

A gaze-based attention model for the space-aware hearing aid.

Giso Grimm¹, Maartje Hendrikse¹, Volker Hohmann¹

¹Carl-von-Ossietzky Universität, Medizinische Physik and Cluster of Excellence Hearing4all, Oldenburg

Spatial filtering and decomposition of sounds into acoustic source objects is increasingly investigated for speech enhancement in hearing aids. However, with increasing performance and availability of these "space aware" hearing aid algorithms, knowledge of the user's personal listening preferences and knowledge of the attended source becomes crucial. Here we present an algorithm which combines gaze information with a spatio-temporal distribution of estimated sound source positions. Gaze direction is recorded by electrooculography (EOG) combined with a head tracking system, which would be feasible also in hearing aids. The spatial distribution is estimated in the ambisonic domain, using a virtual first-order Ambisonics microphone at the position of the listener. This distribution is compared to "oracle" knowledge of the positions.

The attention of 14 young normal-hearing listeners is estimated in a German version of the coordinate-response-measure (CRM) task, in which four simultaneous speakers uttered a sentence containing a keyword, a colour and a number. The subjects had to report the location, colour and number of the speaker who said a given keyword. The estimated attention is compared with the subject performance in this task, in several conditions with different visual cues (e.g., audio only, head animation to guide the attention to the target, head animation to distract the attention). Results show that gaze, and therefore the estimated gaze-based attention, is related to the performance in this task.