

Individual hearing profiles and computer models of hearing-impaired listeners

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Efficient measurement techniques are required in everyday clinical practice to facilitate the diagnosis of sensorineural hearing impairment. At the University of Essex, a detailed hearing profile was developed that in addition to measuring absolute thresholds, includes supra-threshold measures of frequency selectivity and compression. This hearing profile can usually be completed within about two hours. To date, profiles have been measured from more than 60 hearing-impaired listeners. The measurement results show a large variety of different hearing profiles across listeners. Particularly, two listeners with similar thresholds can have very different amounts of frequency selectivity and compression, i.e. different hearing profiles. By carefully interpreting these profiles, hypotheses can be drawn about the physiological "factors" that may have caused the emergence of such a profile. Three main factors are considered: outer hair cell dysfunction, stria presbycusis, and dead (=nonresponsive) regions. Using individualized computer models, it can be tested whether or not these hypotheses result in a profile similar to the profile of the human listener. All listeners were modelled for whom complete data of at least one ear was available. The model results show that the shape of about 80% of the collected profiles can be predicted well using these three factors. [This work is supported by DFG Ju 2858/1-1, EPSRC, Action on Hearing Loss and ORSAS].

