MORE BLOBS! A TRAINING STUDY EXAMINING THE ROLE OF MEDIAL-FRONTAL CORTEX IN THE DEVELOPMENT OF PERCEPTUAL EXPERTISE

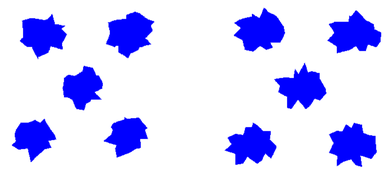
Olav E Krigolson, Heather Gallant, Cameron Hassall

Department of Psychology and Neuroscience, Dalhousie University

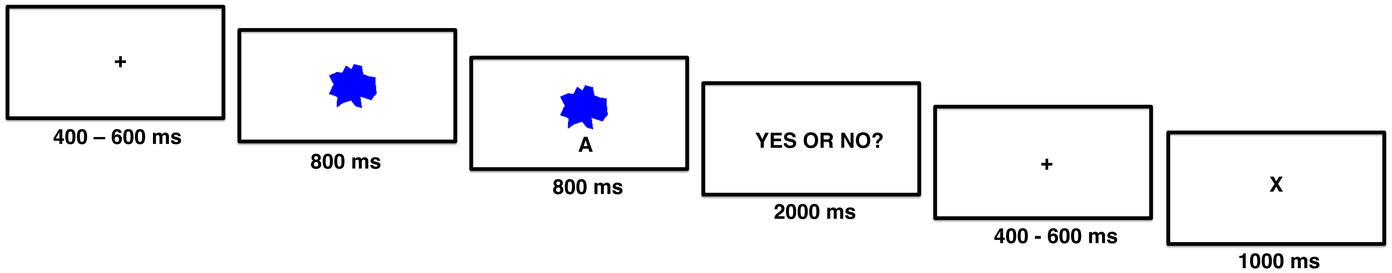
Introduction and Methods

In a previous study (Krigolson et al., 2009), we demonstrated that a reinforcement learning system within medial-frontal cortex appeared to play a role in the development of perceptual expertise.

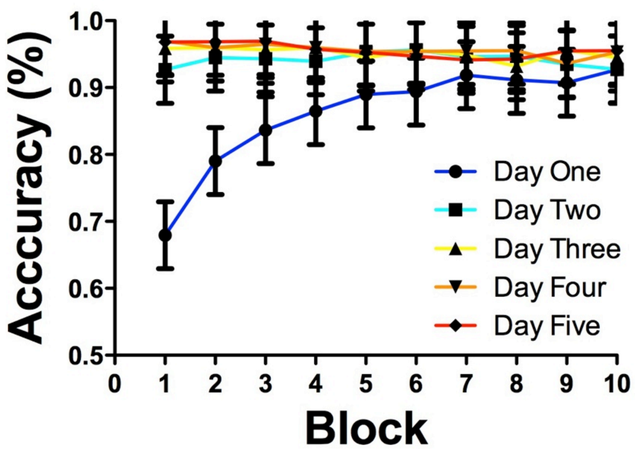
Here, we sought to extend that work by creating "true experts" by greatly increasing the number of items each participant was exposed to. Specifically, Ericsson, Krampe, and Tesch-Romer (1993) noted that 10,000 hours of practice was needed to acquire "expertise". While that clearly was not possible in a laboratory study, we hoped by exposing participants to 5000 learning trials we would see the beginnings of "true" expertise.

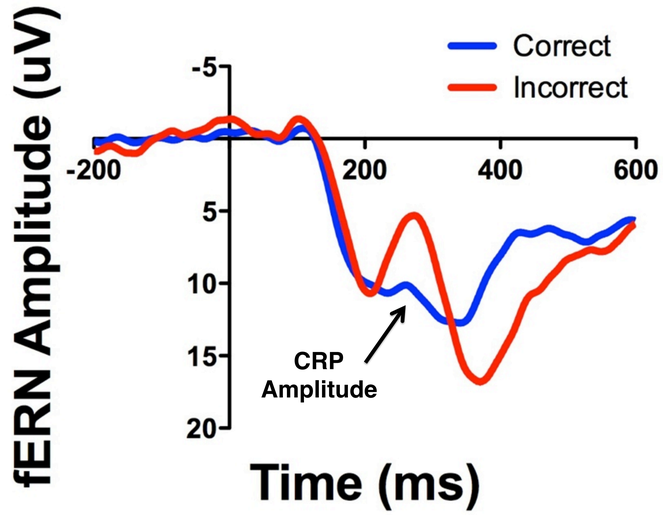


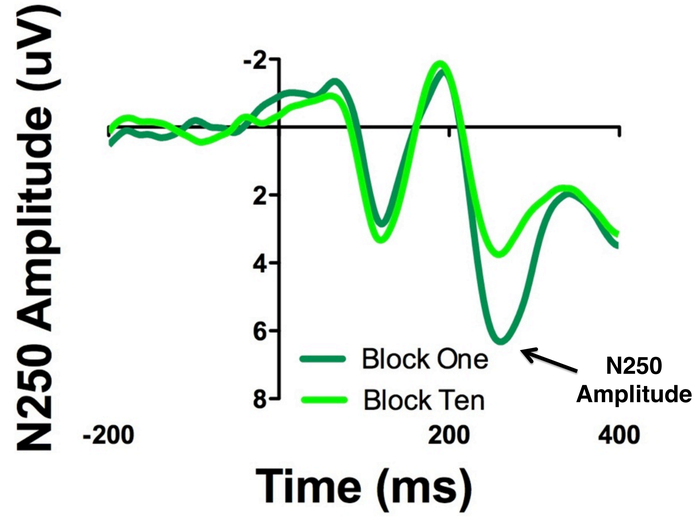
Fifteen participants completed five days of training, viewing 1000 unique blobs each day. Unlike our previous work, we included no "morph" blobs.

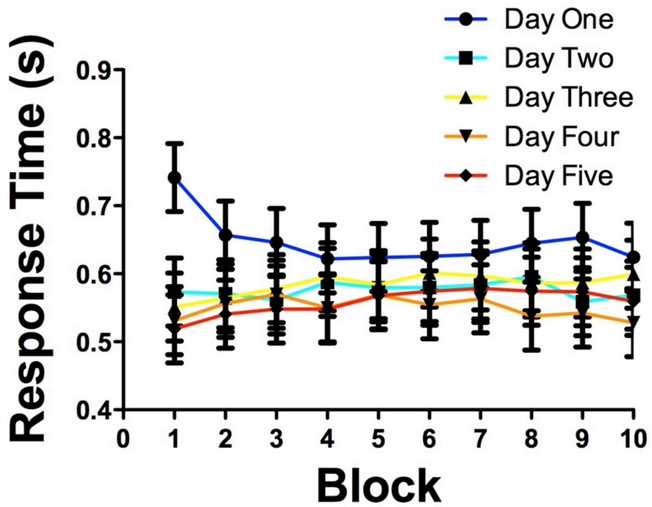


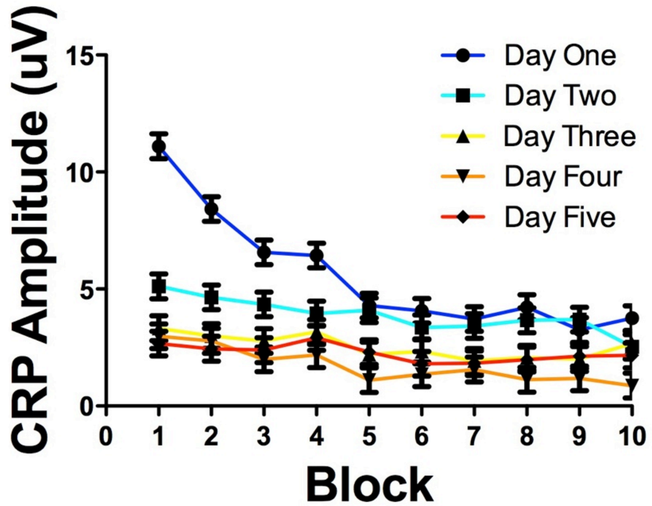
Results

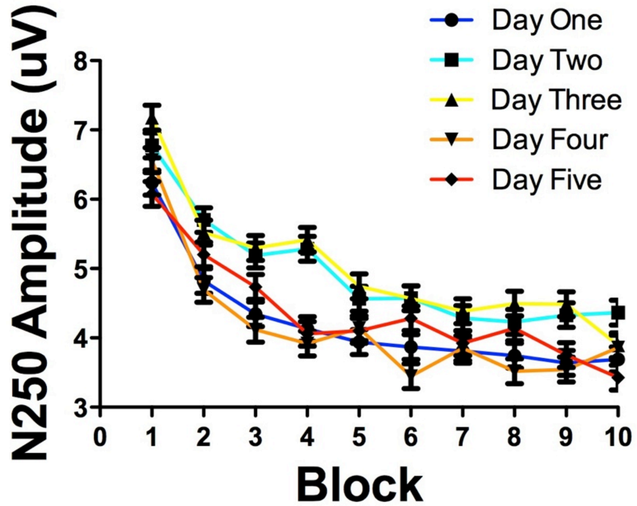












Conclusions

Our results were somewhat expected, and somewhat unexpected. As predicted, our behavioral data exhibited reliable and robust learning effects – accuracy increased and response times decreased with learning. Our analysis of the feedback error-related negativity (fERN) revealed that one was elicited when we contrasted correct and incorrect feedback within the first experimental block of the first day of training. Further, an analysis of the CRP – the positive going aspect of the fERN – revealed a pattern of results completely in line with the predictions of reinforcement learning theory. However, our analysis of the N250 ERP component – a component typically associated with object recognition and/or subordinate level object classification - revealed a pattern of results that was somewhat unexpected. Our results for the first day of training mirrored our previous work – the N250 "grew" and became more negative in amplitude with training. However, somewhat interestingly and in contrast to several other studies we found that the amplitude of the N250 "reset" each day of training – suggesting to us at least that this component may be more related to the processing of relative stimulus frequency than object classification.

Contact

Olav E. Krigolson, PhD
The Neuroeconomics Laboratory
Department of Psychology and Neuroscience
Dalhousie University
Halifax, Nova Scotia, Canada
Email: krigolson@dal.ca
Web: www.neuroeconlab.com