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Poster

Modelling a damaged cochlea: beyond non-speech psychophysics

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It has long been recognized that audiograms provide only a limited view of hearing impairment; exploiting "beyond audiogram" psychophysics was only recently reported. Here, we explore a method in which speech test stimuli are used as integral part of the modeling process of damaged cochleae. In a preliminary phase, non-speech psychophysical data were collected in individual hearing-impaired listeners. Following a procedure described previously, these data were used to adjust parameters of a peripheral auditory model, aiming at simulating the individual listeners' hearing impairment. In the second phase, the same individuals were tested in a speech task – a Diagnostic Rhyme Test (DRT). Monosyllabic words, organized as minimal pairs, were synthesized such that their acoustic waveforms only differed in the initial diphone's segments. These stimuli were processed by the model obtained in the preliminary phase; the resulting representation was analyzed by a machine mimicking the DRT paradigm, generating acoustic-phonetic error patterns. An important feature of the DRT framework is the separation of errors originated by the front-end from those originated by the back-end. In comparing machine to human, some error patterns were accounted for by the model, indicating that there is a relation between speech and non-speech psychophysics.