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Reweighting of Binaural Localization Cues Induced by Discrimination Training

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Normal-hearing listeners weight binaural localization cues depending on the frequency content of the sound. Interaural time differences (ITDs) dominate at low frequencies and interaural level difference (ILDs) dominate at high frequencies. Furthermore, the contribution of each cue to an azimuthal localization percept depends on environmental factors such as room acoustics. A recent study showed that the ITD/ILD weighting can also be changed for stable sound conditions through a localization training in virtual reality (VR) using visual feedback. This study aims to induce a similar reweighting using a simpler task, a left/right discrimination task without VR.
Participants were assigned to two groups: A group trained to increase their ILD weighting and a no-training control group. Both groups completed an identical, constant stimuli pre and post assessment involving a relative discrimination task without feedback, using various combinations of spatially inconsistent ITD and ILD. Stimuli were 500-ms narrowband white noise bursts (one octave bandwidth, geometrically centered at 2.8 kHz). The training group additionally completed three sessions of a relative discrimination training. The training, using a two-alternative forced-choice, 2-down-1-up adaptive procedure, included feedback (correct/incorrect) that always followed the ILD location. After each incorrect response, the auditory stimulus was repeated with the correct response shown on screen.
Pretest results showed that the initial ITD/ILD weighting varied considerably across listeners. While there was no significant difference between the assessments for the no-training control group, responses followed the ILD location significantly more often in the post- than in the pretest for the training group.
These results suggest that binaural cue reweighting can be achieved by using a simple discrimination task. This could make such a training more accessible for a wide range of listeners, e.g., after introducing a previously impeded cue to hearing devices such as cochlear implants.
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