EVENT ABSTRACT

New approaches for studying amplitude correlations and directionality with MEG

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The human brain is a complex system highly optimized for goal-oriented processing of sensory information. This efficient processing relies on the highly coordinated (in space and time) interplay of neural populations. It has been hypothesized that the temporally precise interaction of neural oscillations is a likely mechanism for neural communication. Recent years have seen rapid methodological developments for the analysis of these interactions. Two analysis approaches will be presented that tap into different aspects of neural interactions: 1) The study of task-related power modulations and amplitude correlations at the source level based on a general linear model. The analysis was performed on MEG data from a continuous visuomotor tracking task and allowed identification of frequency-specific networks related to visual stimulation, motor planning and execution and tracking performance. 2) Frequency-specific analysis of Granger causality is an interesting tool to detect directed information transfer between distant brain areas. Still, the of relevant regions of interest for analysis is difficult. Estimation of autoregressive models on sensor data followed by projections of model coefficients into source space leads to a computationally efficient approach that can be used for exhaustive mapping of directionality in the brain. Implications for data analysis and ideas for further developments will be discussed.

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