Error processing in medial frontal cortex during learning of visuomotor associations *Mars RB**/**, Grol M*/***, Holroyd CB****, Nieuwenhuis S*****, Hulstijn W**, Coles MGH*, Toni I* *FC Donders Centre for Cognitive Neuroimaging, Nijmegen, **Nijmegen Institute for Cognition and Information, Nijmegen, ***Helmholtz Institute, Utrecht, ****Department of Psychology, Princeton University, Princeton, NJ, USA, *****Department of Cognitive Psychology, Vrije Universiteit, Amsterdam

Adaptive behavior involves the ability of the brain to use error-related information to improve performance. Critically, the timing of error-related brain activity should change during learning. During initial learning, error detection cannot take place before feedback presentation, while during learned performance, error detection can emerge earlier at the time of response execution.

We investigated learning-related changes in error processing using functional MRI. Participants learned, by trial and error, arbitrary associations between visual stimuli and finger movements, receiving performance feedback after each trial. Trials from two conditions, one enabling learning during the scanning session, and one not enabling learning, were presented randomly intermixed during the course of the scanning session. The use of a stringent reaction time deadline ensured the presence of a substantial number of errors even after learning. Preliminary analysis of the imaging data indicated time-related changes in error processing in pre-SMA, anterior cingulate cortex, and caudate nucleus. Over the course of learning a visuomotor association, error-related activity in these regions shifted in time from feedback presentation (initial learning) to response execution (learned performance) highlighting the dynamic nature of error processing in the human frontal cortex.

Rogier B. Mars, F.C. Donders Centre for Cognitive Neuroimaging, Adelbertusplein 1, 6500 HB Nijmegen, t 024 3610980, e-mail rogier.mars@fcdonders.kun.nl

Speaker in session nr: 40