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Assessment of information retention after first hearing aid fitting appointment: A free-recall questionnaire

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360,000000 people have disabling hearing loss (HL) (WHO, 2015) and hearing aids (HAs) are the tools for aural rehabilitation (AR). In the UK, approximately 2 million people wears HAs however only 1.4 million uses them regularly. Non-use of HAs remains high (15-20%) despite the introduction of digital HAs and advanced technology. There are many suggested reasons for this issue. One is information retention. The study was designed to assess what patient's remember from their first-time HAs fitting and investigate whether information retention is associated with HAs use, benefit and satisfaction employing GHABP Q2&4 to evaluate AR. A controlled clinical trial of an opportunistic sample of first-time HAs fitting patients (n=40) recruited from Nottingham Audiology Services. Participants (n=18 males, n=22 females) with mild-to-moderate HL, who were native English speakers with good cognitive and psychological health, good dexterity and vision. A questionnaire was developed. Retention questions mirrored fitting appointment. A total of 20 questions covered 2 broad categories: Information about practical issues (n=12) and about psychosocial issues (n=8). A standard fitting appointment was adopted with administration of (GHABP) part 1 questions 2 & 4; a telephone follow-up was administered 4-6 weeks post-fitting where part 2 of GHABP questions 2&4 was completed. Overall recall was 49.6%; psychosocial information was less retained 36% and practical better remembered with 63.5% rate. Retention of HA orientation information is important for AR outcomes as it correlated with HA benefit ($r=0.482$, $p<0.05$). AR outcome is a multifactorial construct. Results suggested that HAs intervention alleviated participants listening difficulties and improved their quality of life.

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Probabilistic time-frequency masking for convolutive speech source separation

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Blind source separation (BSS) has received extensive attention over the past two decades; thanks to its wide applicability in a number of areas such as biomedical engineering, audio signal processing, and telecommunications. The aim of BSS is to infer/estimate the most probable but unknown sources, given the available observations (acquired by sensors or sensor arrays) with very limited information about the characteristics of the transmission channels through which the sources propagate to the sensors. In many practical applications, such as in an acoustic room environment, the sensors (i.e. microphones) pick up not only the direct sound from the sources, but also the multipath components due to the sound reflections from the room surfaces. The microphone signals are therefore convolutive mixtures of original unknown sources. Estimating sources from convolutive mixtures leads to the so-called convolutive BSS problem. In this talk, following a brief overview of the methods in the literature, we will focus on stereo source separation based on probabilistic time-frequency masking. In particular, we show that the mixing vector (MV) cue used in the statistical mixing model is complementary to the binaural cues represented by interaural level and phase differences (ILD and IPD). The MV distributions are quite distinct while binaural models overlap when the sources are close to each other; however, the binaural cues are more robust to high reverberation than the MV models. To exploit such complementarity, a new robust algorithm has been developed to model the MV and binaural cues in parallel. The contribution of each cue to the final decision is also adjusted by weighting the log-likelihoods of the cues empirically. The model parameters are updated iteratively with an expectation maximization algorithm, leading to probabilistic time-frequency masks, which are then used to separate the sources in the time-frequency domain. Experiments are performed systematically on determined and underdetermined speech mixtures in five rooms with various acoustic properties including anechoic, highly reverberant, and spatially-diffuse noise conditions. The results in terms of signal-to-distortion-ratio (SDR) confirm the benefits of integrating the MV and binaural cues, as compared with two state-of-the-art baseline algorithms.

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