NAVIGATING THROUGH EMOTION-COGNITION INTERACTIONS: BRAIN OSCILLATIONS OF VISUO-SPATIAL ATTENTION AND AUDITORY EMOTIONAL PROCESSING DURING SIMULATED DRIVING

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During driving, several cognitive processes are required, including visuospatial attention and working memory. In addition, some cognitive resources are also allocated to environmental stimuli, such as conversations. However, research on interacting emotional and cognitive processes and their underlying neurophysiological signatures remains scarce. We investigated interactions of emotional speech and task load during simulated driving in a magnetoencephalography study. We hypothesised that for low load (LW) drives with sufficient cognitive resources, low (LV) and high (HV) valence but not neutral (NV) speech captures attention, but without major interference. During high load (HW), only HV and NV but not LV speech effects can be downregulated by executive control. Spatial permutation-based clustering of MEG sensor data revealed emotion and workload effects in the theta, alpha, and beta bands. We observed increased fronto-temporal theta as well as parieto-temporal alpha and beta during LV and HV compared to NV, suggesting the recruitment of frontal executive functions and re-orientation either towards the road or the emotional speech processing and appraisal. Increases in alpha and beta power during emotional speech likely reflect functional suppression of (right) parieto-temporal emotion-based processes. Decreased beta oscillations during high workload drives imply increased visual processing. In conclusion, findings indicate that emotional but not neutral speech independent of the current cognitive load recruits specific cognitive control mechanisms and processing modes.

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