University College London, UK

Aurelio Bruno (a.bruno@ucl.ac.uk), Division of Psychology and Language Sciences, University College London, UK

We examined observers ability to judge short durations and then reflect upon their own performance.

Observers responded to 2 identical presentations of a drifting sine grating 4 deg above fixation. They initiated presentation with a button-press, and released the button when they considered the stimulus to be half-way through. The intervals ranged between 0.5 and 2 secs and the duration conditions were blocked. Subjects were asked to indicate their ‘most accurate estimate’ of the two.

Observers consistently over-estimated the true duration. This standing error was not proportional to interval length. As expected there was no significant difference in variance (or mean) between the first and second interval. When trials were grouped by objective performance the ‘ideal’ estimates had a significantly smaller variance. However, when grouped on observer section the ‘best’ estimates also had a significantly lower variance compared to the worst, indicating observer awareness of decisional noise on a trial-by-trial basis. The difference in variance between selected and rejected trial provides an objective measure of performance evaluation and an alternative to subjective confidence ratings.

One implication of this study is that improved performance through perceptual learning may involved learning a model of observer noise.

Using electromagnetic articulography to examine masked onset priming

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Michael Proctor (michael.proctor@uws.edu.au), School of Humanities and Communication Arts, University of Western Sydney

Jason Shaw (j.shaw@uws.edu.au), The MARCS Institute, University of Western Sydney

Donald Derrick (d.derrick@uws.edu.au), The MARCS Institute, University of Western Sydney

Christian Kroos (chkroos@gmail.com), The MARCS Institute, University of Western Sydney

Models of how words are read aloud have focussed on word recognition processes and have barely specified how these interface with speech production. For example, models typically represent the processes of going from activated phonological representations to spoken output with a simple arrow. Here we investigated this link by using tongue movement data collected in a masked onset priming paradigm. To date, onset priming has only been investigated using time to initiate an utterance as the response measure; examining articulation allows for a more detailed look at how the prime affects target production. Three prime conditions were used, full prime (the prime and target were the same word); “onset” prime (the prime and target had the same initial letter) and an all letters different control. In addition to the standard measure of time to acoustic onset; we measured time to gestural initiation and time to the constriction target for syllable onset and the same measures for the syllable nucleus. We found that the tongue gesture measures were a more sensitive measure of prime effects than the acoustic one and there was evidence of gestural intrusions from the control prime. The results are discussed in terms of stage versus cascading models of production.

Multidimensional scaling of personality trait inferences from human faces

Robert de Lisle (delisler@student.unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Daniel Little (daniel.little@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

People reliably make inferences about the personality traits of emotionally neutral faces. Prior research has shown that these inferences can be described with two components, one corresponding to warmth/trustworthiness, and the other corresponding to competence/dominance. This poster presents new research that explores how these perceived components interact. Similarity ratings of the ‘personality’ of computer-generated faces were scaled to data-driven values of warmth and competence with Multidimensional Scaling (MDS). The results are compatible with existing person perception literature, and suggest warmth and competence are perceived as integral dimensions.

Visual biases override proprioceptive biases in the estimation of limb position following a visual illusion

Harriet Dempsey-Jones (h.dempseyjones@gmail.com), School of Psychology, University of Queensland

Ada Kritikos (a.kritikos@psy.uq.edu.au), School of Psychology, University of Queensland

Proprioception refers to an individual’s awareness of the location of their body in space and the relative position of their body-parts. In the absence of vision, proprioception is inaccurate and varies across the workspace of the limb. In the current study we wished to determine whether variations in acuity affect the manipulability of proprioceptive position using the Rubber Hand Illusion (RHI). In the RHI perceived position of a subject’s arm is drawn from its actual position towards false visual position information, in the form of a rubber hand. We predicted a reduction in RHI proprioceptive shifts for limb positions around the shoulder, because previous research suggests proprioceptive acuity is greatest in this area. It was expected proprioceptive recalibration should increase as the limb is displaced laterally from this area. Interestingly, we found that while errors were indeed at a minimum around the shoulder, proprioceptive recalibration was smallest around the cyclopean eye – increasing as limb position moved towards extracorporeal space. We draw two conclusions. First, a consistent pattern of proprioceptive biases affect position location in the absence of vision. Second, (and in contrast to the first conclusions,) biases of the visual system affect position location when proprioception has been recalibrated by a visual illusion.

Rapid pointing to targets cued with auditory or visual information

Grant Dewar (grant.dewar@adelaide.edu.au), School of Psychology, University of Adelaide

Anna Ma-Wyatt (anna.mawyatt@gmail.com), School of Psychology, University of Adelaide

Visual information about target location is often used to plan a rapid movement and to update the movement online. In a natural environment, auditory as well as visual information may be used to cue a target location. We investigated the effect of different types of cues on pointing performance. We used a visual cue and several types of auditory cues. Participants (N=5) were required to make a rapid movement and point to a target, which could appear at one of three locations. Target location was either uncued (baseline), cued with an auditory or visual cue, or with an auditory and visual cue. We measured pointing precision and movement time. Pointing performance was most precise with a visual cue; auditory cues improved performance above baseline. A combined auditory and visual cue did not improve performance above conditions with a visual cue alone. Movement times were generally shorter when target location was cued. These results support previous findings indicating that representation for goal locations can be defined across modalities.

Talk: Friday 16:00, Stream 2 (Ferguson Room)

RT distribution analysis of semantic priming effects in semantic categorization: Explaining the relatedness proportion effect

Bianca de Wit (bianca.dewit@mq.edu.au), Department of Cognitive Science, Macquarie University, and ARC-CCD

Sachiko Kinoshita (sachiko.kinoshita@mq.edu.au), Department of Psychology, Macquarie University, and ARC-CCD

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

This study used an analysis of RT distribution to investigate semantic priming effects in a semantic categorization task (“Is it an animal?”). Relatedness proportion (RP, .25 and .75 related) was manipulated in these experiments, using unmasked primes at short and long prime-target SOAs (240 and 1014ms). The use of a short SOA is widely assumed to preclude strategic use of the prime, and hence the RP manipulation is not expected to affect the magnitude of priming effects at the short SOA. Surprisingly, robust RP-effects were found with both short and long SOAs. RT distribution analysis showed the magnitude of the priming effect was constant over RT bins. The RP manipulation led to a distributional shift, increasing the magnitude of the priming effect by a constant amount across the RT bins in the high RP conditions. The implication of the pattern of RT distributions for the mechanisms underlying the semantic priming effect in the semantic categorization task will be discussed.

Putting an 'end' to the motor cortex representations of action words

Greig de Zubicaray (greig.dezubicaray@uq.edu.au), School of Psychology, University of Queensland

Joanne Arciuli, Faculty of Health Sciences, University of Sydney

Katie McMahon, Centre for Advanced Imaging, University of Queensland

'Embodied language' theories assume that conceptual representations of action words are grounded in the motor systems responsible for performing those actions. In reviewing the neuroimaging evidence cited in support of these theories we demonstrate that the reported activity peaks have approximately chance probability of being located within cytoarchitecturally defined primary and premotor cortical areas. Although the current debate about action words reflects a focus on semantics and syntax, we investigated whether motor activity might also reflect sensitivity to probabilistic orthographic or phonological cues to grammatical category embedded within individual words. A review of activity peaks reported for perception and production of nonwords revealed the majority to be located within cytoarchitecturally defined motor areas. Next, using event-related fMRI and a grammatical judgement task, we show that disyllabic words denoting manual actions (e.g., applaud) elicit increased activity compared to non-body-part-related words (e.g., canyon) within a cytoarchitecturally and functionally delineated hand motor cortex area. However, disyllabic nonwords containing endings with cues predictive of verb status (e.g., -eve) also evoked increased activity compared to nonwords with endings predictive of noun status (e.g., -age). These results indicate that motor cortex responses to action words cannot be assumed to selectively reflect conceptual content and/or its simulation.

Human performance on the Travelling Salesperson Problem: The role of the convex hull

Matthew J. Dry (matthew.dry@adelaide.edu.au), School of Psychology, University of Adelaide

The Traveling Salesperson Problem (TSP) is a difficult combinatorial optimization task for which there is no known algorithm that can solve the problem in a linear time-frame. In spite of this human solvers are able to generate close-to-optimal solutions in a time-frame that increases as a linear (or close-to-linear) function of problem size. Numerous theories have been proposed to account for human performance on this task. One of the longest-standing theories, proposed by MacGregor and colleagues, suggests that human solvers employ the convex hull (or outer-edge) of a given problem as a guide for generating solutions. The current experiment tests this theory and suggests that the convex hull does indeed play a role in influencing human performance on TSPs, but in a different manner than has been implicated by previous studies.

Why there can be no such thing as the face-inversion effect: The problem of nomic measurement in psychological science

John Dunn (john.c.dunn@adelaide.edu.au), School of Psychology, University of Adelaide

Cueing with an inverted stimulus leads to a decrement in memory accuracy and this decrement is greater for pictures of faces than for pictures of other mono-oriented stimuli such as houses. This is called the face-inversion effect and is of interest as it suggests that faces are perceived, represented, or processed differently from, say, houses. However, the existence of this effect rests on the implicit assumption that the relationship between memory strength and accuracy is the same for faces and houses. This illustrates a more general problem whereby constructs of interest, such as memory strength, attention, or affect, must be inferred from changes in some observable feature of human behaviour. Remarkably, this problem is not confined to psychology but affects all of science and has been called by Chang (2004), the problem of nomic measurement. I outline how this problem affected attempts to measure temperature by physicists over a 250 year period and draw some stern lessons for psychology consonant with earlier admonitions by Loftus (1978). I conclude that at our present level of development, there can be no such thing as a face-inversion effect.

Chang, H. (2004). *Inventing temperature: Measurement and scientific progress*. New York: Oxford University Press.

Loftus, G. R. (1978). On interpretation of interactions. *Memory & Cognition*, 6(3), 312-319.

Perception of bidirectional transparent-motion requires a bimodal population response

Mark Edwards (mark.edwards@anu.edu.au), Research School of Psychology, Australian National University

John Greenwood (john.greenwood@parisdescartes.fr), Laboratoire Psychologie de la Perception, Université Paris Descartes

Alyssa Morse (alyssa.morse@anu.edu.au), Research School of Psychology, Australian National University

Carlos Cassanello (carlos.cassanello@anu.edu.au), Research School of Psychology, Australian National University

It has been proposed (based upon the average tuning bandwidth of V5 cells) that the neural population-activity mediating the perception of bidirectional motion-transparency (two directions of motion in the same region) depends upon the angular separation between the directions: bimodal for separations greater than 90° and broad uni-modal for smaller separations (NatNeurosci 2000, 270-276). If true, this means that uni-modal activity can underlie both uni- and bi-directional motion, as opposed to the perception of transparency always requiring bimodal activity. We directly determined the underlying population response by adapting to transparent motion with various angular separations and establishing the subsequent pattern of elevation in unidirectional motion thresholds. Stimuli consisted of either global-plaid or global-Gabor stimuli (JoV 2009 1-25). The threshold angular separation between the motion directions required to perceive transparency was established and adaptation was conducted at sub-threshold, threshold and supra-threshold (but below 90°) angular separations. To tap activity in area V5, the apertures in the adapting and test stimuli were in different locations. Sub-threshold separations typically resulted in a uni-modal pattern of threshold elevation while threshold and supra-threshold separations always resulted in bimodal patterns. The results indicate that the perception of motion transparency requires bimodal rather than uni-modal activity.

Effects of semantic and visuospatial factors on visual orienting in response to spatial cues

Cameron T. Ellis (cell600@aucklanduni.ac.nz), School of Psychology, University of Auckland

Andrea Greenwood, School of Psychology, University of Auckland

Anthony J. Lambert (a.lambert@auckland.ac.nz), School of Psychology, University of Auckland

In two experiments we investigated effects of semantic and visual factors on attentional orienting in response to spatial precues. In Experiment 1, participants shifted attention in response to the semantic value (high or low) of centrally presented digits. Contrary to the spatial correspondence hypothesis, attentional effects were driven solely by the semantic value of the cues, and were unaffected by whether the cues were visually symmetric (1, 8) or asymmetric (2,7). In Experiment 2 participants were presented with two peripheral digits; the target usually appeared adjacent to a high value (or low value) digit. Again, participants shifted attention in response to the semantic value of the cues. Moreover, attentional effects were of equivalent size when participants shifted attention in response to visually similar and dissimilar cue-pairs (e.g. 8 + 3 vs. 8 + 2). Results from both experiments indicate that when numbers were used as spatial cues, participants attentional behaviour was driven primarily by semantic, rather than by visual features of the cue stimuli.

Do touch and audition share common temporal frequency channels?

Han Shui Er (han.shuier@gmail.com), School of Psychology, University of Sydney

Johahn Leung (jleung@mail.usyd.edu.au), Bosch Institute and School of Medical Science, University of Sydney

Erik Van der Burg (erik.vandenburg@sydney.edu.au), School of Psychology, University of Sydney

David Alais (davida@psych.usyd.edu.au), School of Psychology, University of Sydney

It is commonly assumed that tactile and acoustical vibrations give rise to neural signals that are processed separately. However, a recent report by Yau, Olenczak, Dammann and Bensmaia (2009) examining temporal frequency sensitivity suggested the contrary. In their study, auditory sine tones (200 & 400 Hz) and band-pass white noise stimuli were found to be effective maskers of tactile frequency discrimination, and did so in a frequency-tuned manner. Here, we extend Yau et al.'s study by asking if the same effect of auditory masking of tactile perception can be observed for lower tactile frequencies (50-100Hz). Our results did not show auditory masking of tactile perception, however, these null results may be due to factors such as tactile-driven phantom sounds and experimental controls (e.g. randomised phase). The implications of these factors and future directions are discussed.

iPhone therefore iAttend: Ownership over iPhones moderates behavioural responses of visuo-spatial attention

Robert S. Eres (robert.eres@uqconnect.edu.au), School of Psychology, University of Queensland

Ashleigh E. Chant (ashleigh.chant@uqconnect.edu.au), School of Psychology, University of Queensland

Hayley A. Colman (h.colman@uq.edu.au), School of Psychology, University of Queensland

Merryn D. Constable (merryn.constable@uqconnect.edu.au), School of Psychology, University of Queensland

Andrew P. Bayliss (apbayliss@gmail.com), School of Psychology, University of East Anglia

Ada Kritikos (a.kritikos@uq.edu.au), School of Psychology, University of Queensland

We used discrimination and detection cueing paradigms to measure how the presence and location of personal property directs visuo-spatial attention in the right and left hemispace. We manipulated property ownership with mobile Smartphones (Apple iPhones ©) presented adjacent to the computer monitor and horizontally aligned with experimental stimuli. Smartphones belonged to either the participant or the experimenter. Participants wrote a message (a significant other's name) into either the Experimenter's phone or their own. We calculated the cueing cost (Invalid - Valid trials) to measure orienting and re-orienting of spatial attention. There was a subtle effect of ownership with predictive cueing, such that, a significant difference was found between targets presented to the left compared with the right but only when the Experimenter's phone was used to write the message. When the cue was irrelevant (non-predictive cueing) and the Experimenter's phone was presented, a larger cueing cost was found for when the Experimenter's phone was used to write the message compared with when the Participant's phone was used. This was specific for targets presented to the left. Collectively, the present findings implicate a modulatory role of ownership over the distribution of visuo-spatial attention.

Does trust perception and behaviour change with development?

Louise Ewing (louise.ewing@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Frances Caulfield (20249353@student.uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Ainsley Read (ainsley.read@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

Adults are widely reported to ‘read’ trustworthiness from others’ faces rapidly, automatically and with considerable consensus. However, little is known about how this ability develops. The current study investigated facial trustworthiness perception across three age-groups: 5 year olds, 10 year olds, and adults. Children and adults rated individual faces for trustworthiness and made forced-choice judgments about face pairs comprised of a (pre-rated) high- and a low-trustworthy face. They also played a behavioural economics trust game designed to reveal how facial trustworthiness cues were valued and influenced behaviour in a ‘social context’. Participants indicated how much they were willing to trust fictional partners with high- or low-trustworthy faces or reputations. Results support mature perceptions of facial trustworthiness from the youngest ages tested, but suggest there may be developmental differences in how this information influences behaviour. These results, like recent reports of adult-like perceived competence judgments in young children, support the very early development of sensitivity to personality characteristics in faces.

The short and the tall of it: The role of viewer height in recognising faces viewed from above and below.

Simone Favelle (simone.favelle@uow.edu.au), School of Psychology, University of Wollongong

Stephen Palmisano (stephenp@uow.edu.au), School of Psychology, University of Wollongong

Jessica Jackson (jkj999@uowmail.edu.au), School of Psychology, University of Wollongong

The pattern of generalisation across different views of faces is dependent on the angle and the axis of rotation of those views. For views of faces rotated in pitch (i.e., above and below a frontal full-face view) our previous research shows that generalisation is poorer for views from above than for views from below (Favelle, Palmisano & Maloney, 2007; Favelle, Palmisano & Avery, 2011). To what extent does viewer height account for viewpoint effects in pitch rotated views of faces? In this study we investigate the role of experience in viewpoint dependent face recognition by correlating viewer height (as an objective measure of exposure to particular views) with face matching performance across rotations in pitch; the rationale being that short people have greater exposure to views from below and tall people to views from above. Results show some group differences based on height and the sex of the face to be matched that may indicate a role for experience with views in face recognition.

Disrupting prefrontal cortex prevents performance gains from sensory-motor training

Hannah L. Filmer (h.l.filmer@gmail.com), School of Psychology, University of Queensland

Jason B. Mattingley (j.mattingley@uq.edu.au), School of Psychology, University of Queensland

René Marois (rene.marois@vanderbilt.edu), Department of Psychology, Vanderbilt University

Paul E. Dux (paul.e.dux@gmail.com), School of Psychology, University of Queensland

Humans show large and reliable performance costs when required to make more than one simple decision simultaneously. Such multitasking costs are thought to reflect capacity limits in response selection (RS), the information processing stage where sensory input is mapped to an appropriate motor response. Neuroimaging has implicated the left posterior lateral prefrontal cortex (pLPFC) as a key neural substrate of RS. For example, activity in left pLPFC tracks improvements in RS efficiency typically observed following training. To date, however, there has been no causal evidence for the involvement of pLPFC in RS or training effects, and the left hemisphere lateralisation of this operation remains controversial. Here we employed excitatory, inhibitory and sham transcranial direct current stimulation (tDCS) and measured participants' performance on high and low RS-load tasks after different amounts of practice. Both excitatory and inhibitory stimulation of the left pLPFC disrupted training effects for the high load condition relative to sham. No disruption was found for the low load and right pLPFC stimulation conditions. The findings support a causal role for the left pLPFC in both RS and training effects. It also suggests training improves RS efficiency by sharpening the neural ensemble in prefrontal cortex that performs sensory-motor translations.

The time course of the Simon effect in the reach-to-touch paradigm

Matthew Finkbeiner (matthew.finkbeiner@mq.edu.au), Department of Cognitive Science, Macquarie University

Andrew Heathcote (andrew.heathcote@newcastle.edu.au), Department of Psychology, University of Newcastle

When subjects classify stimuli along some non-spatial dimension (e.g. “press the right button for green stimuli and the left button for red stimuli”), reaction times are faster when stimulus and response locations correspond. This phenomenon is known as the Simon effect. It is widely held that the Simon effect is due to two independent response processes that run in parallel. On this view, there is a ‘fast’ process that uses the task-irrelevant spatial code to activate a corresponding response and a ‘slower’ process that uses the task rules to translate the relevant dimension of the stimulus into an appropriate response. In the present study, we sought to quantify the time course of these two independent processes. To do this, we incorporated the response-signal procedure into the reach-to-touch paradigm. Our findings are consistent with the standard account of the Simon effect. Specifically, we demonstrate how stimulus location governs the initial segment of reaching trajectories that commence ~ 120 ms following stimulus onset. In contrast, the governing influence of the stimulus’ task-relevant dimension does not emerge for an additional ~ 100 ms. We also find that the ‘fast’ effect of stimulus location is short-lived, already absent on trajectories that commence ~ 300 ms after stimulus onset.

Exploring the parameters of visual search in 3D space

Nonie Finlayson (nonie.j@gmail.com), School of Psychology, University of Queensland

Philip Grove (p.grove@psy.uq.edu.au), School of Psychology, University of Queensland

Many activities, such as meeting a friend in a crowded place, necessitate finding objects within our three-dimensional (3D) environment, which requires deployment of attention to specific locations in 3D space. However we know little about how this deployment is carried out, and the parameters surrounding attentional deployment in 3D space. In the experiments reported here, participants searched a 3D array of bars tilted top-back in depth for the presence or absence of a bar tilted top-forward. The arrangement of these bars within the 3D space was manipulated, as was the overall volume of the space. We observed that search times are longer over larger 3D volumes than smaller 3D volumes. Furthermore, the target’s relative position in 3D space is also important, such that targets closer in depth to the participant were found faster than those further away. However, both the absolute distance of a target from the observer and the layout of items in the 3D volume did not affect search performance. Our data demonstrates that the deployment of attention depends on various characteristics of 3D layout, and in particular suggests that increasing the 3D volume of an array results in decreased processing for each item within that display.

The Lombard speech intelligibility benefit for younger and older adults

Michael Fitzpatrick (m.fitzpatrick@uws.edu.au), The MARCS Institute, University of Western Sydney

Jeesun Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Talkers adapt their speech production in noise (known as ‘Lombard’ speech), which results in an auditory signal that has increased intensity, higher average pitch, and a flatter spectral-tilt, and is delivered with greater face and head movements (i.e. visual speech). Younger adults can take advantage of the acoustic changes and the enhanced visual signal to substantially improve their speech perception in noise. However, it is unclear how effective Lombard speech modifications will be for older adults. Compared to younger adults, older adults’ hearing is often poorer (especially in high frequencies) and they tend to benefit less from audio-visual speech relative to younger adults. The aim of the current study was to examine the intelligibility benefit of auditory and audio-visual Lombard speech for older adults. To examine this, we tested older and younger adults’ perception of auditory and auditory-visual speech produced in quiet and in noise. Results will be discussed in relation to (1) how to speech signals might be enhanced to mitigate problems in speech perception due to noise and/or hearing difficulties and (2) what skills visual speech processing may require.

What is familiar may not be old: Recollection and markers of recognition accuracy for ‘no’ decisions

Sarah Fletcher (timm0021@flinders.edu.au), School of Psychology, Flinders University

Nathan Weber (nathan.weber@flinders.edu.au), School of Psychology, Flinders University

Eyewitness identifications play an important role in our justice system, and are not always reliable. Hence it is important to identify predictors which indicate whether eyewitness decisions are correct. Confidence and response latency have been found to be useful predictors of accuracy for positive identifications, but not lineup rejections. A discrimination task using words presented in different modalities was used to investigate whether this phenomenon generalises to simpler laboratory recognition tasks. We proposed that the discrepancy is due to overreliance on familiarity, as opposed to recollection, as an evidence base for decisions. We manipulated word presentation form (written vs audio), number of presentations (one vs three) and test conditions (deadline, expected to make only familiarity evidence available; vs delay, an enforced wait before responding, expected to encourage recollection). Results showed that in the deadline condition, the established difference between positive and negative decisions occurred. However in the delay condition, the relationship between confidence, response latency and accuracy for negative decisions was strengthened, and false alarm rates to strengthened words were reduced. This supports the idea that neglect of recollection produces the positive-negative difference. Implications for application to the eyewitness lineup task will be discussed.

Patterns of spatially dependent cueing on horizontal line bisection biases

Jason Forte (jdf@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Michael Nicholls, School of Psychology, Flinders University

Charles Spence, Department of Experimental Psychology, University of Oxford

Evidence of leftward biases on a horizontal line-bisection task (termed pseudoneglect) has been attributed to the asymmetry of visual attention processing. The perceived midpoint of a horizontal line shifts towards the location of a previously flashed spatial cue presented in the left or right visual field. It is not known if cues appearing in front or behind a target influence pseudoneglect in the same way as left/right cues. We have measured horizontal line bisection biases in 54 participants after briefly flashed cues to the left/right or front/back of a pre-transected horizontal line. Left/right cues shifted horizontal line bisection biases towards the cue location for a minority of participants. Front/back cues had little directional effect on pseudoneglect. However pseudoneglect was shifted independently of cue location for both left/right and front/back cues in a number of participants. Our data is consistent with the idea that spatial cues can shift pseudoneglect by focusing or diverting attention from the stimulus. However, the data also indicate that spatial cues have little impact on pseudoneglect for many participants.

Talk: Thursday 11:30, Stream 3 (Gallery)

The dynamics of perceptual rivalries have been over-interpreted

Regan M. Gallagher (regan.gallagher@uqconnect.edu.au), School of Psychology, University of Queensland

Hamish Haggarty, School of Mathematics and Physics, University of Queensland

Derek H. Arnold (d.arnold@uq.psy.edu.au), School of Psychology, University of Queensland

Perceptual rivalries are situations wherein the content of awareness alternates despite constant stimulation. For instance, in binocular rivalry awareness switches intermittently between stimuli presented to the right or left eye, such that only one image is seen at a time. In motion-induced blindness, typically salient static dots can seem to disappear when placed in close proximity to motion. One observation that has been used to argue for a common causal mechanism is that the dynamics of diverse perceptual rivalries can be similar on an individual basis. If, for example, a participant reports rapid changes during binocular rivalry, they are also likely to report rapid changes during motion-induced blindness. We assessed this relationship by also having people report on the visibility of unexpected physical stimuli (an intermittent gabor presented in noise). We find that the dynamics of perceptual rivalries are well predicted by the speed at which participants report seeing unexpected changes, and by the tendency to over- or under-report seeing unambiguous physical stimuli. We suggest that the dynamics of diverse forms of perceptual rivalry likely reflect subjective criteria used when reporting on the dynamics of unexpected changes, and thus do not provide strong evidence for a common causal mechanism.

Outlier responses reflect sensitivity to statistical structure in the human brain

Marta Garrido (m.garrido@uq.edu.au), Queensland Brain Institute, University of Queensland

Maneesh Sahani (maneesh@gatsby.ucl.ac.uk), Gatsby Computational Neuroscience Unit, University College London

Raymond Dolan (r.dolan@ucl.ac.uk), Wellcome Trust Centre for Neuroimaging, University College London

We constantly look for patterns in the environment that allow us to learn key regularities and make predictions about what will happen next. The physiological study of regularity extraction has focused primarily on repetitive sequence-based rules within the sensory environment, or on stimulus-outcome associations in the context of reward-based decision-making. Here we ask whether we implicitly encode non-sequential stochastic regularities, and detect violations therein. We addressed this question using a novel experimental design and both behavioural and magnetoencephalographic metrics associated with responses to pure tones with frequencies sampled from a Gaussian distribution. We observed that sounds in the tail of the distribution evoked a larger response than those that fell at the centre. This response resembled the mismatch negativity evoked by surprising events in traditional oddball paradigms. Crucially, responses to physically identical outliers were greater when the distribution was narrower. These results show that humans implicitly keep track of the uncertainty induced by random distributions of sensory events. Source reconstruction suggested that these responses arose in a temporo-parietal network, areas that have been associated with attention orientation to unexpected events. Our results demonstrate a very early neurophysiological marker of the brain's ability to implicitly encode complex statistical structure in the environment.

Invariance of sequential effects factor structure with response-stimulus interval

Dinis Gokaydin (dinis.gokaydin@adelaide.edu.au), School of Psychology, University of Adelaide

Anna Ma-Wyatt (anna.mawyatt@adelaide.edu.au), School of Psychology, University of Adelaide

Daniel Navarro (daniel.navarro@adelaide.edu.au), School of Psychology, University of Adelaide

Amy Perfors (amy.perfors@adelaide.edu.au), School of Psychology, University of Adelaide

Sequential Effects results in two-alternative forced-choice (2AFC) tasks are usually presented in terms of the mean reaction time (RT) across multiple participants, overlooking variation in individual results. Here we focus on such variation, pooling together data from several different two-alternative forced-choice experimental paradigms and four different RSIs (50, 250, 500 and 800ms). Four separate factor analyses were then conducted, one for each RSI. Our results indicate that the same two-factor structure is responsible for the differences observed in each RSI condition. The fact that the same factor structure was found at 50ms is particularly surprising since RT patterns at very low RSIs are qualitatively different from those obtained at higher RSIs. The specific pattern of loadings of the two factors found is similar to RT patterns averaged across participants found in the literature. Moreover, the patterns of loadings of both factors look very similar to results obtained from EEG studies. Together, these results could be taken as evidence for two separate mechanisms responsible for the detection of repetitions and alternations. The results presented here go a long way towards unifying sequential effects results across multiple experimental paradigms.

Temporal selection: Two targets for the price of one

Patrick T. Goodbourn (patrick.goodbourn@sydney.edu.au), School of Psychology, University of Sydney

Alex O. Holcombe (alex.holcombe@sydney.edu.au), School of Psychology, University of Sydney

Can multiple visual targets be selected at the same time? We used rapid serial visual presentation (RSVP) tasks to investigate spatiotemporal properties of attentional selection. Two concurrent streams of letters were presented in a range of spatial configurations, with target letters cued either by a surrounding ring (exogenous cueing) or by an auditory tone (endogenous cueing). In single-target conditions, a target appeared in only one stream; in dual-target conditions, two targets appeared simultaneously, one in each stream. Observers reported each target's identity, and a mixture model fitted to the distribution of position errors estimated the efficacy (probability of reporting a relevant item), latency, and temporal precision of selection. We found that the latency and precision observed for single targets were unaffected by selection of a second, simultaneous target. In dual-target conditions, latency was similar in both streams, suggesting that selection was simultaneous—however, simultaneous selection within the same visual hemifield appeared to require exogenous cueing. We also observed visual field asymmetries in selection efficacy, with implications for models of hemifield-specific attentional resource allocation. While some tasks may require serial shifts of attention, the present results suggest that under certain conditions, target selection in multiple RSVP streams can occur simultaneously.

Reduced temporal fusion in near-hand space

Stephanie C. Goodhew (stephanie.goodhew@anu.edu.au), Research School of Psychology, The Australian National University

Davood Gozli (d.gharagozli@mail.utoronto.ca), Department of Psychology, University of Toronto

Susanne Ferber (ferber@psych.utoronto.ca), Department of Psychology, University of Toronto

Jay Pratt (pratt@psych.utoronto.ca), Department of Psychology, University of Toronto

The brain is continuously confronted with changing visual input, from which it must infer what stimulation belongs to a continuing object over time, versus that which belongs to distinct objects. Performance on a variety of tasks is known to be affected by the proximity of visual stimuli to the observer's hand, which has recently been suggested to be mediated via enhanced magnocellular channel input to near-hand space. Given the magnocellular channel's superior temporal resolution, we tested whether observers' ability to perceive two discrete visual events in time would be influenced by the proximity of observers' hands to the stimuli. To do this, we used object substitution masking (OSM), where two objects in close spatiotemporal proximity are mistaken for one. Specifically, participants' task was to identify the gap location (left vs. right) in a target C, which was surrounded by a configuration of four small dots (the mask). When the offset of the mask is delayed (masking condition), target perception is impaired relative to simultaneous offset. We found that masking was reduced in near-hand space. This suggests that conscious perception of two distinct objects can be facilitated by a transient boost in the temporal precision of encoding.

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Perceived boundary sharpness along a depth discontinuity

Philip Grove (p.grove@psy.uq.edu.au), School of Psychology, University of Queensland

Nicholas Tierney, School of Psychology, University of Queensland

Many reports claim that the boundary along a stereoscopic depth discontinuity is perceptually enhanced when appropriate monocular features are present. We quantified the perceptual enhancement along an occlusion boundary. We employed a novel stimulus consisting of adjacent stacks of horizontal lines of irregular lengths abutting along a vertical edge, generating an illusory contour separating the stacks. We simulated four stereoscopic depth relationships between the stacks: valid occlusion, which depicted the nearer of two stacks partially occluding the other; no occlusion in which the two stacks appeared in depth but no occlusion occurred along the boundary; invalid occlusion such that the binocular images were incompatible with one stack occluding the other; no depth. Experiment 1 confirmed that the valid occlusion condition generated the strongest illusory contour. Experiment 2 quantified the advantage observed for the valid occlusion condition by varying the number lines in the stacks for occluding and non-occluding depth relationships. Fewer lines were required in the valid occlusion condition to generate an illusory contour of equivalent strength to the non-occluding depth relationships. This method provides a metric for the perceptual advantage conferred by appropriate monocular features indicating occlusion in stereoscopic depth perception and can be applied to other stereoscopic displays.

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Do eyewitnesses recall-to-reject? The role of recollection in lineup decisions

Nicola Guerin (nicky.guerin@flinders.edu.au), School of Psychology, Flinders University

Nathan Weber (nathan.weber@flinders.edu.au), School of Psychology, Flinders University

False identifications are often viewed as the most serious problem with eyewitness identification evidence. Despite this, few attempts have been made to theorise mechanisms underlying false identifications. We extended a dual-process model of recall-to-reject in recognition memory to an eyewitness identification-type task to address this problem. In basic recognition tasks that involve highly similar target and foil stimuli, foils can seem misleadingly familiar following exposure to targets. Recollection must be used to offset this misleading familiarity and avoid false positive recognition of foils. However, recollection may be neglected if participants do not anticipate that the use of recall-to-reject will be needed to avoid false alarms. While eyewitness identification tasks are much more complex, they also involve the identification of a target from an array of similar (appearance-matched) foils. We tested whether a neglect of recollection would explain false identifications in an eyewitness identification-type task. Familiarity and recollection were varied by manipulating repetitions (two, six) and attention (divided, undivided), respectively. Results suggest that participants rely on familiarity when recollective evidence is relatively weak, but do not indicate a neglect of recollection. Dual-process models may provide a good framework for eyewitness identification theory.

Visual channels encoding race are sensitive to facial morphology, not skin

O. Scott Gwinn (scott.gwinn@mq.edu.au), Department of Psychology, Macquarie University

Kevin R. Brooks (kevin.brooks@mq.edu.au), Department of Psychology, Macquarie University

Research suggests judgments of racial typicality are based primarily on morphological information with skin tone providing only secondary cues (Brooks & Gwinn, 2010). The current study aims to examine this conclusion using a novel approach: race-contingent face aftereffects. These aftereffects have been shown to be dependent upon ratings of racial typicality and so should be more substantially influenced by differences in morphology than by skin tone. Contingent aftereffects of expansion and contraction were induced by adaptation to African and Caucasian faces, and then tested using faces differing in both morphology and skin luminance (ML), in morphology alone (M), and in skin luminance alone (L). Significant effects were found when test stimuli included morphological information (ML and M), but not when it was absent (L). Furthermore, the strength of the aftereffect measured in the ML condition was no greater than that in the M condition, suggesting that the effects measured here can be accounted for by differences in morphology alone. Given that race-contingent aftereffects reveal underlying differences in the neural encoding of race information, these results indicate morphological cues are the basis of the neural encoding of faces in separate channels that are preferentially responsive to faces of a specific race.

Examining the pitch memory deficits in amusia

Jeff P Hamm (j.hamm@auckland.ac.nz), School of Psychology, University of Auckland

Cunmei Jiang (cunmeijiang@126.com), Music College, Shanghai Normal University

Vanessa K Lim (vlim003@hotmail.com), School of Psychology, University of Auckland

Congenital amusia, simply amusia hereafter, refers to the diminished ability to distinguish between two separate pitches in the absence of brain injury. This condition is present from birth in approximately 3.5-4% of the population. This condition has subtle, but detectable, negative impact upon language prosody and the tones in tonal languages. It also greatly impairs music appreciation and those with amusia tend to utilize music in their everyday life much less than the rest of the population. As a result, not only do amusics have deficits in their pitch discriminations they also have reduced experience with musical stimuli. Recently, a few studies have suggested that amusia is also associated with impaired memory for pitch. In this presentation we suggest that these apparent pitch memory deficits may simply reflect differences in task difficulty, with the amusic group's impairment at pitch discrimination simply making the memory task harder. We present data where we attempt to equate the discrimination difficulty of the stimuli and, when this is done, demonstrate that the amusic group's memory performance is not impaired relative to the controls.

Damn! Evidence for pre- and post-lexical processing of taboo distractors in the picture-word interference paradigm

Samuel J. Hansen (sam.hansen@uq.edu.au), School of Psychology, University of Queensland

Katie L. McMahon (katie.mcmahon@cai.uq.edu.au), Centre for Advanced Imaging, University of Queensland

Jennifer S. Burt (j.burt@psy.uq.edu.au), School of Psychology, University of Queensland

Greig I. de Zubicaray (greig.dezubicaray@uq.edu.au), School of Psychology, University of Queensland

Taboo words were used as distractor stimuli in the picture-word interference (PWI) paradigm. Lexical selection by competition (LSC) models predict interference (slower picture naming latencies) based on increased lexical-level competition for selection generated from higher activation/arousal levels for taboo vs. non-taboo words. Alternatively, the response exclusion hypothesis (REH) predicts interference at a post-lexical articulatory buffer level with a verbal self-monitor editing inappropriate phonologically well-formed responses. In three experiments, participants named target pictures (e.g. CRAB) with taboo and non-taboo distractor words (CRAB-damn vs. CRAB-song). Experiment 1 demonstrated taboo interference at stimulus onset asynchronies of -150ms and 0ms but not at 150ms. In Experiment 2, the taboo interference effect was eliminated in a phonologically-related taboo condition (e.g. CRAB-crap). Experiment 3 repeated Experiment 2, but masked the distractor to prevent a word-form entering the output buffer. Taboo interference manifested under masked conditions for both phonologically-unrelated and phonologically-related taboo words, eliminating the interaction observed in Experiment 2. The interference effects observed with unmasked words in Experiments 1 and 2 are consistent with both LSC and REH accounts, but in order for the REH to reconcile the effects with masked stimuli, self-monitoring would need to be extended to cover processes occurring prior to the generation of the ! phonological word-form.

Feature specificity in attentional capture by size and colour

Anthony M. Harris (anthony.harris1@uqconnect.edu.au), School of Psychology, University of Queensland

Roger W. Remington (r.remington@psy.uq.edu.au), School of Psychology, University of Queensland

Stefanie I. Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Top-down guidance of visual attention has classically been thought to operate in a feature-specific manner. However, recent studies have shown that top-down visual attention can also be guided by information about target-nontarget feature relations (e.g. larger, redder, brighter). Here we examine the use of these strategies in the guidance of attention by size and colour stimuli. Across three experiments we employ a spatial cueing paradigm and recommend a minimal set of cues for differentiating between relational and feature-specific attentional guidance. In Experiment 1 we demonstrate that in search for size, when both feature-specific and relational strategies are available, participants adopt a relational strategy. In Experiment 2 we demonstrate that when feature-specific information is the only reliable information to guide attention to the target, participants are able to adopt a feature specific set for size information. Finally, in Experiment 3 we extend our paradigm to differentiate between feature-specific and relational strategies in search for colour, producing the first demonstration of feature specific results that controls for the possibility of the effect being driven by relational strategies. Together, these experiments help to clarify the conditions under which different attentional guidance strategies will be employed, and demonstrate a useful minimum cue condition requirement for differentiating between relational and feature-specific top-down guidance. Implications for current theories of attention are discussed.

Causal models and experience-based sampling reduce base rate neglect

Guy E. Hawkins (guy.e.hawkins@gmail.com), School of Psychology, University of New South Wales

Brett K. Hayes (b.hayes@unsw.edu.au), School of Psychology, University of New South Wales

Ben R. Newell (ben.newell@unsw.edu.au), School of Psychology, University of New South Wales

Base rates are critical to understanding the frequency of events in the environment, yet the use of base rate information in probabilistic judgment is notoriously poor. Two experiments examined the combined effect of two novel approaches proposed to reduce base rate neglect: sampling base rate information from a probability distribution over relevant outcomes, and explanation of false positive information in the context of a causal model. We found that both causal model and sampling approaches moved open ended probability judgments closer to the normatively correct solution and increased selection of the correct response in a forced-choice test. The sampling and causal framing manipulations had additive effects on probability judgments. A follow-up study confirmed that a detailed description of the relevant distribution could produce a similar facilitation in intuitive probability estimates to sequential sampling. Hence, using experienced or described samples can lead to a more accurate representation of base rates, and supplying a cause for false positives increases the likelihood that they will be considered in probability judgments.

Resisting temptation: Role of cognitive goal activation and self-control

Ashleigh Haynes (ashleigh.haynes@flinders.edu.au), School of Psychology, Flinders University

Eva Kemps (eva.kemps@flinders.edu.au), School of Psychology, Flinders University

Robyn Moffitt (robyn.moffitt@acu.edu.au), School of Psychology, Australian Catholic University

Philip Mohr (phil.mohr@csiro.au), Animal, Food, and Health Sciences, Commonwealth Industrial and Scientific Research Organisation

According to counteractive control theory (Trope & Fishbach, 2006), the automatic cognitive activation of a weight-management goal by temptation cues predicts successful self-regulation of eating. The current study conducted a novel test of the theory by assessing the intensity of temptation experienced, using a controlled, lab-based measure of snack intake to measure the self-regulation of eating, and tested whether trait self-control would moderate this relationship. A sample of 124 women (18-25 years) trying to manage weight through healthy eating completed a lexical decision task to assess cognitive accessibility of the weight-management goal. Intake of four popular energy-dense snack foods was measured in a task disguised as a taste-test. Participants also completed measures of temptation experience intensity and trait self-control. Consistent with counteractive control theory, cognitive accessibility predicted lower food intake, but only for participants with high self-control. This relationship between cognitive accessibility and snack intake was mediated by temptation experience intensity, such that participants who felt less tempted by the snack foods ate less of them. Results suggest that changing the processes underlying the experience of temptation might be more effective at enhancing self-regulation among individuals with low self-control than changing cognitive goal accessibility.

Conservatism in generalisation

Andrew T. Hendrickson (drew.hendrickson@adelaide.edu.au), School of Psychology, University of Adelaide

Daniel J. Navarro (daniel.navarro@adelaide.edu.au), School of Psychology, University of Adelaide

Amy Perfors (amy.perfors@adelaide.edu.au), School of Psychology, University of Adelaide

The degree to which individuals are more or less conservative in generalising is increasingly being used in clinical assessment but the consistency of individual differences in generalisation conservatism across cognitive tasks has not been systematically assessed. In this current work, we report the results of four cognitive tasks that assess the degree of conservatism in generalisation across a wide array of domains. Those domains include: probability assessment of which distribution items were sampled from, generalisation of grammatical rules to new instances in a grammar learning task, categorisation of new instances in an environment with a shifting category boundary, and a probability assessment of category membership for new items in a one-dimensional category space. The assessments of conservatism in generalisation for each task was collected from 24 individuals and the results show a pattern of conservatism across individuals that was not consistent across all tasks. This suggests that a single measure of conservatism in generalisation across all cognitive domains might not be appropriate. More complex patterns of conservatism and domain interaction will be discussed.

Is conscious error awareness necessary for adaptive post-error behavioural change?

Rob Hester (hesterr@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Catherine Orr (corr@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Kathleen Charles-Walsh (kathleen.charleswalsh@gmail.com), School of Psychological Sciences, University of Melbourne

Ashley Skilleter (a.skilleter@neura.edu.au), Neuroscience Research Australia

Response conflict theory argues that adaptive cognitive control can occur in the absence of conscious awareness. Studies examining error-related behaviour have been unable to demonstrate adaptive post-error slowing in the absence of awareness, because of the requirement to explicitly signal recognition of an error. We administered a modified version of the Error Awareness Task (EAT), a motor Go/No-go task that induces response inhibition commission errors from participants, a proportion of which they are unaware. Rather than overtly signalling awareness of an error, participants were trained to alter their response on the no-go trial following an error, which occurred every 6-12 trials. Standard and dynamic conditions were administered, with the latter presenting a No-go trial on one of six trials following a No-go error, so as to encourage cautious post-error behaviour and avoid another commission error. Significant post-error slowing followed aware errors, in both the standard and dynamic conditions, with slowing more sustained during the latter. In contrast, post-error slowing did not follow unaware errors in either condition. The current data appear inconsistent with the conflict theory of cognitive control, and, further, have implications for the control difficulties arising from significant error awareness deficits in a range of clinical conditions.

Own- and other-ethnicity faces are processed holistically

Ruth Horry (ruth.horry@flinders.edu.au), School of Psychology, Flinders University

Winnee Cheong (cheongwn@help.edu.my), Department of Psychology, HELP University

Neil Brewer (neil.brewer@flinders.edu.au), School of Psychology, Flinders University

Holistic processing is a hallmark of visual expertise, and contributes to our remarkable capacity to discriminate between and recognize faces. However, not all faces are recognized equally well; people tend to recognize faces of their own ethnic background more accurately than faces from other ethnic backgrounds (the other-ethnicity effect). It has been argued that a relative lack of experience with other-ethnicity faces impairs our ability to extract holistic information from them, and that this holistic processing deficit underlies the other-ethnicity effect in recognition. The strongest evidence for the holistic-deficit hypothesis comes from the composite face task, which measures selective attention to one region of a face. However, recent research has shown that the version of the composite task that has been used in this area of research lacks construct validity, as it is susceptible to factors unrelated to holistic processing. We use an improved version of the composite task to revisit the holistic-deficit hypothesis of the other-ethnicity effect. Across two experiments, we found robust holistic processing effects of similar magnitudes for both own- and other-ethnicity faces, despite the typical recognition deficit for other-ethnicity faces. These data therefore cast doubt upon the role of holistic processing in the other-ethnicity effect.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

The same-race advantage in expression recognition

Kalyce J. Howard (kalyce.howard@uon.edu.au), Department of Psychology, University of Newcastle

Darren Burke (darren.burke@newcastle.edu.au), Department of Psychology, University of Newcastle

In addition to a general expertise in face perception, individuals are often more effective when recognising the facial identity of, or expression portrayed by, members of the same race. The same-race advantage (SRA) in facial identity recognition has been linked to a superior ability to utilise configural information on same-race faces. In the present study, we considered whether the same perceptual mechanism (i.e., configural processing) is responsible for the facial expression SRA, or whether this relies more heavily on featural cues (which have also been implicated in the facial identity SRA). Using the composite paradigm, Asian and Caucasian participants matched the facial expressions between pairs of Asian and Caucasian facial composites. Despite finding a significant composite effect, results were unable to support a configural-processing hypothesis of the SRA in facial expression recognition. Therefore, the use of featural cues was considered as a contributing factor of the SRA in facial expression recognition.

Sensing unseen changes

Piers D. L. Howe (pdhowe@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Margaret E. Webb (maggiebethwebb@gmail.com), School of Psychological Sciences, University of Melbourne

Does becoming aware of a change to a purely visual stimulus necessarily cause the observer to see the change or is it possible to sense a visual change without seeing it? In other words, is it possible for one's awareness of a visual change to be purely cognitive without an associated perceptual component?

In one experiment, observers were sequentially presented with two images of a face. For each image pair, observers were first asked to indicate if there was a change. If they indicated that there was, they were subsequently asked to select what had changed from a list of nine possible options. We found that observers could regularly correctly identify when a change had occurred, without being able to specify which change had occurred. Such changes were sensed but not seen.

In a second experiment all the face images were inverted. Again, observers were able to regularly detect when changes occurred without being able to specify what had changed. Even for inverted faces, changes could be sensed without being seen. Additional experiments are in progress to attempt to identify the source of this sensing ability.

Meditation instigates stress induced enhancement of neurobehavioural performance

Maarten A. Immink (maarten.immink@unisa.edu.au), School of Health Sciences, University of South Australia

Shona Kelly (s.kelly@shu.ac.uk), Faculty of Health and Wellbeing, Sheffield Hallam University, UK

Chris Della Vedova (chris.dellavedova@unisa.edu.au), School of Pharmacy and Medical Sciences, University of South Australia

John Hayball (john.hayball@unisa.edu.au), School of Pharmacy and Medical Sciences, University of South Australia

Changes in salivary cortisol and neurobehavioural measures of working memory and implicit motor learning after exposure to a social stress challenge was examined in adult meditators and non-meditators. Results demonstrated no effect of meditation experience on cortisol activity in response to social stress. In terms of working memory, performance on a verbal n-back task revealed that exposure to social stress reduced target identification response latency in meditators but increased response latency in non-meditators. In terms of implicit motor learning, overall, meditators demonstrated faster performance on a serial reaction time task than non-meditators and exposure to social stress did not result in any change on performance in either group. However, when transferred to a random sequence, meditators significantly increased reaction time while non-meditators revealed no significant change in reaction time. In conclusion, the present results indicate that exposure to acute stress enhances working memory performance and promotes implicit motor learning for meditators but results in deficits for non-meditators. This divergent effect of acute stress exposure on neurobehavioural performance does not appear to be mediated by cortisol activity. The present results are consistent with a growing body of literature demonstrating that regular meditation practice benefits neurobehavioural performance.

The role of working memory in top-down modulation of attentional capture

Oscar Jacoby (o.jacoby@uq.edu.au), Queensland Brain Institute, University of Queensland

Roger W. Remington (r.remington@psy.uq.edu.au), School of Psychology, University of Queensland

Stefanie I. Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Marc R. Kamke (m.kamke@uq.edu.au), Queensland Brain Institute, University of Queensland

Kristy Butler (kristyabutler@gmail.com), School of Psychology, University of Queensland

Jason B. Mattingley (j.mattingley@uq.edu.au), Queensland Brain Institute and School of Psychology, University of Queensland

When we search for objects that possess particular features, we pre-emptively bias brain networks such that any object possessing those features readily captures our attention. It has been suggested that maintaining such biases, or attentional sets, involves similar neural resources to those involved in working memory. If so, then taxing working memory should reduce top-down influences on attentional capture. In Experiment 1, we recorded EEG while observers monitored dynamic stimulus streams above and below fixation for target events defined by a particular feature value (e.g., red). Distractor events presented at lateralised irrelevant locations evoked a larger N2pc component of the evoked potential when they possessed the target feature than when they did not, consistent with top-down modulation of capture. In Experiment 2, observers performed the monitoring task with a concurrent n-back task on letters presented at fixation that placed either low (1-back) or high (2-back) demands on working memory. Target-coloured distractors evoked larger N2pcs than non-target-coloured distractors during the low working memory load task, but not during the high working memory load task. The results suggest that taxing working memory reduces the effectiveness of top-down modulation of attention, compromising our ability to maintain an attentional set for task-relevant features.

The relation between autobiographical memory and verbal and visuospatial memory: A biological account for the reminiscence bump

Steve M. J. Janssen (steve.janssen@flinders.edu.au), School of Psychology, Flinders University

Gert Kristo (gertkristo@hotmail.com), School of Social and Behavioral Sciences, Tilburg University

Romke Rouw (r.rouw@uva.nl), Department of Psychology, University of Amsterdam

Jaap M. J. Murre (jaap@murre.com), Department of Psychology, University of Amsterdam

People recall more personal events from adolescence and early adulthood than from other periods, a finding known as the reminiscence bump. Several explanations, such as the identity-formation or the life-script account, have suggested that events from the reminiscence bump are more often novel or more emotional, important or positive, but studies in which the memories were cued with words have not found support for these claims. Research has shown that adolescents and young adults perform better on verbal and visuospatial memory tests than middle-aged and older adults, suggesting that age differences in encoding efficiency may underlie the reminiscence bump. The biological account assumes that cognitive abilities and their neural substrates, to which encoding efficiency is linked, function optimally in adolescence and early adulthood, which may cause more memories to be stored in those periods. In the present study, 617 participants who completed verbal or visuospatial memory tests also recorded one personal event, which they recalled after a certain interval. Participants who performed well on the verbal and visuospatial memory tests also had better retention for the event. This is consistent with the view that age differences in encoding efficiency cause people to have more memories from adolescence and early adulthood.

Adaptation to dynamic faces produces face identity aftereffects

Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Samantha Petrovski (32135596@student.murdoch.edu.au), ARC-CCD and School of Psychology, University of Western Australia

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

Face aftereffects have been used extensively as a tool for understanding the neural mechanisms underlying face recognition. It has also been argued that adaptive coding, as demonstrated by face aftereffects, plays a functional role in face recognition by calibrating our face norms to reflect current experience. Face aftereffects are well established for static stimuli, but have only recently been shown for dynamic faces. If aftereffects tap high-level mechanisms that are critically involved in everyday face recognition then they should occur for moving faces. Here we ask whether the face identity aftereffect can be induced using dynamic adaptors. This aftereffect occurs when adaptation to a particular identity (e.g. Dan) biases subsequent perception toward the opposite identity (e.g. antiDan). Here we adapted participants to faces that displayed either rigid (head movement), non-rigid (facial muscle movement) and no motion (static image) and tested for aftereffects in static antifactes. Adapt and test stimuli differed in size, to minimize low-level adaptation. Aftereffects were found in all conditions, suggesting that face identity aftereffects tap high-level mechanisms important for face recognition. The non-rigid adaptors produced larger aftereffects than did the rigid or static adaptors, possibly because the social motion they displayed (speaking and smiling) elicited greater attention.

Talk: Thursday 09:40, Stream 1 (Hickinbotham Hall)

The motion aftereffect induced by illusory brightening

Alan Johnston (a.johnston@ucl.ac.uk), Cognitive, Perceptual and Brain Sciences, University College London

Rupal Shah (r.shah.11@ucl.ac.uk), Cognitive, Perceptual and Brain Sciences, University College London

Peter Scarfe (ps611@cam.ac.uk), Department of Psychology, University of Cambridge

Anstis (1967, *Science* 155 710-712) introduced the brightening illusion in which uniform fields appear to brighten after adaptation to repeated darkening. When the uniform test field was replaced by a spatial gradient observers reported illusory motion. However the mechanisms underlying this effect are not well understood and the significance of this observation for models of human motion perception deserves further attention. We first measured the apparent speed of the aftereffect. Observers adapted to a radial pattern of ramping lightening or darkening regions, which were replaced by static luminance gradients. Observers perceived clear rotational motion. We found that the perceived speed of the rotation was inversely proportional to the spatial gradient as would be predicted by a spatio-temporal gradient motion computation. The rate of ramping during adaptation had no effect on the speed of perceived rotation. We then sculpted the luminance ramps to introduce higher spatial derivatives within the test pattern. Perceived duration systematically decreased with the accumulation of higher orders of spatial derivative for both convex and concave luminance ramps - a prediction of the multichannel gradient model (Johnston et al (1992) *Proc. R. Soc. Lond.* B250 297-306).

Attentional bias modification encourages consumption of healthy food

Naomi Kakoschke (kako0017@flinders.edu.au), School of Psychology, Flinders University

Eva Kemps (eva.kemps@flinders.edu.au), School of Psychology, Flinders University

Marika Tiggemann (marika.tiggemann@flinders.edu.au), School of Psychology, Flinders University

The Western diet is characterised by eating too much fat and sugar, and not enough fruit and vegetables. The continual exposure to unhealthy food cues in the environment encourages such poor dietary habits. Unhealthy eating is thought to be a behavioural response to biased attentional processing. This study used an attentional bias modification paradigm to discourage the consumption of unhealthy food and instead promote healthy eating. One hundred undergraduate women were trained to direct their attention toward pictures of either healthy ('attend-healthy group') or unhealthy food ('attend-unhealthy group'). Attentional bias was assessed before and after training. Following post-training assessment, consumption of healthy (strawberries, mixed nuts) and unhealthy (chocolate M&Ms, potato chips) snacks was assessed by a so-called taste test. Training participants to attend to healthy food cues induced an attentional bias for such cues; in contrast, training participants to attend to unhealthy food cues did not alter their existing bias for these cues. Additionally, the 'attend-healthy group' ate relatively more of the healthy than unhealthy snacks compared to the 'attend-unhealthy group'. The results support Berridge's (2009) theory that rewarding stimuli automatically capture attention. At a practical level, they offer potential scope for an intervention that focuses on eating well.

Individual differences in response caution adjustment: Evidence from a model-based neuroscience approach

Frini Karayanidis (frini.karayanidis@newcastle.edu.au), School of Psychology, University of Newcastle

Elise Mansfield (elise.mansfield@newcastle.edu.au), School of Psychology, University of Newcastle

Andrew Heathcote (andrew.heathcote@newcastle.edu.au), School of Psychology, University of Newcastle

Birte Forstmann (buforstmann@gmail.com), Cognitive Science Center Amsterdam, University of Amsterdam

Cortico-basal ganglia networks have been shown to underpin flexible trial-by-trial adjustment of response threshold, a model parameter that indexes response caution. Consistent with distinct cortico-basal ganglia networks for risky vs. cautious decisions, Mansfield et al. (2011, *JNeurosci* 31 14688-14692) showed that response threshold setting is directly related to BOLD activation in striatum for repeat trials and inversely related to BOLD activation in subthalamic nucleus for switch trials. In this study, we use diffusion weighted imaging (DWI) to examine whether individual differences in preference for a more risky or more cautious response strategy are associated with structural differences in cortico-basal ganglia networks. Separate fronto-striatal networks were associated with adopting an overall more risky or more cautious response threshold. Specifically, preference for a riskier approach was associated with higher fractional anisotropy (FA) in the pre-supplementary motor area and external capsule, while preference for a more cautious strategy was associated with higher FA in inferior frontal gyrus and anterior limb of the internal capsule. FA in these striatal regions mediated the relationship between response threshold and the cue-locked ERP switch-positivity that is associated with advance preparation. These findings are consistent with the striatum being involved in setting both overall and trial-by-trial response caution.

Investigating letter recognition in the brain via the use of typeface

Hannah Keage (hannah.keage@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Owen Churches (owen.churches@unisa.edu.au), School of Psychology, Flinders University

Mark Kohler (mark.kohler@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Scott Coussens (scott.coussens@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Myra Thiessen (myra.thiessen@unisa.edu.au), School of Art, Architecture and Design, University of South Australia

We investigated letter recognition in the brain by varying the typeface (i.e. the font) in which letters were presented. Eighteen participants completed a one-back task where letter stimuli were presented in different typefaces. Electrical brain activity was recorded and event-related potentials (ERPs) were calculated relative to the stimuli type (target versus non-target/update) and typeface (fluent/easy-to-read versus disfluent/hard-to-read). As expected, disfluent letter stimuli evoked a larger posterior N1, thought to reflect higher-order visual representation of letters and attention. Disfluent letter stimuli were also associated with larger posterior P2 and N2 components, theorised to reflect the activation of abstract letter representations and conscious identification. Contrary to the hypothesis, central mean amplitude 450-550 milliseconds post-stimulus was greater for disfluent stimuli, for non-target/update stimuli only. This finding conflicts with the concept of an abstract letter unit/identity, where activity post-300 milliseconds should be unrelated to visual letter form. The study illustrates how typeface influences letter recognition and the use of abstract letter information by higher-order cognitive processes. Findings question how and when abstract letter identity is processed within the brain. Increased attention and working memory allocation to disfluent typefaces can help to explain the behavioural findings relating disfluent typefaces with better content memory.

Mechanisms of temporal adaptation in interpersonal action coordination

Peter E. Keller (p.keller@uws.edu.au), The MARCS Institute, University of Western Sydney

Interpersonal coordination in joint rhythmic activities, such as musical ensemble performance, requires individuals to adapt to the timing of each other's actions. Previous research has identified two forms of mutual temporal adaptation—one characterized by assimilation (akin to mimicry) and the other by compensation (temporal error correction)—that are assumed to operate automatically. Two experiments examined the relationship between these processes in dyadic sensorimotor synchronization tasks. The first experiment tested whether mutual temporal adaptation is predominated by assimilation or compensation in a task that required paired musicians to produce finger taps in alternation, in synchrony with an auditory metronome. Serial dependencies between successive asynchronies associated with the alternating individuals' taps relative to the metronome indicated that interpersonal assimilation was stronger than compensation (when taps triggered feedback sounds). The second experiment tested how assimilation and compensation are affected by increases in the demands of interpersonal coordination in a task that required paired individuals to tap in synchrony with one another, first paced by a metronome (low demand), and then without the metronome (high demand). Removing the metronome affected compensation but not assimilation. Based on these findings, a hierarchical model of temporal adaptation mechanisms that support interpersonal action coordination is proposed.

My conf preso: Linguistic and social factors in the use of Australian diminutive word forms

Nenagh Kemp (nenagh.kemp@utas.edu.au), School of Psychology, University of Tasmania

A distinctive characteristic of Australian English is the common use of hypocoristics, or diminutive word forms such as “footy” and “arvo”. Linguists have detailed the history and scope of Australian hypocoristics, but we know much less about how and why these word forms are created. An initial hypocoristic collection study revealed several age differences, with younger Australians removing more word endings, and older Australians using more “y” and “o” suffixes. Studies on the social use of hypocoristics suggest that although interacting with a person who uses many hypocoristics did not change participants’ rated attitudes of that person, it encouraged participants to laugh and smile more, and to use more hypocoristics themselves, regardless of the other person’s sex or perceived Australian-ness. Ongoing research into people’s production of hypocoristics from nonwords shows that people tend to make long words shorter but short words longer. Finally, we support linguists’ observations about the “meaning” of some endings: people were more likely to use “o” endings to create hypocoristic versions of nonwords referring to big/bad things, and “y” endings for small/cute things. This research provides insight into the ways that Australians create new hypocoristic forms, and about the nature of current Australian English.

Attentional bias modification for food cues in obese individuals

Eva Kemps (eva.kemps@flinders.edu.au), School of Psychology, Flinders University

Marika Tiggemann (marika.tiggemann@flinders.edu.au), School of Psychology, Flinders University

Sarah Hollitt (shollitt77@gmail.com), School of Psychology, Flinders University

Accumulating research shows that obese individuals selectively attend to food and eating cues. Such biased attentional processing is thought to play a role in the development and maintenance of (over)eating. This study investigated whether attentional biases for food cues in obese individuals can be modified. Using a dot probe paradigm, 60 obese adults were trained to direct their attention either towards (‘attend’), or away from (‘avoid’), food pictures. Attentional bias was assessed before and after training. Following post-training assessment, participants were administered a word stem completion task. In this task, participants were given 3-letter word stems (e.g., ROA_), which could be completed as a food-related word (e.g., roast), or a word that is not related to food (e.g., road). Attentional bias for food cues increased in the ‘attend’ group, and decreased in the ‘avoid’ group. Additionally, the ‘avoid’ group produced relatively fewer food-related words on the word stem task than the ‘attend’ group. These results support the key prediction of incentive salience theory (Robinson & Berridge, 1993) that rewarding stimuli automatically capture attention. They further suggest that targeting the attentional processes that underlie the heightened responsiveness to environmental food and eating cues in the obese could help combat pathological (over)eating.

The capacity limits of visual imagery

Rebecca Keogh (rebeccakeogh@gmail.com), School of Psychology, University of New South Wales

Joel Pearson (jpearson@unsw.edu.au), School of Psychology, University of New South Wales

Our ability to hold visual information in mind is severely limited and is highly variable across individuals. Most research in this field focuses on the characteristics of memory as the limiting factor responsible for these capacity limits. Here, we take a different approach, by focusing not on memory *per se*, but on the nature of the system representing the sensory information: visual mental imagery. It has been suggested that mental imagery may be the cognitive process used by the visual buffer (a sub-component of working memory) to maintain highly detailed sensory information in memory. So far visual imagery has been directly assessed using both subjective and objective means in terms of strength, clarity and vividness. Here we use a novel adaptation of the previously documented binocular rivalry paradigm to investigate the capacity limits of mental imagery independent of memory. We find that mental imagery has its own capacity limits. Imagery strength decreases with increasing set size, even when all memory components are removed from the task. These results suggest that voluntary mental imagery does not have infinite resources, instead it has its own severe capacity limits, which may be reflected in individuals working memory capacities.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

The perception of illusory cast-shadow motion is dependent on conscious awareness

Sieu Khuu (s.khuu@unsw.edu.au), School of Optometry and Vision Science, University of New South Wales

Juno Kim (juno@psych.usyd.edu.au), School of Psychology, University of Sydney

A stationary object appears to move in depth away from the background when its accompanying cast shadow undergoes lateral motion in a particular direction. In the present study we investigated whether conscious awareness of the moving cast shadow is a requirement for the induction of illusory object motion. To quantify this motion illusion observers judged the perceived speed in depth of two sequentially presented light-increment squares whose motion was defined either by a moving cast shadow (at speeds of 0.1, 0.2, 0.4 and 0.8 deg/sec) or changing binocular disparity. A staircase procedure was used to modify the speed of the disparity-changing stimulus until it matched the speed of the cast shadow stimulus. This procedure was repeated for two stimulus conditions in which 1) the cast shadow was perceptually visible to the observer, or 2) the cast shadow was rendered invisible using Continuous Flash Suppression (CFS). Our results show that when the cast shadow was visible, increasing shadow speed increased the perceived speed of the moving object; the disparity speed required to match the cast-shadow stimulus changed monotonically with cast-shadow speed. However, when the cast shadow was made invisible, no illusory motion in depth was reported regardless of the cast-shadow speed. These results show that conscious awareness is a basic requirement for the perception of depth from cast shadows, and challenges the long held view that cast shadows are ignored by the visual system.

Seeing a talker's face in the periphery: Effects on speech perception

Jeesun Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Seeing the talker's moving face (visual speech) facilitates auditory speech perception. Our previous study showed that such effects occur even when visual speech was presented in the visual periphery and participants performed a central visual task. The current study examined the extent to which a visual speech effect was modulated by the eccentricity of visual speech. Two experiments ($N = 15$ each) were conducted with visual speech presented at a visual angle of 10.40 (Exp 1) and 23.60 (Exp 2). In both experiments spoken vCv syllables were presented in noise (-6 dB) with congruent or incongruent visual speech in full-face or upper-half face (baseline) conditions. Participants were required to identify what they heard and also to perform a central visual task. Participants' eye-movements were monitored to assure that visual speech input occurred only from the periphery. Congruent visual speech facilitated speech perception and incongruent interfered. The size of these effects tended to be smaller for the more eccentric presentation but nonetheless was significant. We will discuss the results with respect to the role of visual speech as form versus timing cues for incoming auditory speech and the robustness of the processes that use these cues for speech processing.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Image properties for the perception of surface texture and shape

Juno Kim (juno@psych.usyd.edu.au), School of Psychology, University of Sydney

Phillip J Marlow (pmarlow@unsw.edu.au), School of Psychology, University of Sydney

Barton L Anderson (barta@psych.usyd.edu.au), School of Psychology, University of Sydney

The perception of surfaces requires the visual system to separate the environmental causes of luminance variations in images, such as shape, specularly, and texture. Surface shading and texture generally produce luminance gradients with different orientations, because illumination influences the flow-field orientations of shading, but not the textural properties of surfaces. We performed experiments to test whether the visual system considers the orientation of textural flow fields when estimating surface texture and shape. We used image processing and graphical rendering techniques to generate images of surfaces where the flow fields of textures and diffuse shading were maximally correlated, and then parametrically rotated and blurred textures before adding diffuse shading to alter the correlation between diffuse and textural flow fields. We found that the appearance of surface texture increased as a function of the sharpness and angular offset of textural edges relative to surrounding patterns of surface shading. We also found that textural gradients modulated perceived shape when observers misattributed them to regions of high surface curvature generating steeper diffuse shading gradients. These results suggest that perceived texture and shape depend on interactions between textural flow fields and diffuse shading.

Letter position coding is equally noisy in subset and full-length primes

Sachiko Kinoshita (sachiko.kinoshita@mq.edu.au), Department of Psychology, Macquarie University, and ARC-CCD

Dennis Norris (dennis.norris@mrc-cbu.cam.ac.uk), MRC Cognition and Brain Sciences Unit

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

We investigated the apparent contradiction in the word recognition literature concerning the coding of letter order. It is well-established that a prime in which adjacent letters in the target are transposed (e.g., gadren-GARDEN) produces robust priming – the so-called transposed-letter (TL) priming effect. In contrast, the same letter transposition manipulation in a prime that contains only a subset of the letters in the target (e.g., gdrn-GARDEN) has been reported to abolish priming (Peressotti & Grainger, 1999), prompting the claim that “letter order is highly important when the prime is comprised of a restricted subset of the target’s letters” (Whitney, Bertrand & Grainger, 2012). In the present study, in both lexical decision (Experiment 1) and the same-different match task (Experiment 2), transposition of adjacent medial letters impacted equally on the priming produced by the primes containing all of the letters (e.g., gadren-GARDEN) and those containing a subset of letters (gdrn-GARDEN). Implication of the results for the letter order coding schemes will be discussed.

Talk: Saturday 11:20, Stream 3 (Gallery)

It’s a girl! Opponent versus multichannel neural coding underlying the perception of face gender

Nadine Kloth (nadine.kloth@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Stephen Pond (stephen.pond@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Elinor McKone (elinor.mckone@anu.edu.au), ARC-CCD and Department of Psychology, Australian National University

Jessica Irons (jessica.irons@anu.edu.au), ARC-CCD and Department of Psychology, Australian National University

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

Faces contain a variety of socially relevant signals. One important piece of information is a person’s gender, which we can usually determine without difficulty. Although we perform this categorisation effortlessly every day, the mechanisms underlying the perception and neural coding of gender in a face are not well understood. We sought to distinguish between two competing coding models. The two-pool model proposes two opponent pools of channels in the brain, one that responds more strongly to male than female faces, and another that responds more strongly to female than male faces. The alternative model proposes multiple channels that are each tuned to different values along a male-female gender dimension. The two models make different predictions about the effects of adaptor masculinity/femininity on the magnitude of gender aftereffects. We therefore measured the size of gender aftereffects after adaptation to male and female faces at increasing levels of gender dimorphism. We found that aftereffects increased, and then saturated, with increasing masculinity or femininity of the adaptors. This pattern is consistent with two-pool coding but not multiple-channel coding of gender.

Sleep dependent declarative memory in children: Does emotional content modulate the effect?

Mark Kohler (mark.kohler@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Hannah Keage (hannah.keage@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Owen Churches (owen.churches@flinders.edu.au), School of Psychology, Flinders University

Sleep has been shown to play an active role in declarative memory consolidation in adults and children. Furthermore, emotional content of information is shown to further improve the effect of sleep on memory consolidation in adults. Yet, whether the same is true of children is not known. We investigated 41 children aged 8-12 years for recall of emotionally valenced images across both a period of nocturnal sleep and of daytime wake. Consistent with previous findings, recall for images after sleep was significantly greater when compared to recall after wake. However, the emotional valence of the images did not interact with sleep to further enhance recall performance. These results are in contrast to the adult findings, and may be related to social- and neuro-developmental differences between children and adults.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Language lateralisation during infancy: A functional transcranial Doppler study

Mark Kohler (mark.kohler@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Atlanta Flitton (atlanta.flitton@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Rachael Spooner (rachael.spooner@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

Nicholas Badcock (nicholas.badcock@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Owen F. Churches (owen.churches@flinders.edu.au), School of Psychology, Flinders University

Scott Elliott (one.metric.scott@gmail.com), School of Psychology, Social Work and Social Policy, University of South Australia

Hannah A.D. Keage (hannah.keage@unisa.edu.au), School of Psychology, Social Work and Social Policy, University of South Australia

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

Language is typically lateralised to the left hemisphere, and better cognitive performance is associated with a left language lateralisation in school aged children. Whether the same is true of very young children is not known, and we therefore aimed to investigate the development of language lateralisation and its association with cognitive performance in infants aged 12-48 months. Functional Transcranial Doppler ultrasound (fTCD) was used to measure changes in cerebral blood flow velocity in the middle cerebral artery in 17 infants during an implicit language task (‘Whatbox’). Infants were presented with a picture of an object followed by its verbal label. Blood flow velocity was averaged relative to stimulus onset (i.e. the object) and hemisphere (left and right middle cerebral artery). Language, motor and visual abilities were assessed using the Mullen Scales of Early Learning. Lateralisation of language to the left hemisphere was evident in even very young infants, and greater lateralisation was associated with overall cognitive performance. Results suggest lateralisation of cognitive tasks is present during the infancy years, and has broad associations with cognitive functioning. Findings also highlight the research applications of the fTCD method.

The dorsal and ventral visual streams make differential re-entrant contributions to the P1 component of visual ERPs, according to task context

Anthony J. Lambert (a.lambert@auckland.ac.nz), School of Psychology, University of Auckland

Adrienne Wootton, School of Psychology, University of Auckland

Nathan Ryckman (n.ryckman@auckland.ac.nz), School of Psychology, University of Auckland

The P1 component of the visual event-related potential (ERP) originates from occipital cortex, and appears to involve an integration of afferent visual signals from the eyes with re-entrant influences from higher levels in the visual system. Here we show, using high density EEG recording, that the peak of the P1 component elicited in response to peripheral visual stimuli is preceded by varying patterns of high-level activation in the dorsal and ventral visual streams, depending on the task context. When peripheral stimuli acted as cues for an attention movement, but did not require a direct, conscious response, source localisation applied to the rising edge of the P1 showed activation of parietal lobe structures. In contrast, when participants made a conscious decision regarding the location and identity of the peripheral stimuli, activation of temporal lobe structures was seen. Early visual processing appears to be influenced by varying patterns of re-entrant influence from the dorsal and ventral visual streams. Moreover, findings from this study indicate that, early dorsal activation is associated with shifting attention in response to peripheral objects, while early ventral activation is observed when peripheral stimuli require a conscious perceptual response.

Talk: Thursday 10:00, Stream 3 (Gallery)

Simon task reveals the balanced visual attention and visuo-motor control of expert video-game players

Andrew J. Latham (alat028@aucklanduni.ac.nz), School of Psychology, University of Auckland

Christine Westermann, Department of Biopsychology, Ruhr-University

Lucy L. M. Patston, School of Psychology, University of Auckland

Lynette J. Tippett, School of Psychology, University of Auckland

Research findings indicate that short-term and long-term video-game play can result in superior performance on visual and attentional tasks. We examined whether expert video-game players (VGPs) possess superior visuo-motor control. Fifteen male expert VGPs and 15 matched non-VGPs participated. Expert VGPs had begun playing before the age of 10, had a minimum 8 years experience and a minimum play time of 20 hours per week over the past 6 months. Participants completed the Simon task, which involves participants making a task-relevant response to a stimulus while ignoring its location. When the task-relevant response and location are in opposition (i.e., left-response; right-visual field stimuli), a performance cost is incurred (Simon effect). Overall VGPs had significantly quicker reaction times (RTs) and more balanced hand performance than non-VGPs. Analysis of the Simon effect revealed that for non-VGPs, RT costs associated with stimuli presented to the right-visual field were greater than costs associated with stimuli in the left-visual field. VGPs had no asymmetry of RT costs. This suggests VGPs may possess more balanced visual attention and visuo-motor control than non-VGPs. We argue this may be the result of extensive video-game play during childhood and adolescence when the brain is developing and its most malleable.

Pupil dilation and expert cognitive automaticity

Ruben Laukkonen (ruben.laukkonen@gmail.com), School of Psychology, University of Queensland

Jason Tangen (jtangen@psy.uq.edu.au), School of Psychology, University of Queensland

Pupils dilate during cognitively demanding tasks (Laeng, 2012; Beatty, 1982), and experts often experience tasks as more automatic and less effortful than novices (Kahneman 1973; 2011). Expert cognitive automaticity may therefore be detectable by measuring pupil dilation. To test the prospect that task associated pupil dilation is lower for experts than novices, we measured pupil responses during a face matching task and a fingerprint identification task. We are exposed to upright faces every day, and matching inverted faces is more difficult than matching the same upright faces (Valentine, 1988). Participants required to recognise upright faces therefore simulated an expert group. In our focal experiment, we compared the pupil responses of professional fingerprint examiners to novices during fingerprint identification. Preliminary analyses revealed that peak pupil dilation was able to distinguish between fingerprint experts and novices, with experts characterised by lower peaks. This experiment provides incentive for further investigation of the pupil response as a physiological marker for cognitive automaticity in expertise.

Inferring expertise from ranking tasks

Michael Lee (mdlee@uci.edu), Department of Cognitive Sciences, University of California, Irvine

Mark Steyvers, Department of Cognitive Sciences, University of California, Irvine

Mindy de Young, Department of Cognitive Sciences, University of California, Irvine

Brent Miller, Department of Cognitive Sciences, University of California, Irvine

We apply a cognitive modelling approach to the problem of measuring expertise on rank ordering problems. In these problems, people must order a set of items in terms of a given criterion (e.g., ordering the landmasses of a set of countries). Using a cognitive model of behaviour on this problem that allows for individual differences in knowledge, we are able to infer people's expertise directly from the rankings they provide. We show that our model-based measure of expertise outperforms self-report measures, taken both before and after completing the ordering of items, in terms of correlation with the actual accuracy of the answers. These results apply to six general knowledge tasks, like ordering landmasses, and two prediction tasks, involving sporting and television competitions. Based on these results, we discuss the potential and limitations of using cognitive models in assessing expertise.

Happy and angry faces affect visual attention on the landmark task

Nathan C. Leggett (legg0028@flinders.edu.au), School of Psychology, Flinders University

Nicole A. Thomas (nicole.thomas@flinders.edu.au), School of Psychology, Flinders University

Thobias Loetscher (tobias.loetscher@flinders.edu.au), School of Psychology, Flinders University

Mike E. R. Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

Approach and avoidance motivation differentially bias attention toward right and left space, respectively. Interestingly, visuospatial attention also displays a leftward bias on line bisection tasks, which is suggested to be caused by increased right hemisphere activation. As lateral biases are observed for both motivation and line bisection, it might be the case that similar cognitive mechanisms drive both effects. Using a within-participants design, happy, angry and neutral faces were presented for 200 ms to cue approach, avoidance and neutral motivational states, respectively. Directly after each cue, participants judged whether the left or right side of the line was longer followed by stating whether the face was male or female. Sex judgements were used to ensure that each face was adequately processed. Overall, biases were more leftward after viewing angry faces, compared to happy faces. This difference might be a product of avoidance motivation eliciting greater relative right hemisphere activation than approach motivation. These results are congruent with previous findings investigating line bisection and approach/avoidance motivation, and show that this effect extends to faces.

Talk: Thursday 14:30, Stream 1 (Hickinbotham Hall)

Examining the response time profile of change detection

Simon D. Lilburn (lilburns@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

David K. Sewell (dsewell@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Philip L. Smith (philip@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Experiments employing a change detection paradigm have been primary, since Phillips's (1974) original study, in examining the fundamental characteristics of visual short-term memory (VSTM). A potential issue, however, with the use of this paradigm is the complexity of a perceptual judgement which relies on the comparison of an array of stimuli held in memory to one currently presented. Tasks involving ostensibly simpler judgements, for instance a post-cued two-alternative forced choice (2AFC), can also be employed to precisely examine the properties of VSTM. This presentation outlines the results of a small-N psychophysical study where observers perform in alternating change detection and 2AFC orientation discrimination conditions using orthogonally oriented near-threshold Gabor patches. Implications of an analysis of response time distributions will be discussed.

In search of males and females: Does emotional expression affect visual search for targets defined by sex?

Ottmar Lipp (o.lipp@uq.edu.au), School of Psychology, University of Queensland

Clare Kempnich, School of Psychology, University of Queensland

Visual search for target faces defined by emotional expression is frequently confounded by emotion related perceptual features such as toothy smiles or angry snarls. Here we investigated whether emotional expression would affect visual search for target faces defined by sex rather than emotion. Experiment 1 employed an interference task in which participants searched for neutral male target faces among female backgrounds or for neutral female target faces among male backgrounds. The emotional expression of one of the background faces was varied across trials and could be angry or happy. Emotional distracters did not differentially slow target detection regardless of whether the expression involved the display of teeth (was open or closed mouthed). Experiment 2 varied the expression of the target face (happy, neutral or angry) in a search for males among (neutral) females or females among (neutral) males. Both emotional expressions facilitated detection of closed and open mouthed male targets and of open mouthed female targets. However, closed mouthed angry females were found slower than neutral or closed mouthed happy females. This pattern of results is not consistent with the notion that threatening expressions can interfere with or guide visual search for target faces defined by sex.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Similarity, discrimination and categorical perception

Daniel Little (daniel.little@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Simon Cropper (scropper@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Margaret E. Webb (m.webb3@student.unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Despite obvious differences in the goals of categorization and discrimination, exemplar-based theories (Nosofsky, 1986) suggest that behaviour in both tasks can be accommodated by the same underlying process. Recent work has demonstrated that discrimination differs from categorization of cardinal colour stimuli by requiring a higher degree of similarity before a “same” response is evoked (Cropper, Kvansakul & Little, in press, PLOS-One). We provide a further test by examining the categorization and discrimination of unidimensional face morphs. Following either no training, single category training, or two category training, twelve participants made discrimination and categorization judgements by comparing a variable probe to a common reference point. The reference and probe points were varied to map out the generalization gradients across the entire stimulus space. We estimated parameters of the exemplar model using a hierarchical Bayesian approach; as expected, higher similarity, indicated by an increased response criterion, was required in discrimination than in categorization. Interestingly, training with a category boundary increased specificity or discriminability in the discrimination but not the categorization tests. We discuss the implications of these findings for theories of categorical perception.

Cognitive loads modulate early visual perceptual processing

Ping Liu (virliu@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Luca Cocchi (l.cocchi@uq.edu.au), Queensland Brain Institute, University of Queensland

Jason Forte (jdf@unimelb.edu.au), School of Psychological Science, University of Melbourne

David Sewell (dsewell@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Olivia Carter (ocarter@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Contrary to most dual-task studies, recent studies show that when observers held information in working memory, performance on an unrelated visual perceptual task (e.g., grouping-by-proximity) was improved (increased accuracy and reduced reaction time)(Cocchi et al, 2011, *Neuropsychologia*, 49, 92-102). These results suggest cognitive control mechanisms supporting working memory may facilitate concurrent but independent visual perceptual processing. To further explore the nature of perceptual facilitation as a function of cognitive loads, two studies explored whether cognitive load could influence sensitivity to low-contrast stimuli or modulate surround-suppression mechanisms in low-level visual processing. A contrast detection task was employed in study one, where participants judged the orientation (horizontal vs. vertical) of a small Gabor of various contrasts presented at one of the four corners of an imaginary square. A visual motion discrimination task eliciting surround-suppression was used in study two, where participants judged the motion direction (left vs. right) of a large high-contrast drifting Gabor of various exposure durations presented at fovea. In both studies, the perceptual tasks were conducted during a concurrent no-, low- and high-working memory load task. In experiment one, under high working memory load, perceptual sensitivity to low contrast stimuli is reduced. In experiment two, preliminary results suggest high cognitive load reduces surround-inhibition in early visual perception. Thus, the current study shows cognitive load effects do penetrate to the early visual perceptual processing stage.

The relationship between blocking and inference in causal learning

Evan Livesey (evan.livesey@sydney.edu.au), School of Psychology, University of Sydney

The blocking effect in causal learning, once taken as a hallmark of associative learning, has recently been explained in terms of an explicit deductive reasoning process. Yet when the conditions necessary for deduction are removed, a small blocking effect is often still present. We examined the relationship between blocking and participants' performance on analytical thinking and probabilistic reasoning measures. Inferential processes predict blocking or an absence of blocking in this situation, depending on the observer's consideration of conditional probabilities. Although Bayesian inference predicts blocking, most individuals are not inclined to use this form of probabilistic reasoning explicitly, an observation we confirmed using a logical problem with similar properties to the relationships present in the blocking effect. Furthermore, participants who showed the greatest capacity for analytical reflection were less likely to show a blocking effect, suggesting that blocking in causal learning is the product of an intuitive and unreflective thought process.

Place, value or place-value? How different number systems affect mental representations of number

Steson Lo (steson@psych.usyd.edu.au), School of Psychology, University of Sydney

Sally Andrews (sally.andrews@sydney.edu.au), School of Psychology, University of Sydney

Numbers can be presented in many different ways in everyday life (e.g. as Arabic numbers printed on receipts, as an assortment of coins in your hand, as tallies on a tab), with an underlying assumption that these disparate forms are unified by a common holistic mental representation based on magnitude. On the other hand, representations of two-digit Hindu-Arabic numbers have been reported to be decomposed based on their constituent unit and decade digits (e.g. Nuerk, Weger & Willmes, 2001), which would suggest the existence of format specific representations of number. The present experiment sought to clarify the features that define this format specific representation of number by using number systems that orthogonally manipulate whether value information is conveyed through position (column or random) and/or sign (unique symbols for units and decades). The results suggest that both of these dimensions are independently important for decomposition, and that they also vary as a function of individual differences in working memory.

Testing the activation–orientation account of spatial attention using tDCS

Andrea Loftus (andrea.loftus@curtin.edu.au), School of Psychology and Speech Pathology, Curtin University

Mike Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

The general population shows an attentional bias to the left, known as pseudoneglect. This bias is thought to be driven by higher levels of activation in right parietal areas. Using transcranial direct current stimulation (tDCS) to manipulate activation, this study examined whether tDCS over the left and right posterior parietal cortices (PPC) affects pseudoneglect. Normal participants received tDCS over the left or right PPCs (15 in each group). Pseudoneglect was measured using the greyscales task, which requires a forced-choice discrimination of luminance between two opposing luminance gradients. The greyscales task was administered both before and after; (a) anodal (b) cathodal and (c) sham tDCS. Participants who received tDCS over the left PPC demonstrated pseudoneglect for the greyscales task, which was significantly reduced by anodal tDCS, but was unaffected by sham or cathodal tDCS. In contrast, for those participants who received right PPC tDCS, pseudoneglect for the greyscales task was unaffected by tDCS. Anodal tDCS, which is known to elevate neural excitation, may have overcome lower levels of activation in the left PPC, resulting in decreased pseudoneglect. These findings provide convincing evidence in support of an activation–orientation model of pseudoneglect and have implications for models of left neglect.

Prepared or not prepared: Considerations from the behavioural immune system

Camilla Luck (camilla.luck@uqconnect.edu.au), School of Psychology, University of Queensland

Ottmar Lipp (o.lipp@psy.uq.edu.au), School of Psychology, University of Queensland

Preparedness, an evolved adaptive mechanism, is said to mediate the preferential association of fear relevant stimuli with aversive outcomes. Fear conditioned to snakes, spiders or angry faces is resistant to extinction relative to fear conditioned to non-fear relevant stimuli. Fear conditioned to other race faces or older faces shows similar resistance to extinction raising the question of whether this is an instance of prepared learning. Alternatively other race and older faces could present a biological disease threat which facilitates learning. Faces disfigured by a port-wine birthmark were used as disease cues to test this hypothesis. A within-participants differential fear conditioning paradigm was used, in which participants viewed two control and two disfigured faces. One set of faces (control and disfigured) was paired with an electric stimulus (CS+) and the other was not (CS-). Conditioning was readily acquired to both sets of faces and no differences between control and disfigured stimuli were revealed. A follow-up was conducted, priming participants with a disease threat. Results replicated the first study, revealing no differences between faces. The findings suggest that disease cues do not mediate fear learning that is resistant to extinction.

Are risk and delay interchangeable? Testing a common process account of risky and inter-temporal choice

Ashley Luckman (a.luckman@unsw.edu.au), School of Psychology, University of New South Wales

Ben Newell (ben.newell@unsw.edu.au), School of Psychology, University of New South Wales

The current experiment examined the relationship between risk and temporal delay in decision making. We tested the claim that risk and delay are psychologically equivalent and thus both are discounted via a common underlying process. We presented participants with three sets of hypothetical choices. The first two were used to calculate present certainty equivalents (PCE) for amounts at different delays (eg. \$90 in 3 months is equal to \$50 now) and risks (eg. 60% chance of \$90 is equal to \$50 for sure). The third involved choices between delays and risks with the same PCE (eg. \$90 in 3 months, or 60% chance of \$90). According to a common process account participants should be indifferent between the two options in all these pairings, because the delay and risk are interchangeable. Furthermore if they are truly the same this indifference should hold when magnitudes are increased (e.g., \$900). In contrast to this prediction, the vast majority of participants were not indifferent with approximately equal numbers showing preferences for risk and delay with small magnitudes and a clear shift towards preference for delayed rewards when magnitudes were higher. The implication of these results for current conceptions of risky inter-temporal choice will be discussed.

Procedural learning is impaired in dyslexia: Evidence from a meta-analysis of serial reaction time studies

Jarrad Lum (jarrad.lum@deakin.edu.au), School of Psychology, Deakin University

Gina Conti-Ramsden (gina-conti-ramsdend@manchester.ac.uk), School of Psychological Sciences, University of Manchester, UK

Michael Ullman (michael@georgetown.edu), Department of Neuroscience, Georgetown University, USA

Individuals with dyslexia have difficulty reading. It has been hypothesised that the reading problems are caused by procedural learning impairments. These impairments are proposed to impact on phonological processing and the automatization of skills necessary to support fluid reading. The procedural learning abilities of individuals with dyslexia have been repeatedly investigated using Serial Reaction Time (SRT) Tasks. On the task participants implicitly learn a visuo-spatial sequence. Overall, results from studies have been mixed. To better understand procedural learning in dyslexia, we re-examined the research on SRT Task performance in dyslexia using meta-analysis.

Following a systematic search of the literature we identified a total of 13 studies, representing data from 305 individuals with dyslexia and 305 controls. We submitted data from these studies to a meta-analysis and found that overall, individuals with dyslexia were significantly poorer on the SRT Task compared to controls. Our findings suggest procedural learning is poorer in dyslexia. Using meta-regression we also found that studies using a complicated sequence on the SRT Task and also had older participants were less likely to observe a significant difference between individuals with dyslexia and controls. Results are discussed with respect to compensatory and delayed memory systems in dyslexia.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Do source monitoring cues help to monitor accuracy?

Karlos Luna (karlos.luna.ortega@gmail.com), Department of Basic Psychology, University of Minho, Portugal

Beatriz Martín-Luengo (beatriz.martin.luengo@gmail.com), Department of Basic Psychological Processes and their Development, University of the Basque Country, Spain

According to the Source Monitoring Framework (SMF), the source of a given memory is determined by an inferential process that takes into account different characteristics of the memory, e.g., the amount of perceptual or contextual information. Do those characteristics also influence the subjective confidence about the outcome of the inference? Specifically, we posed that when there are no characteristics to retrieve, as when the information is new, the evaluation of the confidence that the inference is correct could be more difficult. Participants read two narratives about the same bank robbery: the testimony of a customer and of a teller. Then, they completed a source monitoring test with statements from either the customer, the teller, included in both testimonies, or new information, and also rated the confidence that the selected source was correct. For information in the testimonies, confidence was higher for correct than incorrect answers, but for new information it was not. This result shows that when participants retrieve cues diagnostics of the source of the information, those cues also help to determine the confidence with which decision is made. Therefore, when there is nothing to retrieve, the metamemory judgements are impaired.

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Attentional modulation of auditory steady state responses

Yatin Mahajan (y.mahajan@uws.edu.au), The MARCS Institute, University of Western Sydney

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Jeesun Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

Research on attention has typically examined the processes involved in the maintenance, retrieval, and manipulation of representations in working memory (executive attention). Less work has been carried out on changes in those processes involved with filtering, orienting and the maintenance of the bottom-up processing of stimuli (perceptual attention). In the present study we investigated the effects of perceptual attention on the processing of auditory stimuli electrophysiologically, by using auditory steady state responses (ASSR) with a novel technique called ‘frequency tagging’. ASSR was elicited using tones that were modulated at different frequencies while participants selectively attended to minor stimulus changes. The preliminary results showed robust steady state responses at 16Hz, 23.5 Hz, 40 Hz and 60 Hz modulated frequencies. The preliminary results of the experiment will be discussed with respect to auditory responses. The results of the present study will be used as a point of comparison for the effects of intramodal attentional load on perceptual abilities of persons with hearing impairment.

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Sensitivity to complex motion patterns: Psychophysics and fMRI

Ryan T. Maloney (ryan.maloney@sydney.edu.au), ARC-CVS and School of Psychology, University of Sydney

Tamara L. Watson (t.watson@uws.edu.au), School of Social Sciences and Psychology, University of Western Sydney

Colin W. G. Clifford (colin.clifford@sydney.edu.au), ARC-CVS and School of Psychology, University of Sydney

(‘ARC-CVS’ refers to the ARC Centre of Excellence in Vision Science)

Complex patterns of image motion (contracting, expanding, rotating and spiralling fields) are important in the coordination of normal forward locomotion, yet their representation in human visual cortex is poorly understood. Functional magnetic resonance imaging (fMRI; n = 6 human subjects) was used to measure selectivity in functionally-defined regions of visual cortex to complex motion dot fields centred in the periphery. Eye position and attention were controlled by requiring subjects to monitor dimming of a fixation spot. Sensitivity to the peripheral stimuli was also estimated psychophysically (outside the scanner). Anisotropies were observed in the pattern of neural activity, dominated by an enhanced response to expanding over contracting fields. Anisotropies in the psychophysical sensitivity measures followed a similar pattern such that coherence thresholds for locating an expanding target amongst contracting distractors were lower than for the reverse condition, and this was significantly correlated with activity in V5/MT, MST and, perhaps surprisingly, hV4. The results reveal a characteristic processing anisotropy in human visual cortex. Enhanced sensitivity for expansions even when presented peripherally demonstrates anisotropy to the pattern of complex motion per se, distinct from previously reported biases for image motion radial to the point of fixation.

Understanding how bounding contours shape the perception of shading and lightness

Phillip Marlow (phillip.marlow@sydney.edu.au), School of Psychology, University of Sydney

Bart Anderson (barta@psych.usyd.edu.au), School of Psychology, University of Sydney

The majority of work on shading has focused on its contribution to shape perception rather than on the problem of distinguishing shading from other sources of image structure, such as cast shadows and surface lightness. The segmentation of shading and lightness has been found to depend on interactions between luminance gradients and bounding contours, but there is no explanation of the interactions. Here, we show that the perception of shading can be understood as a direct consequence of a correlation between luminance and a non-linear transformation of bounding contour angle. We found that the correlation predicts the perception of shading across a large factorial combination of phases, frequencies, and amplitudes of the bounding contour and the luminance gradient. The model generalises to the shading of complex shapes illuminated from two directions simultaneously, and to displays generating experiences of shading from globally inconsistent directions. These results provide new insights into the perception of shading and an explanation for striking interactions between bounding contours and luminance gradients in the surface perception literature.

The comprehension of emotions in narrative texts: The role of embodied knowledge

Fernando Marmolejo-Ramos (fernando.marmolejoramos@adelaide.edu.au), School of Education, University of Adelaide

Nemanja Vaci (nemanja5808@gmail.com), Laboratory for Experimental Psychology, Faculty of Philosophy, University of Novi Sad

Petar Milin (pmilin@ff.uns.ac.rs), Department of Psychology, University of Novi Sad, and Seminar für Sprachwissenschaft - Quantitative Linguistik, Eberhard Karls Universität Tübingen, Germany

The aim of the study was to examine the comprehension of written narrative texts; in particular, the comprehension of the characters' emotional states. Recent theories of embodied cognition suggest new ways of looking at comprehension of emotional information. These studies suggest that emotions are grounded in perception, and that they involve perceptual and motor 'reexperiencing'. In addition, views of graded embodied cognition suggest determining levels of embodiment of language. This approach focuses more on how perceptual and motor information interact while comprehending text. In the present experiment, one-paragraph stories were written to express six basic emotions: fear, sadness, anger, disgust, happiness and surprise. Four stories were written for each emotion and for each story four critical sentences were composed. The critical sentences were a combination of emotion- and action-based components that matched or mismatched with the story. Participants silently read the stories and then the critical sentences. Their task was to respond to a question about the emotional state of the story's main character and a response box was used to register response latencies and errors. The results suggest that, while reading texts, perceptual knowledge about characters' emotional states is activated, but this knowledge is significantly modulated by motor knowledge.

Impaired perception of facial expressions of emotion in Parkinson's disease

Michelle Marnebeck (michelle.marnebeck@uwa.edu.au), School of Psychology, University of Western Australia

Romina Palermo (romina.palermo@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Geoff Hammond (geoff.hammond@uwa.edu.au), School of Psychology, University of Western Australia

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

The ability to perceive facial expressions of emotion in others is central to the regulation of social behavior. There is some evidence that perception of emotion is impaired in Parkinson's disease (PD). We measured across two experiments in those with PD and controls (Exp 1: PD $n = 34$, control $n = 32$; Exp 2: PD $n = 25$, control $n = 24$) the basic perceptual processes of the ability to discriminate (1) graded intensities of emotional expressions from neutral expressions (2) graded intensities of expressions of the same emotion (3) discrepant emotional facial expressions from two similar emotional expressions, and the more complex ability to label emotional expressions. Those with PD were as a group impaired compared to controls in the ability to perceive facial expressions of emotion across basic and complex tasks. However, some with PD performed as well as controls. We next assessed whether those with PD were impaired in their ability to voluntarily contract facial muscle, which we predicted to correlate with their ability to perceive expressions of emotion. We also investigated whether those with PD were impaired at extracting information from faces other than facial expression of emotion, using a measure of the ability to detect graded changes in facial distinctiveness. Individual variation in the ability to perceive facial expressions of emotion was positively and moderately correlated with the ability to voluntarily contract facial muscle and with the ability to perceive graded changes in facial distinctiveness. All abilities in perception of emotion, facial distinctiveness and the ability to voluntarily contract facial muscle correlated strongly with the severity of motor symptoms of PD. The findings provide evidence that most with PD are impaired in the basic and more complex perception of facial expressions of emotion, which relate to the basic perception of facial distinctiveness and the ability to voluntarily contract facial muscle, all of which relate to disease severity.

Thematic congruence, interest of the product, and typicality on memory for advertisements

Beatriz Martín-Luengo (beatriz.martin.luengo@gmail.com), Department of Basic Psychological Processes and its Development, University of the Basque Country, Spain

Karlos Luna (karlos.luna.ortega@gmail.com), Department of Basic Psychology, University of Minho, Portugal

Malen Migueles (malen.migueles@ehu.es), Department of Basic Psychological Processes and its Development, University of the Basque Country, Spain

We studied how the thematic congruence between advertisement and program, the interest of the product, and the typicality of the advertisement's elements, affect the memory for ads in radio, television, and press. In laboratory experiments and survey studies that manipulated the thematic congruence, inconsistent results were found, and the interest of the product has been proposed as explanation for those results. We hypothesised better memory for congruent ads when products are interesting, and better for incongruent ads when products are no interesting. We also expected higher accuracy (A') for low typicality elements, those coherent with the nature of the product, but less likely to appear in an ad. Participants were exposed to a single media with two ads embedded, and, after a distractor task, they completed a true/false recognition task. Similar results were obtained in the three media. There were more hits and false alarms with high-typicality elements of the no interesting product, and accuracy (A') was higher for the low-typicality elements. There were no differences as a function of thematic congruence, likely because participants had not the option to select the materials. The results also suggest the importance of highlighting the distinctive features of the products of no interest.

Cognition, neuroscience and “levels” of explanation

Terence McMullen (terencemcmullen@gmail.com), School of Psychology, University of Sydney

Edited by S. Lewandowsky and M. Coltheart, a recent set of papers (Australian Journal of Psychology, No. 1, 64, 2012) has as its main theme the issue of whether cognitive modelling and cognitive neuroscience are competing or compatible levels of explanation. To pose the issue this way is question-begging: if “levels” of explanation is a mere figure of speech then it needs justification for its choice, if it is taken literally then it is conceptually incoherent. To embrace the notion of levels of explanation is to embrace the notion of levels of being, levels of reality. This ontology can give no account of any relations between events belonging to allegedly different levels, nor can it make sense of “higher” vs “lower” levels, of some events being “more real” or “less real” than others. An empiricist ontology sees all events as extended in space and time, as parts of an infinitely complex spatio-temporal matrix. Coltheart is right in arguing that cognitive states may be legitimately invoked in some explanatory contexts. Such legitimacy can be discovered only when cognitive events are found in the necessary and sufficient conditions (“cause”) of some specified location (“causal field”) being altered in a specified way (“effect”). Central to explanation is the relation of causality, but psychologists are too often not clear about what precise causal questions they are raising.

Where have you been? Motion adaptation distorts the apparent onset location for moving elements

Paul A. Miller (paul.miller@uqconnect.edu.au), School of Psychology, University of Queensland

Derek H. Arnold (d.arnold@psy.uq.edu.au), School of Psychology, University of Queensland

Past research has shown that humans make reliable errors in judging the positions of moving objects. In the Fröhlich effect, for instance, the apparent onset location of a suddenly appearing moving object seems advanced along its trajectory of motion. We have found that this effect is exaggerated for tests following adaptation to faster motion in the same direction. Neither opposite directional adaptation nor adaptation to slower movement had any impact, and the effect could not be attributed to delayed stimulus detection. These data are somewhat counter-intuitive, as adaptation to fast motion reduced apparent test speeds, and yet the positional distortion was exaggerated. These data are consistent with judgments of both perceived speed and apparent onset location reflecting weighted contributions from temporally low and band-pass mechanisms. Low-pass mechanisms are involved in signaling slow-movement (or stasis) and are characterized by protracted integrations times, whereas band-pass mechanisms display the reverse contingencies. Hence the proportional contribution of low-pass mechanisms can be enhanced via adapting band-pass mechanisms through exposure to fast movement. This could result in apparently slowed movement and enhanced positional distortions, if the latter reflect the time taken to estimate the position of a moving object via positional averaging.

Attentional strategies for discomfort management and performance on a strength-based exercise task in sedentary individuals

Robyn Moffitt (robyn.moffitt@acu.edu.au), School of Psychology, Australian Catholic University

Chris Clements, School of Psychology, Flinders University

Robyn Young (robyn.young@flinders.edu.au), School of Psychology, Flinders University

This study investigated the effectiveness of attentional strategies for discomfort management and performance on a strength-based exercise task. Fifty-nine sedentary individuals were randomly allocated to one of three conditions: distraction ($n = 18$), association ($n = 21$), or acceptance ($n = 20$). Participants completed two squat holds at baseline and post-intervention whilst adhering to the attentional instructions. Performance was recorded as the total elapsed time (in seconds) that participants maintained the squat hold position. At post-intervention, participants in the acceptance condition performed significantly better on the squat hold task than participants in the association condition. There was no significant difference in performance between either of these conditions and the distraction condition. Participants taught acceptance reported being significantly more likely to reuse the strategy for discomfort management during exercise (including other forms of exercise i.e., aerobic) than participants in the association condition. Findings suggest that when sedentary individuals attend to their discomfort during strength-based exercise, metacognitive acceptance of this discomfort can provide significant advantages for task persistence. Acceptance-based strategies that go beyond simple awareness and operate through symptom management rather than elimination could be a worthwhile component in exercise programs for sedentary individuals.

Finding hidden types: Inductive inference in long-tailed environments

Daniel J. Navarro (daniel.navarro@adelaide.edu.au), School of Psychology, University of Adelaide

Making inference in everyday life often requires people to make inferences about low frequency events, especially when such events may have extreme consequences (e.g., catastrophic bushfires). It is often the case that such events have never been experienced by the decision maker, implying that the observed frequency is zero. An experiment is presented in which participants needed to infer the existence and number of unobserved event types, based solely on the frequency distribution of a set of observed events. Results indicate people's inferences are sensitive to the shape of the distribution over the observed events, even when the number of observed events and event types is held constant, and that people are able to infer abstract rules that describe entire classes of event distributions. Human inferences are shown to be similar to those made by a hierarchical Bayesian model.

Small numerosities are associated with the left, large numerosities are associated with the right: Evidence from a SNARC task

Fiona Nemeš (fnemeš@student.unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Mark J. Yates (mjyates@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Tobias Loetscher (tobias.loetscher@flinders.edu.au), School of Psychology, Flinders University

Anna Ma-Wyatt (anna.mawyatt@adelaide.edu.au), School of Psychology, University of Adelaide

Michael E. R. Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

A central finding within numerical cognition is that symbolic numbers (i.e. Arabic numerals) are represented spatially with smaller numbers on the left and larger numbers on the right. This study explored whether non-symbolic numbers (i.e. dot cloud stimuli of varying numerosities) are also represented spatially. Participants judged whether a briefly presented dot cloud stimulus contained more or less dots than a reference dot cloud. It was predicted that dot clouds with less (more) dots would be categorized more quickly with the left (right) hand. This effect was observed, but may have been due to numerosity per se, or total dot surface area, which co-varied with numerosity. To disambiguate between these two possibilities, a follow-up experiment was conducted in which total dot surface area was held constant as numerosity increased. The effect remained, indicating that non-symbolic numbers are also represented spatially.

Talk: Friday 10:00, Stream 3 (Gallery)

Ensemble coding for famous face sets

Markus F. Neumann (markus.neumann@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Stefan R. Schweinberger (stefan.schweinberger@uni-jena.de), DFG Research Unit Person Perception and Department of General Psychology, University of Jena, Germany

A. Mike Burton (m.burton@abdn.ac.uk), School of Psychology, University of Aberdeen, UK

(‘ARC-CCD’ refers to the ARC Centre of Excellence in Cognition and its Disorders)

Humans can accurately extract a variety of information from a single face, such as a person’s gender, emotional state, or identity. When viewing crowds, or sets, of unfamiliar faces, people rapidly form a mean identity representation of the set. Here, we examine whether this ensemble coding occurs for familiar faces, for which participants already have rich pre-existing mental representations. In the first experiment, participants saw sets of four faces, with each set consisting of four different celebrities of the same sex. They indicated whether or not a subsequent single probe face had been presented in the previous set. As expected, participants were very accurate in identifying the actual set celebrities. Strikingly, they also consistently gave large proportions of “present” responses when the probe was a morphed face created from the previous set’s celebrities (the “set mean”). This is the first data suggesting ensemble coding for famous faces. A second experiment revealed that ensemble coding for facial identity is reduced when sets consisted of each two male and two female faces. In conclusion, mean set identity appears to be extracted from famous face crowds in parallel with accurate exemplar representations, when set members belong to a common subcategory (e.g., same gender).

Evidence of action control by subliminal stimuli

Brenda Ocampo (brenda.ocampo@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Shahd Al-Janabi (shahd.al-janabi@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Matthew Finkbeiner (matthew.finkbeiner@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

Cognitive control is needed when an ongoing routine behavior (e.g. driving a car) is unexpectedly interrupted by information (e.g. pedestrian crossing the street) that requires a new, adaptive behavior (e.g. slamming on the brakes). It is widely held that cognitive control depends on consciousness, though this view has recently been challenged. For example van Gaal et al. (2011) showed that subliminal 'stop' signals led to slower RTs in a stop-signal task. While these findings suggest that nonconscious perception can lead to cognitive control, it is still not known if these effects arise proactively (i.e. during the planning of an upcoming action) or reactively (i.e. during the execution of a presently unfolding action). To demonstrate clear evidence for nonconscious cognitive control, one needs to establish that a subliminally presented stimulus can lead to the interruption of an ongoing routine behavior. To this end, we recorded movement kinematics in a modified version of the stop-signal task with subliminal 'stop' or 'go on' primes. We find that the kinematic profiles of over-learned and ongoing movements were modulated by the presence of subliminal stop primes. These findings show that ongoing routine behaviours can be interrupted by subliminal stimuli, a hallmark of nonconscious cognitive control.

Dispelling the illusion of unique invulnerability: Cultivating healthy scepticism towards disease awareness advertisements

Brennan Ong (brennan.ong@adelaide.edu.au), School of Psychology, University of Adelaide

Carolyn Semmler (carolyn.semmler@adelaide.edu.au), School of Psychology, University of Adelaide

Peter Mansfield (peter.mansfield@adelaide.edu.au), School of Medicine, University of Adelaide

The pharmaceutical industry skirts existing regulations that prohibit direct-to-consumer advertising by sponsoring disease awareness campaigns to engage the public. Consumers are, possibly, unaware that information from such campaigns may be biased. We report on an experiment that investigated the impact of an educational intervention on participants' ability to identify the sponsor of a disease awareness advertisement (DAA), their attitudes towards the DAAs, their opinion on conditions discussed in the DAAs, their scepticism towards pharmaceutical advertising, and their behavioural intentions after viewing the DAAs. 113 participants, aged 18 to 58 years, were randomly assigned to an intervention or control group. Results indicated that intervention group participants had better odds of correctly identifying the sponsoring organisation compared to control group participants (OR = 3.09). Intervention group participants were more likely to regard DAAs as not valuable (OR = 5.84) and had greater scepticism towards pharmaceutical advertising ($d = .38$). Finally, intervention group participants perceived a disease as less severe than control group participants only when the DAA was non-independent (generalised eta-squared = .02). This research has important implications for understanding how to enhance the cognitive processes involved in evaluating persuasive messages from biased sources.

Auditory and tactile cues influence selection in visual search

Emily Orchard-Mills (emilyorchardmills@gmail.com), School of Psychology, University of Sydney

Erik Van der Burg, School of Psychology, University of Sydney

David Alais, School of Psychology, University of Sydney

A recent study (Guzman-Martinez et al., 2012) showed that participants match the frequency of an amplitude-modulated auditory stimulus to visual spatial frequency with a linear relationship and suggested this crossmodal mapping automatically guided attention to specific spatial frequencies. We replicated the reported matching relationship and also performed matching between tactile and visual spatial frequency. We then used the visual search paradigm to investigate whether auditory or tactile cues can guide attention to matched visual spatial frequencies. Participants were presented with a search display containing multiple Gabors, all with different spatial frequencies. When the auditory or tactile cue was informative, improved search efficiency occurred for some matched spatial frequencies, with the specificity of the effect being greater for touch than audition. However, when uninformative neither auditory and tactile cues produced any effect on visual search performance. Furthermore, when informative, unmatched auditory cues (shifted substantially from the reported match, but still matched in relative position) improved search performance. Taken together, these findings suggest that although auditory and tactile cues can influence visual selection of a matched spatial frequency, the effects are due to top-down attentional control rather than automatic attentional capture derived from low-level mapping.

Visual consciousness depends on eyes and on images

Robert P. O'Shea (robert.oshea@scu.edu.au), Discipline of Psychology, Southern Cross University

Rishi Bhardwaj, Nethradhama School of Optometry

A popular phenomenon for investigating the neural correlates of consciousness is binocular rivalry: visual consciousness dwells for a second or so on one visible, dominant image that is presented to one eye while another, different image presented to the other eye is invisible, suppressed. Consciousness alternates irregularly between one and the other image without any physical change in either. A fundamental question is what is actually rivaling in binocular rivalry, the two eyes or the two images. This is an important question because it bears on the level in the brain at which visual consciousness is mediated: early if rivalry is between the eyes, late if between images. In 1996, Logothetis, Leopold, and Sheinberg invented a new form of rivalry, swap rivalry, suggesting that rivalry is between images rather than between eyes. To try to eliminate any contribution of the eyes to rivalry, they swapped rival images between the eyes every 333 ms. They found that viewers saw slower, irregular alternations, consistent with rivalry between images. We assessed rivalry suppression objectively by measuring thresholds to detect a probe image during rivalry dominance and suppression. We found that suppression is weak during swap rivalry for probes presented immediately after a swap and that suppression strengthens with time after the swap until after about 150 ms when it is as strong as for conventional rivalry. This implies that immediately after a swap consciousness is mainly determined by rivalry between images and that later after a swap consciousness is augmented by rivalry between eyes. Consciousness, then, is determined by eyes and images.

Which perceptual mechanisms contribute to individual differences in the ability to recognise facial expressions?

Romina Palermo (romina.palermo@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia
Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia
Jessica Lewandowsky (08lewje@googlemail.com), ARC-CCD and School of Psychology, University of Western Australia
Chiara Fiorentini (fiorentinichiara@gmail.com), ARC-CCD and School of Psychology, Australian National University
Elinor McKone (elinor.mckone@anu.edu.au), ARC-CCD and School of Psychology, Australian National University
Jessica L. Irons (jessica.irons@anu.edu.au), School of Psychology, Australian National University
Andrew L. Skinner (andy.skinner@bristol.ac.uk), School of Experimental Psychology, Bristol University
Christopher P. Benton (chris.benton@bristol.ac.uk), School of Experimental Psychology, Bristol University
Nichola Burton (burton01@student.uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia
Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

People vary in their ability to recognise facial expressions of emotion. We investigated whether the ability to recognise facial expression is associated with individual differences in the strength of two key face perception mechanisms – holistic coding and adaptive coding. Expression recognition ability was measured with three tasks involving the matching and labelling of static and dynamic facial expressions. Holistic coding of expression was measured with three composite effect tasks, involving both labelling and matching. Adaptive face coding was measured with an expression aftereffects task, in which participants adapted to anti-expressions and then judged the expression of briefly presented faces, which were reduced in size to minimize low-level adaptation. The ability to recognise facial expressions was strongly associated with the strength of facial expression aftereffects but not the strength of holistic coding of expression (despite good internal reliability and substantial range across individuals). This suggests that the ability to update face norms, but not the ability to holistically code expression, is important for facial expression recognition. In contrast, both holistic coding and adaptive coding mechanisms play an important role in the ability to recognise facial identity, suggesting that the mechanisms underlying face expression and identity recognition are similar but not identical.

Vection during treadmill walking, walking on the spot and standing still

Stephen Palmisano (stephenp@uow.edu.au), School of Psychology, University of Wollongong
April Ash (aea404@uowmail.edu.au), School of Psychology, University of Wollongong
Donovan Govan (geocachernemesis@yahoo.co.nz), The MARCS Institute, University of Western Sydney
Robert Allison (allison@cse.yorku.ca), Department of Engineering and Computer Science, York University

Traditionally vection studies have induced visual illusions of self-motion in physically stationary observers. Recently, two studies examined vection during treadmill walking. While one study found that treadmill walking in the same direction as the simulated self-motion impaired vection (Onimaru et al. 2010), the other reported that this situation enhanced vection (Seno et al. 2011). Our study expands on these earlier investigations of active vection. Subjects viewed radial optic flow (simulating forwards/backwards self-motion) while (a) walking forward on a treadmill at a matched speed, (b) walking on the spot, or (c) standing still. On half the trials, the subject's tracked head movements were updated directly into the self-motion display producing simulated viewpoint jitter (i.e. jittering radial flow). On the remainder, subjects viewed non-jittering radial flow (as in the two earlier studies). We found an overall reduction in the vection induced for all three walking conditions (consistent and inconsistent treadmill walking, as well as walking on the spot) compared to the stationary viewing condition. However, the addition of consistent simulated viewpoint oscillation to the self-motion display always improved vection (in both walking and stationary conditions alike). These findings suggest that complex multisensory interactions are involved in the perception self-motion.

What matters when judging intentionality: Moral content or normative status?

Christopher Papadopoulos (c.papadopoulos@unsw.edu.au), School of Psychology, University of New South Wales

Brett Hayes, School of Psychology, University of New South Wales

The present study examined the side-effect effect, whereby negative but not positive side-effects are judged as intentional (Knobe, 2003). Intuitive moralist accounts claim that the side-effect effect is driven by the moral content of side-effects. Contrarily, the Rational Scientist Model (RSM; Uttich & Lombrozo, 2010) claims that intuitive moralist accounts confound the moral content of side-effects with their normative status (i.e. whether side-effects violate or conform to social norms). According to the RSM it is the normative status not the moral content of side-effects that drives the side-effect effect; that is, norm violating side-effects are judged as more intentional than norm conforming side-effects (referred to as the norm status effect). The present study compared these two models by placing the moral content of side-effects in opposition to their normative status. The key findings for this study were i) a side-effect effect obtained ii) a norm status effect obtained iii) the norm status effect was robust for both positive and negative side-effects iv) a norm status effect obtained even when side-effects were morally neutral. Hence, the evidence suggests that the side-effect effect was driven by the normative status rather than the moral content of side-effects, consistent with the RSM.

Visual predictions influence auditory processing

Tim Paris (t.paris@uws.edu.au), The MARCS Institute, University of Western Sydney

Jeesun Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

Chris Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Dynamic stimuli often provide predictive information about upcoming events occurring in a different modality. From a predictive coding framework, such expected events would require less processing than unexpected ones. We tested this idea using neural and behavioral measures of auditory processing in response to different types of visual prediction. In the experiment, participants were presented with a visual stimulus followed by either a low or high tone while EEG was recorded from a 256 channel active system. The visual stimulus was either a picture (no prediction), a movie cueing the time of an upcoming auditory event (Event prediction) or a movie cueing the type of tone (Tone prediction). In one third of trials, interspersed throughout the experiment, participants also responded to the tone with a button press. In both conditions, participants responded faster to the predicted than the unpredicted sounds. ERP results showed that visual Event predictions resulted in significantly smaller P2 ERP amplitude. Conversely, Tone predictions resulted in greater P2 ERP amplitude. The results will be discussed in terms of a predictive coding account.

A longitudinal analysis of changes in children’s number-line representational abilities

Jacob Paul (jmpaul@student.unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Robert Reeve (r.reeve@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Age-related changes in the ability to accurately mark the position of numbers (e.g., “20”, “55”, 132”, “879” etc.) on a number-line (NL) (e.g., anchored by “0” and “1000”) are claimed to reflect changes in the nature of numerical cognition. Previous research has investigated this claim using cross sectional designs (focusing on age differences) and age-adjusted NL tasks. Consequently, it is not possible to specify whether NL representation abilities remain constant across age, or whether different NL representations are differentially associated with differences in numerical cognition. To investigate these issues the NL abilities of 217 children were assessed on four occasions over two years (Time 1 = 8.29 yrs), using a 0-100 NL at Time 1; 0-100 and 0-1000 NLs at Time 2; and a 0-1000 NL at Time 3). Deviations in NL accuracy were analysed using a latent difference score mediation model, which showed that (1) initial NL deviations indices were relatively constant over the different NL tasks, and (2) NL deviations were associated with later arithmetic computation. These findings suggest that deviation in NL representational abilities remain relatively stable over time and reflect differences in numerical cognition.

Faces from out of the mist: The impact of lighting direction on facial coding is due to its impact on horizontal image structure

Samuel L. Pearce (samuel.pearce@uqconnect.edu.au), School of Psychology, University of Queensland

Derek H. Arnold (d.arnold@psy.uq.edu.au), School of Psychology, University of Queensland

It has been shown that horizontal facial image structure (i.e. contrast/power along the vertical axis) is more informative than its vertical counterpart (Dakin & Watt, 2009; Watt, Dakin & Goffaux, 2010). A reliance on horizontal structure might underlie a number of manipulations that impact facial coding, such as the disruptive effect when faces are lit from below, as opposed to above. We assessed this by developing a novel paradigm, wherein facial images were initially filtered so as to only contain horizontal or vertical information. As a trial wore on more information was revealed by broadening the orientation bandwidth of filtering. We found that recognition performance (indexed by response times and accuracy) was generally superior for initially horizontally filtered images, regardless of whether faces were lit from above or the side. But this relationship reversed for faces lit from below. This mirrored the disproportionate changes that lighting from below, as opposed to above or the side, had on image structure visible through horizontal filtering. Overall, our data are consistent with facial recognition relying disproportionately on horizontal image structure, which would be functionally adaptive in natural conditions, wherein lighting is typically from above, or from the side, but very rarely from below.

Motion-induced blindness without awareness or attention

Joel Pearson (jpearson@unsw.edu.au), School of Psychology, University of New South Wales

Kevin C. Dieter (dieter.kevin@gmail.com), Center for Visual Science & Dept of Brain and Cognitive Sciences, University of Rochester

Duje Tadin (duje@cvs.rochester.edu), Center for Visual Science & Dept of Brain and Cognitive Sciences, University of Rochester

Motion-induced blindness (MIB) - distinctly visible stimuli are made to periodically disappear by placement within a moving pattern. MIB has been widely utilized to investigate the neural and cognitive mechanisms of visual awareness. We probed observers' perceptual states after periods of MIB outside of awareness (suppressed by continuous flash suppression: CFS), unattended (concurrent rapid serial visual presentation task), or both. If the target fluctuates during these manipulations (without awareness and/or attention), it should sometimes be perceptually suppressed after this period due to MIB, resulting in longer reaction times (RT) to report the target.

We found that CFS and/or inattention had no significant effect on RTs for target detection compared to normal MIB. This suggests that the dynamics of MIB were unaffected by removing awareness, attention or both. A baseline condition in which the target dot was physically absent during the manipulation period only, produced reliably faster RTs for all of our manipulations, including CFS. To ensure that target suppression was due to MIB and not CFS, we ran a stationary MIB control and found no effect of CFS. Together, these results suggest that the phenomenon of MIB is unaffected by the removal of awareness, attention, or both.

The effect of a two-stage interview process on the use of the don't know response in eyewitness reports

Nicole Perry (perr0175@flinders.edu.au), School of Psychology, Flinders University

Nathan Weber (nathan.weber@flinders.edu.au), School of Psychology, Flinders University

Eyewitnesses are required to report detailed memories of an event with a high degree of accuracy. Accuracy can be regulated when eyewitnesses selectively withhold information they are unsure of. Recent research from our lab showed that relative to a single free-report interview, a two-stage interview process increased accuracy due to more effective use of the don't know response. I tested two possible explanations of this finding: 1. Relative to the two-stage procedure, participants using one-stage free-report do not effectively monitor their responses. They use the don't know response when they cannot retrieve an answer from memory, but report every answer that comes to mind. 2. Using one stage to elicit answers and a second stage to decide whether to volunteer or withhold answers encourages superior metacognitive monitoring of responses, thus more effective use of the don't know response. I examined the effect of reporting condition (one-stage or two-stage interview) on free-report accuracy, metacognitive discrimination ability, and metacognitive bias. Participants in the two-stage procedure showed more conservative responding than in the one-stage procedure. However, there was no clear support for either of the proposed explanations. I will discuss the implications of these findings for theories and applications of eyewitness interviewing.

CDP++.French: Testing computational principles in reading aloud across languages

Conrad Perry (conradperry@gmail.com), Faculty of Life and Social Sciences, Swinburne University of Technology

Johannes Ziegler, Aix-Marseille Université and Centre National de la Recherche Scientifique

Marco Zorzi, Dipartimento di Psicologia Generale and Center for Cognitive Science, Università di Padova

Cross-language data can provide important constraints on our understanding of how people read aloud. French is an interesting case because it differs from most other writing systems in that it uses a large number of multi-letter vowel graphemes and consonants that are systematically silent (i.e., do not map to any lexical phonology). Here, we developed a French version of the Connectionist Dual Process Model of Reading Aloud (Perry, Ziegler, & Zorzi, in press, *Cognitive Science*). We tested the model on extant data and an experiment examining silent letters in nonwords. The results of the silent-letter experiment showed that, contrary to what would be predicted on the basis of lexical database statistics, people generally pronounce “silent” consonants in nonwords. We show that the French CDP++ model faithfully predicted this effect because it implements a linear mapping between orthography and phonology. In contrast, three-layer networks, which allow for non-linear relationships to be learnt, fail to capture the effect because they predict non-linear relationships will be used when reading both words and nonwords. These findings highlight the theoretical and practical significance of using computational models to help determine the processes and representations that underlie skilled reading.

Gaining the upper hand: Vertical asymmetry in visual perception is not stimulus-driven

Genevieve Quek (genevieve.lauren.quek@gmail.com), Department of Cognitive Science, Macquarie University

Matthew Finkbeiner (matthew.finkbeiner@gmail.com), Department of Cognitive Science, Macquarie University

Visual perception and performance are characterised by asymmetries that arise from the brain’s preferential response to particular stimulus types at different retinal locations. Where the lower visual field (LVF) holds an advantage over the upper visual field (UVF) for many tasks (e.g. hue discrimination, contrast sensitivity, motion processing), face-perception appears best supported at above-fixation locations. This is consistent with Previc’s (1990) suggestion that vertical visual asymmetries are driven by ecological convenience. That is, the UVF has become specialised for object recognition processes often required in ‘extrapersonal’ space (e.g. recognising a face), and the LVF conversely specialised for visuomotor coordination processing that occurs in ‘peripersonal’ space (e.g. reaching towards an object). In the present study, we used the reach-to-touch paradigm to examine how vertical meridian placement and spatial attention influence perception of a stimulus that occurs most often in the LVF – human hands. Against expectations, we observed that participants’ ability to classify hands as male or female was only affected by spatial attention in the lower visual field, and not the upper visual field. Our finding suggests that vertical asymmetries for visual tasks are not stimulus-driven, but may relate rather to stimulus-general attentional biases.

The contributions of expectancy and prior exposure to the surprise response in visual search

James Retell (jdretell@gmail.com), School of Psychology, University of Queensland

Stefanie Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Roger Remington (r.remington@psy.uq.edu.au), School of Psychology, University of Queensland

In the context of visual search, surprise is the phenomenon by which a previously unseen and unexpected stimulus exogenously attracts spatial attention. Capture by such a stimulus occurs, by definition, independent of tasks goals and is thought to be dependent on the extent to which the stimulus deviates from expectations (Horstmann, 2005, JEP:HPP). However, the relative contributions of prior exposure and expectation to the surprise response have not yet been systematically investigated. Here we investigated the extent to which surprise is related to never having seen a given stimulus before versus the extent to which a given stimulus violates task expectancies. Across conditions we varied prior exposure to the motion stimulus – seen versus unseen - and top-down expectations of occurrence – expected versus unexpected - to assess the extent to which each of these factors contributes to surprise. When participants were told to expect an unexpected task-irrelevant stimulus, the magnitude of the surprise response was augmented. In contrast, prior exposure to the unexpected stimulus had no effect on the magnitude of the surprise response. These results suggest that the expectancies driving surprise may have different characteristics than previously thought and that surprise may be immune to cognitive strategies to attenuate it.

Talk: Thursday 11:50, Stream 1 (Hickinbotham Hall)

High manual dexterity relates to superior tactile perception and changes in evoked potentials but does not interact with age

Eva-Maria Reuter (e.reuter@jacobs-university.de), Jacobs Center on Lifelong Learning, Jacobs University Bremen

Claudia Voelcker-Rehage (c.voelcker-rehage@jacobs-university.de), Jacobs Center on Lifelong Learning and AgeAct Research Center, Jacobs University Bremen, Germany

Solveig Vieluf (s.vieluf@jacobs-university.de), Jacobs Center on Lifelong Learning, Jacobs University Bremen

Axel H. Winneke (a.winneke@jacobs-university.de), Jacobs Center on Lifelong Learning, Jacobs University Bremen

Ben Godde (b.godde@jacobs-university.de), Jacobs Center on Lifelong Learning and AgeAct Research Center, Jacobs University Bremen, Germany

Extensive dexterous use of the fingers, for instance in blind people or musicians, leads to specific expertise in tactile perception and is characterized by improved tactile discrimination and changes in brain activation. The current study investigates whether extensive use of the fingers at work affects tactile perception similarly and whether this might serve as a buffer against age-related decline. Middle-aged workers (N=47) were divided into four sub-samples (younger/older experts; younger/older non-experts) and performed a tactile two-choice pattern and frequency discrimination tasks (PDT and FDT). Age range was 35-45 years for younger and 55-65 years for older subjects. We considered precision mechanics as experts and service employees as non-experts. The event-related brain potentials P50, N70 and P300 at Fz, Cz, and Pz were analysed. In both tasks, experts outperformed non-experts and age and expertise led to increased N70 amplitudes. Further, in PDT, Age and Expertise resulted in reduced P300 amplitudes; while in FDT an Age X Electrode interaction was revealed, showing more equally distributed P300 amplitudes in older as compared to younger adults. We conclude that extensive and dexterous manual work leads to acquisition of tactile expertise. Similar neurophysiological changes induced by age and expertise might have different underlying mechanisms.

Adaptive face-coding mechanisms contribute to face expertise: Evidence from individual differences in face identity aftereffects

Gillian Rhodes (gillian.rhodes@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Linda Jeffery (linda.jeffery@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

Libby Taylor (libby.taylor@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

William G. Hayward (whayward@hku.hk), ARC-CCD and School of Psychology, University of Hong Kong

Louise Ewing (louise.ewing@uwa.edu.au), ARC-CCD and School of Psychology, University of Western Australia

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

Despite their similarity as visual patterns, we can discriminate and recognize many hundreds of faces. This expertise has been linked to two coding mechanisms: holistic integration of information across the face, and adaptive norm-based coding, where identity is coded relative to norms tuned by experience. Recent evidence for strong and stable individual differences in face recognition ability raises the question of whether these differences are linked to variation in holistic and/or adaptive coding mechanisms. Several studies have now linked variation in face recognition ability to variation in holistic coding. Here we ask whether variation in adaptive coding of face identity is also linked with variation in face recognition ability. We measured adaptive coding using face identity aftereffects. Adaptive identity coding was linked to several measures of face recognition ability, including those that isolated face-selective recognition ability, and (marginally) race-selective face recognition ability. There was no link with memory for cars. These results provide strong evidence that adaptive face-coding mechanisms contribute to our face expertise.

Information extraction during simultaneous motion processing

Reuben Rideaux (reuben.rideaux@anu.edu.au), Research School of Psychology, The Australian National University

Mark Edwards (mark.edwards@anu.edu.au), Research School of Psychology, The Australian National University

When confronted with multiple moving objects the visual system can process them in two stages: an initial stage in which a limited number of signals are processed in parallel (i.e. simultaneously) followed by a sequential stage. We previously demonstrated that during the simultaneous stage, observers could discriminate between presentations containing up to 5 vs. 6 spatially localized motion signals (Edwards & Rideaux, 2012). Here we investigate what information is actually extracted during the simultaneous stage and whether the simultaneous limit varies with the detail of information extracted. This was achieved by measuring the ability of observers to extract varied information from low detail, i.e. the number of signals presented, to high detail, i.e. the actual directions present and the direction of a specific element, during the simultaneous stage. The results indicate that the resolution of simultaneous processing varies as a function of the information which is extracted, i.e. as the information extraction becomes more detailed, from the number of moving elements to the direction of a specific element, the capacity to process multiple signals is reduced. Thus, when assigning a capacity to simultaneous motion processing, this must be qualified by designating the degree of information extraction.

The influence of feedback in reading aloud

Serje Robidoux (serje.robidoux@mq.edu.au), ARC-CCD and Department of Cognitive Science, Macquarie University

Derek Besner (dbesner@uwaterloo.ca), Department of Psychology, University of Waterloo

('ARC-CCD' refers to the ARC Centre of Excellence in Cognition and its Disorders)

The dominant framework for language processing in general and reading in particular assumes that processing is best characterised by interactive-activation (IA; McClelland & Rumelhart, 1981; Rumelhart & McClelland, 1982). A key feature of IA is the presence of feedback from later processing modules to earlier ones. This is thought to make processing more efficient by allowing later modules to constrain earlier processing (McClelland, 1987), but little effort has been made to directly examine the role that feedback is playing in letter string processing. If the constraint hypothesis is true, it should be especially apparent when stimuli are degraded and such constraints should help to reduce the effects of other variables like word frequency. Simulations of the well-established interaction between stimulus quality and word frequency using CDP+ (Perry, Ziegler, & Zorzi, 2007) show that a) feedback does serve to constrain processing, but that b) it's influence is very small, and c) increases in the strength of the feedback does not increase its influence, but does increase error rates. These results suggest that the field has overemphasized the importance of feedback in reading aloud.

Talk: Saturday 13:40, Stream 3 (Gallery)

Forget about the future

Nathan Ryckman (n.ryckman@auckland.ac.nz), School of Psychology, University of Auckland

Donna Addis (d.addis@auckland.ac.nz), School of Psychology, University of Auckland

Tony Lambert (t.lambert@auckland.ac.nz), School of Psychology, University of Auckland

In a novel variation of the Think/No-Think paradigm, we found that imagined future episodic events were susceptible to intentional forgetting. Participants imagined emotionally positive and emotionally negative events that could potentially occur within five-years of participation. Each event was imagined around unique sets of three nouns (a person, an object, and a place). After repeated attempts at avoiding recollection of (i.e., suppressing) imagined events, participant recall was significantly worse on a cued-recall test of emotionally negative, but not positive, imagined events. This was true only for participants who were organically predisposed to think about the future, as indexed by the Zimbardo Time Perspective Inventory. These results provide insight regarding individual differences that determine successful intentional forgetting, and further demonstrate that episodic memories are better engaged by the mechanisms of suppression when they are emotionally negative, rather than positive.

Holistic processing of emotional faces in visual search

Ruth Savage (r.savage@uq.edu.au), School of Psychology, University of Queensland

Ottmar Lipp (o.lipp@psy.uq.edu.au), School of Psychology, University of Queensland

Previous research in visual search has established that, when presented upright, angry faces are detected faster than happy faces. The attenuation of this pattern after face inversion has been used to argue that this finding reflects on holistic processing of the emotional expressions (Fox & Damjanovic, 2006). However, this is in contrast to findings indicating that differential detection of emotional expressions in visual search survives inversion (Lipp, Price, & Tellegen, 2009). The present research aims to consolidate these inconsistent findings and determine the source of these differences. In Experiment 1, the number of faces presented in each array (set size) was investigated as a potential factor for the different results. Consistent with previous findings suggesting that search for emotional expressions may not reflect on holistic processing (Lipp et al.), angry faces were found faster than happy faces regardless of orientation and set size. Experiments 2 and 3 aimed to replicate Fox and Damjanovic's (2006) finding that inversion eliminates preferential detection of anger. In both experiments, no significant difference emerged in search for upright and inverted faces. Our results suggest that visual search for emotional expressions may not rely on holistic face processing, but is instead mediated by the detection of distinct features.

Anger is seeing red: The effect of emotions on colour ratings

Timothy Schofield (t.schofield@unsw.edu.au), School of Psychology, University of New South Wales

Thomas Denson (t.denson@unsw.edu.au), School of Psychology, University of New South Wales

Joel Pearson (jpearson@unsw.edu.au), School of Psychology, University of New South Wales

Metaphors link the experience of anger to “seeing red” and sadness to “feeling blue”. Previous research has shown that when angered or primed with anger words people are more likely to rate ambiguous colours as red. In two studies participants primed with anger (metaphorically linked with red), sadness (metaphorically linked with blue), and fear (control) related words were asked to rate ambiguous shades of purple as more red or more blue. In both studies participants were more likely to classify the purple as red when primed with anger words and blue when primed sadness words. However, these effects were more pronounced when the actual colour of the purple shade (redder or bluer) was incongruent with the preceding metaphor. That is, the anger-red effect was largest for bluer shades of purple, and the sadness-blue effect was largest for redder shades of purple (an interaction). This pattern of results did not appear to result from a ceiling effect, is inconsistent with increased sensitivity to red/blue when primed with anger/sadness, and with a simple response bias because the bias was moderated by the actual colour presented. The results leave open the possibility that angry people really do “see red”.

The hidden potential of the seemingly irrational: Probability matching as an adaptive strategy

Christin Schulze (c.schulze@unsw.edu.au), School of Psychology, University of New South Wales

Don van Ravenzwaaij (d.vanravenzwaaij@unsw.edu.au), School of Psychology, University of New South Wales

Ben R. Newell (ben.newell@unsw.edu.au), School of Psychology, University of New South Wales

Proportionately matching choices to payoff probabilities (probability matching) is a tendency frequently observed in repeated binary decision tasks. This choice strategy has long been dismissed as a choice anomaly which violates the assumptions of rational choice theory. What seems irrational in the stringent context-free environments of commonly employed experimental decision tasks, however, may have emerged from highly adaptive cognitive functions governing optimal choice behaviour in ecologically valid situations. Following this argument, we examine choice behaviour in dynamic probability learning environments that reinforce probability matching as an optimal response. Superiority of matching behaviour can, for instance, be attained by defining outcome probabilities contingent on prior decisions, e.g. through transferability of forgone payoffs across trials. Similarly, competition for monetary resources within group settings endorses variable choice behaviour and, likewise, renders probability matching optimal. Employing such decision tasks, we regularly observe that responding indeed approaches probability matching accurately. To describe the parameters of choice behaviour within these dynamic environments more holistically, we apply computational models of reinforcement learning that aim to illuminate the general adaptability of binary choice behaviour under risk and uncertainty.

Cognitive bias in fingerprint identification: The subtle effects of familiarity

Rachel Searston (rachel.searston@gmail.com), School of Psychology, University of Queensland

Jason Tangen, School of Psychology, University of Queensland

The forensic fingerprint identification process, similar to decision making processes in other expert fields such as diagnostic medicine relies heavily on human perception and judgement to reach conclusions about whether a pair of fingerprints ‘match’ or not. In the forensic sciences there is a tendency to attribute errors in identification decisions to the individual, or otherwise competent examiners who are labelled as “bad apples” rather than considering the problem at a broader, systems level. There has been significant resistance from within the forensic science community to acknowledge the inevitability of human error and the potential impact of cognitive bias on the fingerprint identification process with very limited empirical research being conducted in this area. We empirically examined and documented the influence of intrinsic and extrinsic cognitive and perceptual factors, including case familiarity and perceived crime severity, on novice fingerprint examiners accuracy and response bias when matching fingerprints. Our findings provide three novel demonstrations of how intrinsic and extrinsic sources of information can bias the fingerprint identification process - each leading to the kind of bias that could result in devastating errors of misidentification and innocent people being wrongfully accused. Further research in this area with expert populations will provide a framework of empirical evidence to assist forensic professionals, researchers and the wider legal community in developing more effective systems and training programs to counter the effects of cognitive bias in forensic analysis.

Understanding expertise in unfamiliar face matching

Carolyn Semmler (carolyn.semmler@adelaide.edu.au), School of Psychology, University of Adelaide

Anna Ma-Wyatt (anna.mawyatt@adelaide.edu.au), School of Psychology, University of Adelaide

Rebecca Heyer (rebecca.heyer@dsto.defence.gov.au), Land Operations Division, Defence Science and Technology Organisation

Veneta MacLeod (veneta.macleod@dsto.defence.gov.au), Land Operations Division, Defence Science and Technology Organisation

We set out to characterise the behaviour of experienced operators (recruited from nine state and federal government agencies) and naïve observers on a one-to-one unfamiliar face matching task. In the first experiment we measured performance on an unfamiliar face matching task, as well as on other tests of more general abilities and face-specific abilities. We also recorded observers' eye movements during the task. We found that a select group of very experienced operators were somewhat more accurate and less variable in their responses than untrained or less experienced operators. In a second experiment, we trialled a method for improving face matching performance. Confidence calibration was generally good across groups and there was little difference between the groups on any of the psychometric tests that we conducted. However, the experienced and trained operators showed slightly higher performance on the Glasgow Face Matching Test, a measure of one-to-one unfamiliar face matching ability. We discuss the findings in the context of efforts to improve unfamiliar face matching performance.

Roads to Rome: A diffusion model analysis of individual differences in the contextual cuing paradigm

David K. Sewell (dsewell@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Ben Colagiuri (ben.colagiuri@sydney.edu.au), School of Psychology, University of Sydney

Evan J. Livesey (evan.livesey@sydney.edu.au), School of Psychology, University of Sydney

When a stimulus array is repeatedly presented in a visual search task, people are faster at responding to targets embedded in the repeated arrays relative to location-matched targets in novel arrays. Several accounts of this contextual cuing effect have been proposed. According to one account, the benefit for repeated arrays is due to improvements in search efficiency—people become faster at locating the target. According to a second set of accounts, the effect is due to more efficient decision-making with repeated arrays without any change in search efficiency (e.g., via perceptual learning or relaxing a decision criterion). We implement these alternatives using the diffusion model and test them by fitting the models to two data sets. The results reveal striking individual differences suggesting the contextual cuing effect is not a monolithic phenomenon.

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Attentional mechanisms in learned predictiveness

Lauren Shone (lsho0771@uni.sydney.edu.au), School of Psychology, University of Sydney

Evan Livesey (evan.livesey@sydney.edu.au), School of Psychology, University of Sydney

In novel situations, learning is biased in favour of previously predictive information. One particularly robust example of this is the learned predictiveness effect which has proved crucial in theorising about the role of attention in learning. However, the exact nature of this bias has only recently been questioned. In line with a role of inferential reasoning, Mitchell et al. (2012) have shown that learned predictiveness is susceptible to instructional manipulation, whereby instruction can reverse the effect. The current experiments further examine this hypothesis. While experiment 1 found a clear effect of instruction, this was only partial, obliterating learned predictiveness instead of reversing it. Subsequent experiments manipulated instruction and prior predictive utility orthogonally in order to test the relative contribution of inferential reasoning and automatic processes in generating this bias. It was found that even for information explicitly instructed as important, learning is biased in favour of previously predictive over previously non-predictive information. The implication of these findings is discussed in relation to theories of learning and attention.

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Eye movements but not perceptual load modulate goal-irrelevant motor priming in reach-to-grasp action

Samuel Sparks (samuel.sparks@uqconnect.edu.au), School of Psychology, University of Queensland

Ada Kritikos (a.kritikos@psy.uq.edu.au), School of Psychology, University of Queensland

Observing a human model's action alters the observer's subsequent motor output. Previous research demonstrates that this phenomenon, termed motor priming, is not restricted to action goals, but also occurs for specific, goal-irrelevant kinematics of reach-to-grasp movement. Despite instructions to reach directly for a target, participants' reaches lifted higher after observing a model perform higher-lifting (exaggerated) reaches compared with straight reaches (Hardwick and Edwards, 2012). Using life-sized films for action observation, we investigated attentional boundary conditions for this 'trajectory priming' effect. In Experiment 1, participants viewed reaches with or without completing a concurrent detection task designed to increase perceptual load. Perceptual load did not modulate the trajectory priming effect, suggesting it is robust to depletion of attentional resources. In Experiment 2, eye movement was manipulated trial-by-trial in the absence of perceptual load. During the model's reach, participants either fixated on the model's wrist or upon a stationary point equidistant from her straight and exaggerated reach paths. Trajectory priming occurred only in the eye-movement condition. This suggests that trajectory priming depends upon allocation of spatial attention and/or foveation of critical sites on the model. Alternatively, the priming effect may arise from a yoking of recently-executed eye movements and subsequent reach trajectory.

Color and luminance influence, but can not explain, binocular rivalry onset bias

Jody Stanley (jodys@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Jason Forte (jdf@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Olivia Carter (ocarter@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

When an observer is presented with dissimilar images to the right and left eye, the images will alternate every few seconds in a phenomenon known as binocular rivalry. Recent research has suggested that the initial ‘onset’ period of rivalry is not random and may be different in its neural mechanism than subsequent dominance periods. It is known that differences in luminance and contrast have a significant influence on the average dominance during sustained rivalry and that perception of luminance can vary between individuals and across the visual field. We therefore investigated whether perception of luminance contrast plays a role in onset rivalry. Rival targets were matched for brightness in each of eight locations of the near periphery for each observer. Observers then viewed the rival targets for brief presentations in each of the eight locations and reported the color that was first dominant. Results show that minimizing differences in brightness and contrast yields a stronger pattern of onset dominance bias and reveals evidence of monocular dominance. Specifically a significant advantage was observed for the temporal hemifield. These results suggest that both contrast and monocular dominance play a role in onset dominance, though neither can fully explain the effect. Drawing from additional current research, a brief overview of additional factors contributing to dominance at the onset of rivalry will also be presented. Together, these results further clarify the distinction between perceptual dominance at onset and the dominance periods during subsequent alternations.

Confidence-accuracy calibration for positive and negative face matching decisions

Rachel Stephens (rachel.stephens@adelaide.edu.au), School of Psychology, University of Adelaide

Carolyn Semmler (carolyn.semmler@adelaide.edu.au), School of Psychology, University of Adelaide

James Sauer (james.sauer@port.ac.uk), Department of Psychology, University of Portsmouth

We explore the conditions in which we can rely on people’s subjective confidence estimates as an indicator of decision-accuracy. This is an important issue for applied settings such as border security or eyewitness identification, where the objectively “correct” decision is unknown: can we use confidence as an independent marker of accuracy? Recent research on recognition memory for faces and eyewitness identification suggests two factors that affect the relationship between confidence and accuracy. One is whether people make a positive or negative decision (e.g., identify an item in a recognition test phase as “old” or “new”), and another is base rate (e.g., the proportion of “new” items across trials). We conducted a new experiment investigating whether the influence of these factors extends to a one-to-one face matching task. Furthermore, we explored whether the task orientation of the decision maker (and thus what may count as a positive or negative decision) affects the confidence-accuracy relationship. The results suggest that base rate plays an important role in the confidence-accuracy relationship for positive versus negative decisions, shedding further light on the nature and extent of this positive-negative asymmetry. However, people appear to assess their confidence in the same way regardless of task orientation.

Comparison of pupil diameter and the Index of Cognitive Activity as measures of task demand

Karen Stevens (karen.mullins@dsto.defence.gov.au), School of Psychology, University of Adelaide

Kingsley Fletcher (kingsley.fletcher@dsto.defence.gov.au), Maritime Operations Division, Defence Science and Technology Organisation

Alistair Walsh (divide5@gmail.com), Swinburne University of Technology

Vic Demczuk (vic.demczuk@dsto.defence.gov.au), Land Operations Division, Defence Science and Technology Organisation

Gary Ewing (gary.ewing@dsto.defence.gov.au), Land Operations Division, Defence Science and Technology Organisation

Pupil diameter responds to demand manipulations across a range of cognitive tasks and is thought to index cognitive effort. However, pupil diameter is also sensitive to changes in light which makes it difficult to use in operational settings. The Index of Cognitive Activity (ICA) uses wavelet analysis to identify rapid fluctuations in pupil diameter that are related to cognitive activity but independent of light level. However, few validation studies have been performed on the ICA and the present study reports two experiments that compare pupil diameter and ICA response to task demands. In the first experiment seven DSTO employees performed a mental-addition task with three levels of demand. Luminance was also varied during each demand level. Pupil diameter, the ICA, errors and self-report difficulty, effort, negative affect and positive affect were measured. Mean pupil diameter increased with task demand and decreased with luminance. The ICA did not change with luminance, but also did not change with task demand. In the second experiment 23 DSTO employees performed a divided attention and working memory task with three levels of demand while the same measures were collected. Mean pupil diameter increased with task demand, although not linearly, but no significant change was observed in the ICA. Pupil diameter and self-report effort exhibited a different pattern of response to task demands. These results suggest that the ICA is not a sensitive measure of cognitive load and also highlight the shortcomings of using self-report data for cognitive workload assessment.

The shape aftereffect: Appearance matters

Katherine R. Storrs (k.storrs@uq.edu.au), School of Psychology, University of Queensland

Derek H. Arnold (d.arnold@psy.uq.edu.au), School of Psychology, University of Queensland

One of the oldest known visual aftereffects is the shape aftereffect, wherein looking at a particular shape can make subsequent shapes seem distorted in the opposite direction. After viewing a narrow ellipse, for example, a perfect circle can look like a broad ellipse. It is thought that shape aftereffects are determined by the dimensions of successive retinal images. However, perceived shape is invariant for large retinal image changes resulting from different viewing angles; current understanding suggests that shape aftereffects should not be impacted by the operations responsible for this view-point invariance. By viewing adaptors from an angle, with subsequent fronto-parallel tests, we establish that shape aftereffects are not solely determined by the dimensions of successive retinal images. Moreover, by comparing performance with and without stereo surface-slant cues, we show that shape aftereffects reflect a weighted function of retinal image shape and surface slant information, a hallmark of shape constancy operations. Thus our data establish that shape aftereffects can be influenced by perceived shape, as determined by constancy operations, and must therefore involve higher-level neural substrates than previously thought.

Anxiety levels predict systemising-empathising tendencies and social competence

Paul Strutt (paul.strutt@newcastle.edu.au), School of Psychology, University of Newcastle

Darren Burke (darren.burke@newcastle.edu.au), School of Psychology, University of Newcastle

Linda Campbell (linda.e.campbell@newcastle.edu.au), School of Psychology, University of Newcastle

The Systemiser-Empathiser (S-E) theory of autism proposes two divergent strategies that underpin behaviour. ‘Systemising’ involves the observation of environmental contingencies, and the consequent formulation of concrete rules to predict events. ‘Empathising’ is the drive to attribute affective states to others, and to guide responses based on these inferences. The first aim of this study was to demonstrate that divergent trait anxiety levels could explain individual differences in the use of S-E strategies. Because those with autism demonstrate low empathy and impairments in emotion recognition, we were also interested in the degree to which emotion recognition could be explained by patterns of attention to the face. 22 university students completed a series of questionnaires, and an emotion recognition task during which their eye movements were recorded. The sample was then split into ‘Low Anxiety’ and ‘High Anxiety’ groups to identify any effects on S-E and other measures of social competence. As anticipated, individuals with higher levels of trait anxiety demonstrated a bias towards systemising strategies, whilst their less anxious peers utilised empathic strategies. Mediation analysis suggested that trait anxiety underpinned the divergent use of S-E strategies. Number of fixations to salient regions of the face was correlated with emotion recognition accuracy.

Talk: Friday 09:20, Stream 1 (Hickinbotham Hall)

The role of the magnocellular system in visual search

Geoffrey W. Stuart (geoff.stuart@dsto.defence.gov.au), Air Operations Division, Defence Science and Technology Organisation

Ronan. J. McInerny (ronan.mcinerney@dsto.defence.gov.au), Air Operations Division, Defence Science and Technology organisation

The visual system contains separate anatomical and physiological pathways. Previous studies have suggested that one of these pathways, the colour-insensitive magnocellular pathway, controls attention for search tasks that require attention to be deployed serially to different items in the visual field. We devised a controlled visual search task based on the multi-target search paradigm. Single-phase Gabor patterns were used as search items, with the target items mirrored across the vertical axis. In Experiment 1, we defined Gabors to stimulate either of the colour-sensitive parvocellular [L- vs. M-cone only] or koniocellular [S-cone only] systems. Our results were best fit by a serial search model. The type of cone contrast, matched for subjective saturation, did not affect search performance. In Experiment 2 we compared performance with L- vs M-cone contrast defined Gabors to those of different levels of achromatic contrast. At least 20% luminance contrast was required to match search performance with isoluminant coloured Gabors. Search performance improved up to 40% achromatic contrast. The findings are not consistent with the hypothesis that serial visual search is controlled by the magnocellular system.

Does inversion reduce sensitivity to cues of facial attractiveness?

Danielle Sulikowski (dsulikowski@csu.edu.au), School of Psychology, Charles Sturt University

Darren Burke, School of Psychology, University of Newcastle

Kristy Herring, School of Psychology, University of Newcastle

People are highly sensitive to configural variation in faces. This sensitivity allows for discrimination between different identities and detection of facial expressions and is reduced when faces are inverted. The extent to which configural sensitivity facilitates judgements of facial attractiveness is not well understood, but is the focus of the current study. Across two experiments, we manipulated several featural and configural cues to attractiveness (including pupil size, skin tone, lip fullness, symmetry, and sexual dimorphism) of male and female faces and asked participants to make judgements of attractiveness of these faces when presented upright as well as inverted. Our data suggest that reduced sensitivity to configural cues in inverted faces does hinder people's ability to make appropriate attractiveness judgements. This confirms mate-choice judgements as a potential selection pressure in the evolution of hyper-sensitivity to facial configurations.

Looking the other way: How others can bias spatial attention

Ancret Szpak (ancret.pitout@flinders.edu.au), School of Psychology, Flinders University

Tobias Loetscher (tobias.loetscher@flinders.edu.au), School of Psychology, Flinders University

Nicole A. Thomas (nicole.thomas@flinders.edu.au), School of Psychology, Flinders University

Michael E.R Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

Recent research has highlighted the potential impact of social interactions on basic attentional and perceptual processes. A better understanding about how attention is distributed in social space may be gleaned by looking at attentional differences during a shared task. Hence, a standard line task with pre-divided lines was modified to incorporate the responses of two individuals in a go/no-go response paradigm. The aim of this experiment was to investigate whether sharing a task shifts individual attentional processing in space. Experimental conditions were set up so that a second participant's seating position could be laterally manipulated between blocks. Therefore the actor made line judgements: with the lateral-subject sitting to their left, alone with no lateral-subject (baseline), or with the lateral-subject sitting to their right. Findings demonstrate that when the lateral-subject sat on the right side of the actor, the actor had a tendency to overestimate the left side of the line. That is, the actor's attention moved away from the lateral-subject, resembling a repulsion effect. Remarkably, this repulsion effect was negatively related to self-independence. Individuals reflecting high self-independence had a tendency to direct their attention away from the 'other'.

Letter processing in word recognition is sensitive to sublexical orthographic structure

Marcus Taft (m.taft@unsw.edu.au), School of Psychology, University of New South Wales

When a word is presented with two letters transposed, the resultant letter-string is hard to classify as a nonword in a lexical decision task (the “TL” interference effect). This is even true when the first letter is disrupted (e.g., PADTOLE from “tadpole”). The current study builds on recent work of mine using the TL effect to demonstrate that the internal syllabic structure of a word is represented in lexical memory. It is shown here that stronger TL effects are observed when two syllable onsets are transposed (e.g., PADTOLE vs PADFOLE) than when an onset is transposed with part of a coda (e.g., TICDATE from “dictate” vs TICBATE). Such a result supports the idea that words are orthographically represented with a maximised coda in their first syllable (e.g., “dict-ate” rather than “dic-tate”) and that letters are assigned to their subsyllabic position (onset, vowel, or coda) at the early stages of word recognition. TL effects emerge when a letter is tried out in a subsyllabic slot that inadvertently activates a lexical representation. Such a conclusion is compatible with an account of word recognition that is sensitive to the internal orthographic structure of words.

Measuring trauma-related mind wandering and intrusive cognition

Melanie Takarangi (melanie.takarangi@flinders.edu.au), School of Psychology, Flinders University

Deryn Strange (dstrange@jjay.cuny.edu), Department of Psychology, John Jay College of Criminal Justice, CUNY

D. Stephen Lindsay (slindsay@uvic.ca), Department of Psychology, University of Victoria

Research examining people’s maladaptive responses to traumatic experiences routinely relies on self-reported intrusive thoughts. This method assumes that people can accurately recognise and report the occurrence of such symptoms. However, we know from the mind wandering literature that people are not always aware of the content of their thoughts. For example, they may fail to realise when the object of their thoughts has shifted. In several experiments, we examined subjects’ meta-awareness of trauma-related mind wandering. We exposed subjects to a traumatic film, then asked them to complete a computerised task while concurrently reporting any occurrence of intrusive thoughts about the film. At intervals we also asked them whether they were thinking about the film. As expected, subjects often spontaneously reported thinking about the film. However, they were also often ‘caught’ engaging in unwanted thoughts about the film. These data suggest that people may lack meta-awareness of their trauma-related thoughts and have important implications. Theoretically, understanding intrusion meta-awareness will allow refinement of current models of PTSD. Methodologically, our results question whether current approaches to intrusion measurement relying purely on spontaneous self-report are sufficient. The findings also highlight useful research avenues that ultimately will assist people to better manage distressing intrusive experiences.

Independent texture and luminance discrimination processes in globally pooled shape

Ken W. S. Tan (tanw06@student.uwa.edu.au), School of Psychology, University of Western Australia

J. Edwin Dickinson (edwin.dickinson@uwa.edu.au), School of Psychology, University of Western Australia

David R. Badcock (david.badcock@uwa.edu.au), School of Psychology, University of Western Australia

The human visual system's acute sensitivity to minute changes in shape can often be attributed to global pooling of local information. While previous studies have demonstrated that this phenomenon occurs for luminance-defined (LD) shapes, it is unknown whether this global pooling translated to texture-segmentation-defined shapes. Additionally it has been proposed that texture and luminance cues-to-shape are integrated in one shape detection task but the current study determines whether this result applies to a more sensitive shape discrimination task. Radial frequency patterns (shapes deformed from circular by a sinusoidal modulation of radius) defined either by LD-borders, texture-borders or both these cues were employed. We found that as the number of cycles of modulation (of the border) increased in the shapes, deformation thresholds declined swiftly, indicative of global pooling in all conditions. Thresholds for shapes defined by both cues matched predictions based on an independent-cue vector sum of individual thresholds. Thus, while local elements are integrated around the contour and processed by global shape-detection mechanisms, integration did not occur across different shape-cues. Suggesting that two distinct mechanisms exists for shape discrimination – one for luminance-defined- and another for texture-defined contours.

Training and the attentional blink: Limits overcome or expectations raised?

Matthew F. Tang (matthew.tang@uwa.edu.au), School of Psychology, University of Western Australia

David R. Badcock (david.badcock@uwa.edu.au), School of Psychology, University of Western Australia

Troy A.W. Visser (troy.visser@uwa.edu.au), School of Psychology, University of Western Australia

There is a deficit in reporting the second of two sequentially presented targets when separated by less than 500 ms. This is known as the attentional blink (AB) and is a robust phenomenon that is typically attributed to structural or capacity limits in visual processing. This assumption, however, has recently been undermined by a demonstration that the AB could be eliminated after only a few hundred training trials [H. Choi, L. Chang, K. Shibata, Y. Sasaki & T. Watanabe, 2012]. The present work examined whether training benefited performance directly by eliminating processing limitations as claimed or indirectly by creating expectations about when targets would appear. Consistent with the latter option, when temporal expectations were eliminated training did not eliminate the AB. These results suggest that while training may ameliorate the AB indirectly, processing limits evidenced in the AB cannot be eliminated simply by repeated exposure to the task.

Global pooling of transformational apparent motion

Matthew F. Tang (matthew.tang@uwa.edu.au), School of Psychology, University of Western Australia
Troy A.W. Visser (troy.visser@uwa.edu.au), School of Psychology, University of Western Australia
Mark Edwards (mark.edwards@anu.edu.au), Research School of Psychology, Australian National University
David R. Badcock (david.badcock@uwa.edu.au), School of Psychology, University of Western Australia

Transformational apparent motion (TAM) is a relatively recently described visual phenomena highlighting the utility of form information in motion processing. In TAM, smooth apparent motion is perceived when shapes in certain spatiotemporal arrangements change. It has been argued that TAM relies on a separate high-level form-motion system, as certain spatial arrangements of TAM violate low-level motion energy models of vision. As yet, however, few studies have examined how TAM relates to the previously described motion system. We report a series of experiments showing that like, conventional motion stimuli, multiple TAM signals can combine into a global motion percept. After controlling for motion energy, we show that TAM appears to pool using a separate motion system than the motion energy system, that has less tolerance to noise. This system is relatively weak and is easily overridden when motion energy cues are sufficiently strong, but is not limited by attentional capacities. We conclude the ability to holistically integrate multiple TAM signals demonstrates this high-level form-motion information enters the motion system preceding the stage of global motion pooling.

Assessing expertise through cognitive load

Jason Tangen (jtangen@psy.uq.edu.au), School of Psychology, University of Queensland
Jessica Baird (jazzbaird@hotmail.com), School of Psychology, University of Queensland

We are interested in the nature of visual expertise and the factors that distinguish experts from novices. An interesting group of experts are fingerprint examiners with decades of experience with a highly structured set of impressions that vary across individuals and instances. In this experiment, we compared the matching performance of experts and novices while manipulating cognitive load using visual and verbal working memory tasks. By occupying their working memory resources, we can assess the role of non-analytic processing in their identification performance. Even though examiners believe that a slow, careful, and highly analytic approach is critical for matching prints, our results from this experiment and others suggest otherwise. Like experts in other visual domains (e.g., radiologists, cytologists, face recognition), the experiential knowledge based on the hundreds of thousands of prior instances serves as a rich source of analogies to permit efficient problem solving.

Enhancing the production effect in memory

Chelsea K. Quinlan (ch354576@dal.ca), Department of Psychology and Neuroscience, Dalhousie University

Tracy L. Taylor (ttaylor2@dal.ca), Department of Psychology and Neuroscience, Dalhousie University

The production effect refers to better subsequent memory for items that are read aloud at study compared to items that are read silently, and is attributable to increases in relative distinctiveness. The current literature demonstrates that reading aloud is the most effective form of production; however, the distinctiveness account predicts that other forms of vocal production that provide cues to distinctiveness over and above reading aloud should produce even larger production effects. Indeed, in three experiments, we demonstrated that reading items aloud loudly and singing items at study resulted in a greater production effect than reading items aloud in a normal voice, with the largest subsequent benefit for singing. Our findings support the distinctiveness hypothesis by demonstrating that other forms of production can have a more pronounced effect on subsequent memory than reading aloud at study

Binary discrimination performance: The interactive effect of type of knowledge of results and task difficulty

Robert T. Taylor (taylor.rob@hotmail.com), School of Psychology, Massey University

John V. Podd (j.v.podd@massey.ac.nz), School of Psychology, Massey University

There is evidence that the decision criterion for distinguishing overlapping event classes, S and N, is not fixed. The greater the criterion fluctuation the greater discrimination ability is underestimated. Could trial-by-trial knowledge of results (TTKR) stabilise the criterion? With overlapping distributions some values of the evidence variable indicate either an S or an N event, meaning that TTKR causes constant criterion adjustment. Veridical KR, TTKRv, may increase such adjustment in proportion to the degree of distribution overlap. When known, the ideal decision rule (no decision noise) can be used to provide consistent trial-by-trial feedback (TTKRi). TTKRi should yield increasingly superior performance over TTKRv as task difficulty increases. A typical task can be modeled by constructing overlapping normal distributions. In our model, the distributions consisted of 14 tonal frequencies (all tones > 10 jnds apart). Observers listened to a random sequence of 200 “high” tones (S distribution) and 200 “low” tones (N distribution), making a series of “High”/“Low” judgements. The predicted interaction between KR type and task difficulty occurred. A second experiment doubled the number of tones and added a no-KR condition. The KR type-by-task difficulty interaction was replicated. Additionally, TTKRv made performance worse than when receiving no KR at all.

Status quo bias and the ‘don’t know’ response in eyewitness reports

Stacey Taylor-Aldridge (tayl0441@flinders.edu.au), School of Psychology, Flinders University

Nathan Weber (nathan.weber@flinders.edu.au), School of Psychology, Flinders University

Neil Brewer (neil.brewer@flinders.edu.au), School of Psychology, Flinders University

When being interviewed by police, eyewitnesses can control the information they volunteer and withhold. However, it has been observed that even with this control, witnesses continue to provide incorrect information, despite not being confident in their accuracy. This study explored a possible explanation for this reluctance to withhold; the status quo bias. Decisions consistent with the status quo require less evidence than decisions which change it. When questioned, witnesses may feel they should provide answers; this is the status quo. Thus, withholding information is a change to the status quo and strong evidence is required for people to respond ‘don’t know’. We hypothesised that perception of the status quo (manipulated via instructions) would affect participants’ control decisions, and the accuracy of their eyewitness reports. Results showed that manipulating the status quo bias did not affect control decisions, providing no support for the role of the status quo bias in control decisions. However, when the memory report was obtained via a two-stage procedure, accuracy was greater (compared to a one-stage procedure). Importantly, the increase in accuracy was not accompanied by a decrease in quantity, suggesting improved monitoring effectiveness. This raises the possibility of a two-stage procedure as an effective police practice.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Upper visual field distractors bias attention to the left

Nicole A. Thomas (nicole.thomas@flinders.edu.au), School of Psychology, Flinders University

Benjamin Castine (cast0095@flinders.edu.au), School of Psychology, Flinders University

Tobias Loetscher (tobias.loetscher@flinders.edu.au), School of Psychology, Flinders University

Michael E. R. Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

Neurologically normal individuals exhibit an attentional bias toward the left side of space and objects known as pseudoneglect. A similar bias is observed in the vertical dimension, wherein an upward bias occurs. Interestingly, the strength of the leftward bias is influenced by various factors, including vertical elevation. A series of experiments examined the effect of distractor stimulation on attentional asymmetries. Study 1 employed a horizontal landmark task surround by “u-shaped” distractors in the upper, lower, or both visual fields. The leftward bias was stronger following distractor stimulation in the upper field relative to baseline. Study 2 employed more peripheral distractor stimuli that could not be associated with the central line stimulus as readily. Again, a stronger leftward bias was observed following upper field stimulation. In study 3, a vertically rotated version of the paradigm from study 1 was used. Surprisingly, a trend for a stronger upward bias following right side distractors occurred. Overall, results suggest that upward attentional shifts lead to an increased leftward spatial bias, potentially as a result of additional right hemisphere activation. In contrast, right side distractors potentially increased altitudinal pseudoneglect as a consequence of relatively stronger activation of the ventral stream in the left hemisphere.

Expertise, memory, and non-analytic cognition in fingerprint matching: Experts can discriminate prints in noise, spaced in time, and in the blink of an eye

Matthew B. Thompson (mbthompson@gmail.com), School of Psychology, University of Queensland

Jason M. Tangen (jtangen@psy.uq.edu.au), School of Psychology, University of Queensland

Duncan J. McCarthy (mccarthy.duncanj@police.qld.gov.au), Forensic Services Branch, Queensland Police Service

When a fingerprint is found at a crime scene it is a human expert, not a machine, who is faced with the task of identifying the person who left it. We know from similar domains of expertise, such as medical diagnosis, that experts are accurate even with very little information and that much of expert decision making is based on rapid and unconscious recognition of previously encountered instances—non-analytic cognition. Here I will present evidence for non-analytic cognition in fingerprint matching, such that experts can discriminate fingerprints in noise, spaced in time, and in two seconds. Unexpectedly, however, fingerprint experts did not show the classic inversion effect seen in face recognition.

Immediate and delayed recall of a small-scale spatial array

Michael Tlauka (michael.tlauka@flinders.edu.au), School of Psychology, Flinders University

Phill Donaldson (p.donaldson@cqu.edu.au), Psychology, Central Queensland University

Daniel Bonnar (bonn0050@flinders.edu.au), School of Psychology, Flinders University

The study examined people's spatial memory of a small-scale array of objects. Earlier work has primarily relied on short retention intervals, and to date it is not known whether performance is affected by longer intervals between learning and recall. In the present investigation, thirty-two university students studied seven target objects. Recall was tested immediately after learning and after an interval of seven days. Performance was found to be similar in the immediate and delayed conditions, but did not conform to the often reported 'saw-tooth' pattern. Overall, performance was enhanced after a delay relative to immediate recall. The results are discussed with reference to recent investigations that have shown task parameters can influence spatial recall.

Individual differences in temporal anticipation and adaptation during sensorimotor synchronisation

Peta Tram (p.tram@uws.edu.au), The MARCS Institute, University of Western Sydney

Peter Keller (p.keller@uws.edu.au), The MARCS Institute, University of Western Sydney

Interpersonal coordination during joint action (e.g. musical ensemble performance) requires individuals to anticipate and adapt to each other's action timing. The present study used paced finger-tapping tasks to examine the relationship between individual differences in anticipatory skill and adaptive processes. Adaptive ability was estimated by the degree of temporal error correction that participants (N=51) engaged in when synchronising with an auditory pacing signal that modulated its timing based on the participant's performance. Anticipation was measured by calculating a prediction/tracking ratio that reflected the degree to which participant's inter-tap intervals led or lagged behind inter-onset intervals in tempo-changing sequences. A correlational analysis revealed a significant positive relationship between anticipatory and adaptive mechanisms suggesting that these processes may interact to facilitate synchronisation. A secondary aim concerned the contribution of anticipatory and adaptive mechanisms, cognitive ability (working memory), and social capacities (empathy) to individuals' synchronisation precision and accuracy. Hierarchical regression analyses revealed that anticipation and adaptation were the best predictors of synchronisation performance, and that working memory and empathy did not significantly explain additional variance. Together these results demonstrate a relationship between anticipatory and adaptive mechanisms and indicate that individual differences in these two abilities are predictive of synchronisation performance.

Latent difference model of algebraic worry and working memory

Kelly Trezise (trezisek@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Robert Reeve (r.reeve@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

It has been claimed that mathematics anxiety/worry (MA) and working memory (WM) interact to affect mathematics performance. General measures of WM and MA/worry have been used to examine the relationship in the context of arithmetic problem solving, and moderate associations found. It is unknown whether: (1) this relationship occurs in other math domains (e.g. algebra), (2) using domain sensitive measures of MA/worry and WM would result in stronger relationships, and (3) WM affects MA/worry, or vice versa over time. To investigate these issues, 137 14-year-olds completed algebraic WM (x5 test occasions), algebraic sensitivity/worry (x3), spatial WM (x4), and algebraic problem solving (x1) tasks over two test sessions. A latent change model was used to examine the mutual influence between WM and worry over time. Algebraic WM decreased when worry was high; worry increased when WM was low or decreased. Low worry and high WM were associated with higher algebraic problem solving performance. These findings indicate: (1) the MA/worry, WM relationship occurs in algebra, (2) a benefit of domain sensitive measures over general indices, and (3) a mutual influence of MA/worry and WM, which is likely to accumulate over a short period (e.g. a math test).

Adaptation to asynchronous audiovisual events occurs online

Erik van der Burg (vanderburg.erik@gmail.com), School of Psychology, University of Sydney

David Alais (davida@psych.usyd.edu.au), School of Psychology, University of Sydney

John Cass (j.cass@uws.edu.au), School of Psychology, University of Western Sydney

In order to combine information from different sensory modalities the brain must deal with considerable temporal uncertainty. In natural environments, an external event may produce simultaneous auditory and visual signals yet they will invariably activate the brain asynchronously due to different propagation speeds for light and sound and different neural response latencies once the signals reach the observer. One strategy the brain uses to deal with audiovisual timing variation is to adapt to a prevailing asynchrony to help re-align the signals. Here we investigate audiovisual recalibration and show that it takes place extremely rapidly. Our results demonstrate that exposure to a single, brief asynchrony is sufficient to produce strong recalibration effects. Such fast-acting recalibration provides a mechanism for overcoming inevitable audiovisual timing variation and serves to rapidly re-align signals at onset to maximise the perceptual benefits of audiovisual integration.

To recognize or not to recognize, that is the question: Using recognition in cue learning environments

Don van Ravenzwaaij (d.vanravenzwaaij@unsw.edu.au), School of Psychology, University of New South Wales

Ben R. Newell (ben.newell@unsw.edu.au), School of Psychology, University of New South Wales

Chris P. Moore (christophermoore@gmail.com), School of Psychology, University of New South Wales

Michael D. Lee (mdlee@uci.edu), Department of Cognitive Sciences, University of California Irvine

An experiment examined the effect of ‘pure’ recognition — in the absence of concomitant evaluation — on inferences. Participants first indicated whether they recognized a number of Italian and US cities, and subsequently decided which of two cities from each environment had the larger population. The names of the cities were not available, but participants could find out whether they had recognized them in the first stage of the experiment (i.e., ‘pure recognition’). Additional predictive cues (e.g., presence/absence of a university) were also available. Participants used the recognition cue about 50% of the time, rarely examined it first, and used it differently as a function of whether recognition information was binary or continuous. Furthermore, participants used the recognition cue more often if they recognized more items, irrespective of its predictive validity. Finally, we present the results of a Bayesian computational modeling approach that views inference as a process driven by evidence-accumulation.

Lexical expertise and eye movements: Neighbour preview effects

Aaron Veldre (aaron.veldre@sydney.edu.au), School of Psychology, University of Sydney

Sally Andrews (sally.andrews@sydney.edu.au), School of Psychology, University of Sydney

Orthographic neighbourhood effects on eye movements in reading have generally been found to be inhibitory and restricted to temporally late measures, consistent with readers incorrectly retrieving the higher frequency neighbour (HFN). Evidence from the masked priming paradigm suggests that the effect of neighbourhood characteristics on lexical processing depends on individual differences in the precision of skilled readers' lexical representations. To determine how neighbour frequency and lexical precision affect early word processing in reading, we used the boundary paradigm to manipulate the parafoveal preview of a target word, such that it was either identical, a HFN, a non-word neighbour, or an all-letter-different non-word. Lexical precision was assessed using measures of reading comprehension and spelling ability. The average results showed an inhibitory effect of HFN preview in early eye movement measures that interacted with individual differences and neighbourhood size (N). All readers showed relative facilitation from a HFN preview for low N targets. However, for high N targets, poor readers showed facilitation from a HFN preview, while good readers showed inhibition. The findings suggest that lexical precision affects parafoveal processing of upcoming words and that highly proficient readers show sensitivity to lexical competition earlier than average readers.

When looking at nothing is something: Exploring centre of gravity fixations

Dustin Venini (d.venini@uq.edu.au), School of Psychology, University of Queensland

Stefanie I. Becker (s.becker@psy.uq.edu.au), School of Psychology, University of Queensland

Center of gravity (COG) fixations are the result of saccades that land in empty space directly between the saccade target location and the location of an irrelevant distractor, rather than on one of these stimuli. It is currently thought that COG fixations are due to insufficient spatial resolution to discriminate the stimulus locations during the time of saccade initiation. An alternative explanation is that an erroneous saccade was initially programmed to the distractor location and that corrective mechanisms curve saccades towards the target in mid-flight. To distinguish between the bottom-up low-resolution account and the error correction account, we conducted four eye movement experiments in which we manipulated the spacing of target and distractor locations, the amount of top-down knowledge about the target, and the bottom-up stimulus conditions in the center of gravity. The results showed that COG fixations were strongly influenced by both top-down information and bottom-up stimulus conditions, calling for a new account that combines top-down and bottom-up influences to explain COG fixations.

Does depressive rumination lead to realism?

Shruti Venkatesh (s.venkatesh@unsw.edu.au), School of Psychology, University of New South Wales

Professor Michelle Moulds (m.moulds@unsw.edu.au), School of Psychology, University of New South Wales

Professor Christopher Mitchell (christopher.mitchell@plymouth.ac.uk), School of Psychology, University of Plymouth

Individuals tend to believe they exert control over uncontrollable situations - this is referred to as an illusion of control. Interestingly, past findings suggest that depressed individuals do not exhibit an illusion of control. Rather they are accurate at assessing the uncontrollability of a situation - this phenomenon was termed the depressive realism effect. A prominent theory of the depressive realism effect suggests that the realism is due to depressed individuals engaging in rumination (i.e., contemplating the causes, consequences and meaning of their depression) during the task. In contrast, non-depressed individuals are less likely to ruminate, which leads to the illusion of control. This theory was tested in two experiments by manipulating rumination using a non-depressed, depressed and clinically depressed sample. In both experiments, the depressive realism effect was not replicated despite the effectiveness of the manipulation within these samples. In other words all participants displayed an illusion of control. This result is inconsistent with the notion that depressive rumination plays an integral role in the depressive realism effect. Importantly, it suggests that depressed individuals are generally no more accurate than non-depressed individuals when judging their degree of control over a situation.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Lie in my tongue: Cortico-bulbar excitability highlights the somatotopic side of deceptive behaviour

Carmelo Vicario (c.vicario@uq.edu.au), School of Psychology, University of Queensland

Luca De Simone, Cognitive Neuroscience Sector, International School for Advances Studies

Deceptive behaviour is part of social relations and is linked to concepts such as truth and freedom, knowledge and morality. Recent works suggest that the subjective evaluation of a moral act leads to activation of emotional-related (i.e. disgust) brain areas (e.g. Moll et al., 2005) and that the modulation of taste perception influence moral judgment (Kendall et al., 2011). According to the evidence of a close relationship between morality and taste we studied Transcranial Magnetic Stimulation Motor Evoked Potentials (MEPs) of tongue (TNG) and a control muscle (Extensor Carpi Radialis-ECR) during production of truth vs. false answers to personal (moral) vs. impersonal (neutral) questions. Our results show a double dissociation of the effects selectively for the TNG MEP amplitudes, which were significantly reduced when responding with false answers to personal questions relative to true answers. On the other hand, MEP amplitudes were enhanced when participants responded with false answers to impersonal questions with respect to truth answers. The present study is the first in showing the existence of a biomarker able to discriminate between the production of false and true answers to morally relevant questions. We speculate that these differences reflect an implicit moral evaluation occurring while producing false answers to personal questions. This interpretation agrees with the recent work of Chapman et al. (2009) which hypothesize an oral origin for the moral disgust.

Postures in motion: Investigating posture-based encoding of dance-like actions

Staci Vicary (s.vicary@uws.edu.au), The MARCS Institute, University of Western Sydney

Catherine J Stevens (kj.stevens@uws.edu.au), The MARCS Institute, University of Western Sydney

Beatriz Calvo-Merino, Department of Psychology, City University, London

Rachel Robbins, School of Social Sciences and Psychology, University of Western Sydney

Distinct neural regions have been identified for perception of body posture and body movement. If posture and movement are dissociable during visual perception, they may also be dissociable during retention in visual working memory (VWM). To elicit posture-plus-motion and posture-only processing of dance-like actions, frames within an action can be presented in correct or incorrect (jumbled) order. The former elicits action perception and engages form and motion pathways. The latter elicits posture perception and engages form pathways alone. If posture and motion are dissociable in VWM, then recognition of static posture should be best after viewing jumbled, compared to ordered, actions. However, as VWM is capacity limited, posture-based encoding of actions may be ineffective with increased number of actions (items) or frames. To examine these hypotheses a 2 (Frame Progression: ordered, jumbled) x 2 (Frame Number: five, nine) x 2 (Span: two, three items) change detection experiment was conducted. As predicted, recognition of a single test posture was greatest after studying jumbled, compared to ordered, stimuli. However, this effect only occurred for spans of two (but not three) items and for stimuli with five (but not nine) frames. It is concluded that, as in perception, posture and motion are dissociable in VWM.

Semantic distance effects in picture word interference: Investigating the role of shared features

Harrison Vieth (harrison.vieth@uqconnect.edu.au), School of Psychology, University of Queensland

Katie McMahon, Centre for Advanced Imaging, University of Queensland

Greig de Zubicaray (greig.dezubicaray@uq.edu.au), School of Psychology, University of Queensland

Picture-word interference (PWI) studies require participants to name pictures while ignoring superimposed distractor words; slower naming speeds occur when distractors are category coordinates of the target (e.g., both animals) compared to unrelated words – an effect called semantic interference (SI). Mahon et al (2007) examined the influence of ‘semantic distance’: the number of features shared between target and distractor. They demonstrated close distractors (DUCK-goose) speeded picture naming compared to far distractors (DUCK-tiger), a finding challenging to lexical selection by competition (LSC) models of speech production. Over 3 experiments, we examined the influence of shared features on SI. Experiment 1 replicated Mahon et al. (2007; Exp 7) but instead showed a typical SI effect for their close target-distractor pairings. Experiment 2 investigated semantic distance as a graded variable, finding a reliable SI effect only for pairings with the most shared features. Experiment 3 controlled shared features while manipulating distinctive features that are proposed to have a privileged status in computing word meaning (e.g., PIGEON-sparrow; PIGEON-canary). However, distractors with distinctive features did not influence the SI effect. Our results confirm SI occurs reliably for category coordinates, consistent with the LSC model account, but only when target and distractor share a majority of features.

The role of sampling assumptions in category generalization

Wai Keen Vong (waikeen.vong@adelaide.edu.au), School of Psychology, University of Adelaide

Andrew Hendrickson (drew.hendrickson@adelaide.edu.au), School of Psychology, University of Adelaide

Amy Perfors (amy.perfors@adelaide.edu.au), School of Psychology, University of Adelaide

Daniel Navarro (daniel.navarro@adelaide.edu.au), School of Psychology, University of Adelaide

The kinds of beliefs people have about how data is sampled from the environment can influence the kinds of inferences people make from the data. Under a strong sampling assumption, a learner assumes that observed data are sampled only from the set of positive examples, while under a weak sampling assumption, a learner assumes that the observed data has been sampled from the set of all possible examples. Within the context of inductive generalization tasks, these two different sampling assumptions lead to different predictions on how people should generalize from the observed data. Recent work by Navarro, Dry and Lee (2012) has formulated a Bayesian model for generalization that can account for responses from differing beliefs about people's sampling assumptions about the data. We extend their results by conducting a category generalization experiment using two spatially-ordered categories. The model was found to predict generalization responses at the individual level, while manipulation of people's beliefs about how the data was sampled caused differences in generalization. The results of the current study, showing that generalizations are affected by sampling assumptions, are discussed in relation to other models of category learning.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Do women know what men want? Perceptions of opposite-sex allocation of resources to aid mate selection

Danielle Wagstaff (danielle.wagstaff@uon.edu.au), School of Psychology, University of Newcastle

Darren Burke (darren.burke@newcastle.edu.au), School of Psychology, University of Newcastle

Men and women prioritise information gathered from the face over that from the body when making decisions about the attractiveness of a potential mate (Confer, Perilloux and Buss, 2010). However, when men are asked to judge a woman for attractiveness in a short-term context, they increase the importance of information obtained from the body, a potential evolutionary mechanism that aids in detecting cues to ovulation. The aim of the current study was to determine to what extent men and women are aware of these preferences for attention allocation to face and body in the opposite sex. A sample of male and female volunteers completed a task in which they were required to reveal either the face or the body of a conspecific, to gain relevant mating information, after random allocation to either a short-term or long-term condition. Results demonstrate that both sexes over-estimate the importance that the opposite-sex will place on information obtained from the body. Implications are discussed.

Investigating processing of integral dimensioned stimuli in the Garner paradigm

Tony Wang (tony.wang@unimelb.edu.au), School of Psychological Sciences, University of Melbourne

Daniel R. Little, School of Psychological Sciences, University of Melbourne

Robert M. Nosofsky, Department of Psychological and Brain Sciences, Indiana University

A classic distinction between types of dimensions in categorisation is that of separable and integral dimensions. Separable dimensions are analysable such that one can selectively attend to one dimension of the stimulus whilst ignoring the other. For example, a set of rectangle shapes may be categorised based on their height. Variations in the width of these shapes should not affect categorisation performance if height is the relevant dimension. Attention to separate dimensions of integral stimuli however, is less efficient. One example is colours from the Munsell colour space that vary in brightness and saturation. Garner and Felfoldy (1970) reported an interference effect for Munsell colours when only one dimension was relevant for categorisation. Conversely, a facilitation effect was reported for when both dimensions were relevant for categorisation. We report a study that investigated the source of the Garner effect. One possibility is that variation on the irrelevant dimension for categorisation reduces the quality of perceptual information available to the participant for their classification. Thus, more sampling of the stimulus is required to complete a response. Alternatively, the participant might become more cautious in their response when presented with more confusable stimuli. We applied a response time model in order to resolve these two possibilities.

Poster: Wednesday 19:00, Stream 1 (Hickinbotham Hall)

Lateral eye movements in attractiveness and emotional expressivity: The importance of looking at the mouth

Sophie J. Wignall (wign0007@flinders.edu.au), School of Psychology, Flinders University

Nicole A. Thomas (nicole.thomas@flinders.edu.au), School of Psychology, Flinders University

Tobias Loetscher (tobias.loetscher@flinders.edu.au), School of Psychology, Flinders University

Michael E. R. Nicholls (mike.nicholls@flinders.edu.au), School of Psychology, Flinders University

The face is our most immediately informative social stimulus, with the communication of emotion and the conveyance of attractiveness comprising two of its key functions. In order to explore left/right asymmetries, two studies examined fixations to each hemiface, in addition to the eyes and mouth, during appraisals of emotional expressivity and attractiveness. Overall, more fixations occurred on the left hemiface. However, participants fixated more upon the right side of the mouth when judging happiness, whereas the left mouth and left eye elicited more fixations for emotional expressivity and sadness, respectively. The present findings support the notion that the Right Hemisphere and Valence-Specific Hypotheses might not be mutually exclusive. Although a general right hemisphere advantage for the perception of emotion and attractiveness was observed, hemispheric processing differences emerged when exploring the eyes and mouth. Importantly, this highlights the utility of examining not only the hemifaces, but also smaller regions of interest, when investigating lateral biases.

Non-conscious effects of peripheral stimuli on visual attention: How to manipulate spatial attention in a design with equal numbers of cued and uncued trials

Jaimie Wilkie (j.wilkie@auckland.ac.nz), School of Psychology, University of Auckland

Anthony J. Lambert (a.lambert@auckland.ac.nz), School of Psychology, University of Auckland

In the Posner cueing technique, commonly used in studies of visual attention, performance is compared in two main conditions. In the first, target objects appear at locations that are expected, on the basis of a pre-trial cue; in the second condition, targets appear at an unexpected location. However, the relative rarity of unexpected trials is problematic for neuroimaging studies of attention, because low numbers of trials tend to reduce the sensitivity of EEG, ERP and fMRI methods to the neural correlates of performance. Here we report behavioural findings from a novel design employing equal numbers of trials in two attentional conditions. Participants were presented with bilateral peripheral cues which were either informative, or uninformative with respect to target location. After a brief practice period, participants responded more rapidly in trial blocks with informative, compared to uninformative cues. Moreover, this effect was independent of participants' conscious awareness of the spatial information carried by the cues. These results: (i) support the hypothesis that visual orienting in response to peripheral information is controlled non-consciously; and (ii) illustrate a method for studying the neural correlates of visual attention, while avoiding the problems associated with low frequency of uncued trials.

Talk: Friday 11:10, Stream 1 (Hickinbotham Hall)

Sensorimotor temporal recalibration within and across limbs

Kielan Yarrow (kielan.yarrow.1@city.ac.uk), Department of Psychology, City University London

Ingvild Sverdrup-Stueland (ingvildsverdrup@hotmail.com), Department of Psychology, City University London

Warrick Roseboom (wjroseboom@gmail.com), NTT Communication Science Laboratories

Derek H. Arnold (d.arnold@psy.uq.edu.au), School of Psychology, University of Queensland

Deciding precisely when we have acted is challenging, as actions involve a train of neural events spread across both space and time. Repeated delays between actions and consequent events can result in a shift, such that immediate feedback can seem to precede the causative act. Here we examined which neurocognitive representations are affected during such sensorimotor temporal recalibration, by testing if the effect generalises across limbs, and whether it might reflect altered decision criteria for temporal judgements. Hand or foot adaptation phases were interspersed with simultaneity judgements about actions involving the same or opposite limb. Shifts in the distribution of participants' simultaneity responses were quantified using a detection-theoretic model, where a shift of both boundaries together gives a stronger indication that the effect is not simply a result of decision bias. By demonstrating that temporal recalibration occurs in the foot as well as the hand, we confirmed that it is a robust motor phenomenon: Both low and high boundaries shifted reliably in the same-limb conditions. However, in cross-limb conditions only the high boundary shifted reliably. These two patterns are interpreted to reflect a genuine change in how the time of action is represented, and a timing criterion shift, respectively.

Non-intentional and spontaneous coordination between a continuously moving finger and jaw motion during repetitive speech: Preliminary results

Gregory Zelic (g.zelic@uws.edu.au), The MARCS Institute, University of Western Sydney

Christopher Davis (chris.davis@uws.edu.au), The MARCS Institute, University of Western Sydney

Jeesun Kim (j.kim@uws.edu.au), The MARCS Institute, University of Western Sydney

There has been extensive research into how the motions of different limbs synchronize and specific synchronisation strengths as a function of coordination patterns have been identified. Less work has been conducted on how jaw and limb motion may synchronize and these experiments typically focused on synchronies between jaw motion and finger tapping or pointing. The present experiment looked at unconstrained motion (not pointing or tapping), examining whether rhythmic motion of the jaw and the index finger would synchronize and whether vocalisation in conjunction with jaw motion would have an impact. Participants were instructed to repeatedly utter /BA/ or /SA/ syllables with or without vocalizing, while continuously moving their right index finger in flexion/extension. No instructions about synchronization were given; participants were simply told to perform both tasks in the most comfortable fashion. The jaw is differently recruited when producing the bilabial plosive [b] or the alveolar fricative [s] followed by the vowel [a]. We expected that the greater amplitude of the jaw movements for /BA/ would act as an anchor point, strengthen synchronization for /BA/ compared to /SA/ and help maintain this synchronization in the no-sound conditions. Preliminary results suggest a more complex pattern of synchronisation that differed between syllables.