CoBeN

Novel Network-Based Approaches for Studying Cognitive Dysfunction in Behavioural Neurology

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D4.1 Pilot fMRI Protocols

Work Package:	WP4
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1   D4.1 Pilot fMRI protocols

The aim of this package (WP4) till the end of 2017 was to "design and test two fMRI protocols (event-related fMRI task-induced activation designs) to test attentional modulation of working memory using a visual task. Pilot fMRI study will be performed in healthy controls and we will test and analyse fMRI data from 10 young healthy subjects for each of the fMRI task."

As a first, we adjusted and harmonized both protocols across all participating organisations. fMRI acquisition protocol was established concerning stimulation software (for visual stimulus delivery and motor feedback recordings), scanning sequence and behavioural testing of task performance which is done after each scanning session.

First fMRI task was based on Zanto's paradigm (Zanto et al., 2010). This paradigm allows a comparison between automatic/bottom-up vs. strategic/top-down processing of visual information using the same sensory input but varying the task demands. Specifically, after an attention cue (motion or color) four images balanced for category (two dot kinetograms and two dot patterns with color) are presented sequentially for 800ms. After a retention period a probe is presented. Subjects are instructed to attend to the task-relevant stimulus category (as indicated by the cue at the beginning of the trial) and ignore the task-irrelevant distractor category (e.g., remember motion direction/ignore color vs. remember color/ignore motion direction). These task conditions can be compared to passive viewing of colors and motions that serves as the perceptual baseline. Top-down regulation (enhancement and suppression) will be investigated by comparing the remember/ignore conditions to the passive viewing condition.

The second task was based on Gazzaley's paradigm (Gazzaley et al., 2005). This paradigm allows a comparison between automatic/bottom-up vs. strategic/top-down processing of visual information using the same sensory input but varying the task demands. Specifically, after an attention cue (face or scene) four images balanced for category (two faces and two scenes) are presented sequentially for 800msec. After a retention period a probe is presented. Subjects are instructed to attend to the task-relevant stimulus category (as indicated by the cue at the beginning of the trial) and ignore the task-irrelevant distractor category (e.g., remember faces/ignore scenes vs. remember scenes/ignore faces). These task conditions can be compared to passive viewing of faces and scenes that serves as the perceptual baseline. Top-down regulation (enhancement and suppression) will be investigated by comparing the remember/ignore conditions to the passive viewing condition.

Young healthy volunteers were scanned to tune, test and finalize fMRI protocol both in USZ and in MU. Both were tested. Resulting pilot data were processed and analysed for possible modification concerning stimulation protocol. Now we are recruiting elderly subjects and collecting the data for further analysis using both fMRI tasks.