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INDEPENDENT COMPONENT ANALYSIS (ICA) OF EVENT-RELATED POTENTIALS DURING SELECTIVE ATTENTION.

S. Makeig*†§, L. Anllo-Vento§, T-P. Jung†‡, A.J Bell‡, T. J. Sejnowski‡§, and S. A. Hillyard§. †Naval Health Research Center; §Dept. Neurosciences, University of California San Diego; ‡Salk Institute for Biological Studies, La Jolla, and Howard Hughes Medical Institute.

Recordings of event-related potentials (ERPs) can reveal the time course of brain events associated with visual perception and selective attention. ERP studies of visual-spatial attention indicate that cortical processing of stimuli appearing in the attended location is augmented as early as 80 ms after stimulus onset. However, separation of the multiple brain processes contributing to the surface-recorded components of ERP waveforms has proven difficult. Recently, an 'infomax' algorithm for the blind separation of linearly mixed inputs has been devised (Bell and Sejnowski, 1995) and applied to EEG and ERP analysis (Makeig et al., 1996). The neural generators of ICA sources are not specified by the algorithm and may be either physically compact or distributed.

Results of applying this Independent Component Analysis (ICA) algorithm to single-subject and group-mean ERPs recorded during a visual selective attention experiment (Anllo-Vento and Hillyard, 1996) suggest that ERP waveforms represent a sum of overlapping, discrete and time-limited brain processing events whose amplitudes are modulated by selective attention without affecting their time course. These source components identified by ICA appear to index independent stages of visual information processing. Spatial attention operates on early source components in a manner similar to a sensory gain-control mechanism, while later components appear to reflect further processing of stimulus features and feature conjunctions.