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We can be happy upside down: Inversion effects for static and dynamic facial expressions

Simone Favelle
University of Wollongong, skeane@uow.edu.au

Romina Palermo
University of Western Australia

Alanna Tobin
University of Wollongong, atobin@uow.edu.au

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Exploring the effect of procedural differences in humans vs. non-human primate decision making experimentation

Nathan Evans (Nathan.j.evans@uon.edu.au), School of Psychology, University of Newcastle
Mathew Marchant, University of Newcastle
Andrew Heathcote, University of Newcastle
Scott Brown, University of Newcastle

Evidence accumulation models have successfully been fit to human decision data for decades, modelling decisions from simple perceptual choice to consumer choice. Traditionally, these models have assumed that decision thresholds remain constant during each decision (fixed thresholds). However, recent primate studies have suggested collapsing thresholds, which decrease as decision time unfolds. One feature of these results is that collapsing bounds have mostly been supported by data from non-human primates, while fixed bounds are supported by human data. We investigated whether this apparent difference between species might instead be caused by different procedures used for humans vs. non-human primates, by putting human participants through an experimental procedure usually used for non-human primates. Fifteen participants each practised for 4,320 trials of a random dot motion task, over a two-week period. The data became more consistent with the predictions of the collapsing bounds model as practise went on. This effect was magnified by the inclusion of an unusual delayed-reward procedure that is sometimes used for non-human studies. We conclude that the extended practise given to non-human primates, and the reward structure used, may have contributed to the apparent difference in decision-making strategies between the species.

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Simone Favelle (simone_favelle@uow.edu.au), School of Psychology, University of Wollongong
Romina Palermo, ARC Centre of Excellence in Cognition and its Disorders and School of Psychology, University of Western Australia
Alanna Tobin, School of Psychology, University of Wollongong

While it is well documented that inversion impairs recognition of face identity, surprisingly few studies have investigated inversion effects on facial expressions. Expression and identity recognition share some common early processes; however, there is also evidence that they are processed by somewhat independent functional and neurological systems. Also, there is only a limited set of basic facial expressions and many of these have characteristic and featural cues (e.g., upturned mouth for happy). While inversion and motion effects have been shown for subtle expressions, the effects in normal intensity expressions are less clear. Here, we examine inversion for static basic expressions (anger, disgust, fear, joy, sadness, and surprise). For the first time, we also examine whether faces with complete dynamic expressions display an inversion effect. Dynamic expressions were recognised more accurately than static, but both show an overall inversion effect. However, inversion effects were not found for each expression tested. Inversion significantly impaired recognition of

static expressions of disgust and dynamic expressions of sadness. It seems the relative contribution of holistic and analytic processing to facial expression recognition depends on the expression and motion. These findings highlight the differences and complexities of the processes involved in recognising individual expressions.

Electrical stimulation of human prefrontal cortex improves multitasking

Hannah Filmer (h.l.filmer@gmail.com), School of Psychology, University of Queensland
Jason B. Mattingley, School of Psychology and Queensland Brain Institute, University of Queensland
Paul E. Dux, School of Psychology, University of Queensland

Making two decisions simultaneously typically leads to performance impairments that are thought to reflect a response selection (RS) bottleneck. Imaging studies have implicated the left posterior lateral prefrontal cortex (pLPFC) in single- and dual-task RS. In a recent study, we used transcranial direct current stimulation (tDCS) to provide causal evidence for left pLPFC involvement in single-task RS (Filmer et al., 2013). To date, however, there is no causal evidence implicating the left pLPFC in multitasking. We used tDCS to test the involvement of left pLPFC in performing two temporally overlapping tasks. Participants completed three sessions, each involving anodal, cathodal, or sham stimulation. The behavioural paradigm consisted of a mixture of single- and dual-task trials in which a sound, an image, or both were presented. Responses to relevant stimuli were made as quickly and accurately as possible before, immediately after, and 20 minutes after stimulation. For single-task trials, both anodal and cathodal stimulation disrupted reaction times, complementing the findings of Filmer et al. (2013). For dual-task trials, cathodal stimulation reduced reaction times. The results confirm that the left pLPFC is causally involved in the central bottleneck that limits multitasking, and suggest that RS may vary for single- and dual-task responses.