Technical evaluation of hearing-aid fitting parameters for different auditory profiles

Hearing-aid users have reported an increased satisfaction since digital technology and advanced signal processing became available in hearing aids. However, many users still experience difficulties in noisy environments and in complex listening scenarios. Although numerous parameters can be adjusted to provide an individualized hearing solution, hearing-aid fitting currently consists of: 1) the gain prescription and adjustment based on the pure-tone audiogram, 2) the activation of advanced features on-demand, such as beamforming and noise reduction. In a previous study [1], a novel approach for auditory profiling was suggested, where the hearing deficits were characterized according to two types of distortion. This allowed the classification of listeners into four auditory profiles according to a high/low degree of hearing distortions along the two dimensions. The aim of the present study was to evaluate different hearing-aid compensation strategies that may fit the needs of different auditory profiles via technical measures. A hearing-aid simulator, consisting of beamforming, noise reduction, and dynamic range compression, was used to test which parameter spaces and outcome measures may be of interest for a “profile-based hearing-aid fitting”. The simulator consists of two dummy behind-the-ear hearing aids and off-line sound processing performed on a personal computer. Technical measures, such as signal-to-noise ratio (SNR) improvement, envelope degradation, and a metric of spectral distortions, were used to evaluate the effects of different signal processing strategies on the signal at the output of the simulator. Several parameter settings were evaluated using speech in the presence of various interferers at different SNRs. Here, the results of this technical evaluation are presented and discussed, with a view towards identifying the effective compensation strategies for different auditory profiles.