

Electrophysiological correlates of auditory and visual attentional cueing in fine-grained auditory spatial discrimination task

Norbert Kopco^a, Rene Sebens^b, Jyrki Ahveninen^c, Virginia Best^d, Barbara Shinn-Cunningham^e

^a Institute of Computer Science, P. J. Safarik University, Kosice, 04001, Slovakia

^b Department of Psychology, P. J. Safarik University, Kosice, 04001, Slovakia

^c Athinoula A. Martinos Center for Biomedical Imaging, Department of Radiology, Harvard Medical School/Massachusetts General Hospital, Charlestown, MA, 02129, USA

^d Hearing Research Center, Boston University, Boston, MA, 02215, USA

^e Center for the Neural Basis of Cognition, Carnegie Mellon University, Pittsburgh, PA 15213

Abstract:

A behavioral experiment was combined with EEG recordings to examine how directing automatic auditory spatial attention affects listeners' location discrimination performance while the eyes fixate a neutral location, and whether the effect is cue modality-dependent. The behavioral experiment found 1) better performance with auditory valid vs. invalid cues, 2) no difference in performance with visual valid vs. invalid cues; and 3) bias toward perceiving the sounds as moving away from the fixation direction, the strength of which depended on cue modality and validity. The EEG responses to the targets and cues were analyzed separately. The late components of the target-elicited ERPs covaried with the behavioral performance. The analysis of cue-elicited ERPs examined the auditory-evoked occipital response contralateral to an auditory cue (ACOP), previously reported as correlate of attentional processing. While analysis of the interval 100-400 ms after the auditory cue did not find a clear evidence of ACOP, later components (400-700 ms) varied for different combinations of hemispheric laterality, cue validity, and cue position, suggesting that the auditory cue causes attentional modulation in the posterior areas. These results illustrate complex audiovisual interactions between the two modalities in fine-grained spatial attention, independent of eye position or eye movement.

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