E I N L A D U N G

zum Vortrag im Rahmen des Seminars des SFB/TRR 31

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und

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BEHAVIORAL RELEVANCE OF STIMULUS-SPECIFIC GAMMA-BAND COMPONENTS DURING AUDITORY SHORT-TERM MEMORY

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Oscillatory activity in the gamma range (>30 Hz) in human electro- or magnetoencephalogram has been related to cortical stimulus representations and their modulation by cognitive processes. Only few studies, however, have provided evidence for an association between gamma-band activity (GBA) and measures of behavioral performance. In this talk I will give some examples for correlations between GBA and task performance from studies on auditory short-term memory. In previous investigations, we found GBA amplitude to be related both to decisions on acoustic what/where change decisions and to the perception of audiovisual syllables. More recently, we have identified stimulus-specific GBA (ssGBA) components with distinct spectral and topographical properties by contrasting oscillatory responses between sample stimuli S1 in auditory delayed match-to-sample tasks. These components seem to represent representations of S1 that are activated in anticipation of the required comparison with the test stimuli S2. We found positive correlations between task performance and the magnitude of ssGBA differentiation between the preferred versus nonpreferred stimuli for each component. These correlations were limited to time intervals at the end of the delay phase. An exploration of ssGBA differentiation revealed that good and poor performers did not differ in absolute spectral amplitudes but rather in the timing of ssGBA: good performers maintained their differentiation until the presentation of S2 whereas poor performers showed faster decreases or even reversals in differentiation preceding S2. In summary these findings support the notion that oscillatory activity recorded noninvasively in humans may provide unique insights into the temporal dynamics of task- and stimulus-related cortical object representations. These activities show close correlations with performance, suggesting that they reflect behaviorally relevant processes.