

Visual vs. auditory attentional cueing and auditory spatial discrimination

Norbert Kopco^{1,2,3}, Rene Sebens¹, Bernadeta Hrebenarova¹, Jyrki Ahveninen², Virginia Best³, Barbara Shinn-Cunningham^{3,1}; ¹Institute of Computer Science, P. J. Safarik University, Kosice, Slovakia, ²Martinos Center for Biomedical Imaging, Mass Gen Hospital/Harvard Medical School, Boston, MA, USA, ³Hearing Research Center, Boston University, Boston, MA, USA

Auditory spatial discrimination can be influenced by the direction of listener's gaze. Here, we performed behavioral and EEG experiments to examine 1) whether directing automatic auditory spatial attention affects listeners' performance in a task when the gaze direction is fixed, 2) whether the effect depends on the modality of the attentional cue (auditory vs. visual), and 3) how neuronal activity, measured by EEG, changes during task performance. While fixating on a neutral location, listeners made a judgment about the relative position of two click trains, which followed either a visual or an auditory cue. Behavioral results show that 1) subjects performed better overall following the visual cue, 2) an auditory cue presented from an incongruent location had a detrimental effect on performance, and 3) these effects were dependent on whether the direction of auditory position change was towards or away from the gaze fixation point. Analysis of ERPs showed that amplitudes of the auditory N1, P2, N2 and P3 components varied for different combinations of the cue modality, cue validity, and the direction of shift re. gaze fixation. Behavioral performance and auditory ERP components were also modulated by whether the targets were presented in the center or at peripheral locations. These results suggest a complex interaction between attentional and eye-gaze control mechanisms in auditory spatial processing. [Work supported by EU H2020-MSCA-RISE-2015 grant 691229, VEGA 1/1011/16, APVV-0452-12]