Predicting Speech Intelligibility Based on Across-Frequency Contrast in Simulated Auditory-Nerve Fluctuations

The present study proposes a modeling approach for predicting speech intelligibility for normal-hearing (NH) and hearing-impaired (HI) listeners in conditions of stationary and fluctuating interferers. The model combines a non-linear model of the auditory periphery with a decision process that is based on the contrast across characteristic frequency (CF) after modulation analysis in the range of the fundamental frequency of speech. Specifically, the short-term across-CF correlation between noisy speech and noise alone is assumed to be inversely related to speech intelligibility. The model provided highly accurate predictions for NH listeners as well as largely plausible effects in response to changes in presentation level. Furthermore, the model could account for some of the main features in the HI data solely by adapting the peripheral model using a simplistic interpretation of the listeners' hearing thresholds. The model's predictive power may be substantially improved by refining the interpretation of the HI listeners' profiles and the model may thus provide a valuable basis for quantitatively modeling effects of outer hair-cell and inner hair-cell loss on speech intelligibility. (C) 2018 The Author(s). Published by S. Hirzel Verlag, EAA. This is an open access article under the terms of the Creative Commons Attribution (CC BY 4.0) license.