LECTURER
dr. David M. Alexander
(Brain and Cognition Research Unit, University of Leuven, Belgium)

TITLE
"Donders is dead: cortical traveling waves and the limits of mental chronometry in cognitive neuroscience"

DATE & TIME
Tuesday, 27 June 2017, 12.00 – 13.00 hrs

LOCATION
Room 0074, Munting building, Grote Kruisstraat 2/1, Groningen

ABSTRACT
An assumption nearly all researchers in cognitive neuroscience tacitly adhere to is that of space-time separability. Historically, it forms the basis of Donders' difference method. To date, it underwrites all difference imaging and trial-averaging of cortical activity, including the customary techniques for analysing fMRI and EEG/MEG data. I describe the assumption and how it licenses common methods in cognitive neuroscience; in particular the critical role it plays in signal differencing and averaging. I argue that this assumption overemphasizes static activity sources in the cortex. As well as being functionally localized, domains of cortical activity move from moment to moment. I illustrate this claim via recent research on traveling waves of activation in the cortex. Traveling waves have been described at a range of different spatial scales in the cortex; they explain a large proportion of the variance in phase measurements of EEG, MEG and ECoG, and are important for understanding cortical function. Critically, traveling waves are not space-time separable. Their prominence suggests that the correct frame of reference for analyzing cortical activity is the dynamical trajectory of the system, rather than directly in the time and space coordinates of measurements. I illustrate what a lack of space-time separability implies for cortical activity, and what consequences this should have for cognitive neuroscience. I provide a number of examples from Psychology to suggest the same issues apply to the analysis of behaviour in terms of events at times.

For more information you may contact
dr. E.G. Akyurek (e.g.akyurek@rug.nl)