Predicting speech intelligibility based on a correlation metric in the envelope power spectrum domain

A speech intelligibility prediction model is proposed that combines the auditory processing front end of the multi-resolution speech-based envelope power spectrum model [mr-sEPSM; Jørgensen, Ewert, and Dau (2013). J. Acoust. Soc. Am. 134(1), 436–446] with a correlation back end inspired by the short-time objective intelligibility measure [STOI; Taal, Hendriks, Heusdens, and Jensen (2011). IEEE Trans. Audio Speech Lang. Process. 19(7), 2125–2136]. This "hybrid" model, named sEPSMcorr, is shown to account for the effects of stationary and fluctuating interferers as well as for the effects of non-linear distortions, such as spectral subtraction, phase jitter, and ideal time frequency segregation (ITFS). The model shows a broader predictive range than both the original mr-sEPSM (which fails in the phase-jitter and ITFS conditions) and STOI (which fails to predict the influence of fluctuating interferers), albeit with lower accuracy than the source models in some individual conditions. Similar to other models that employ a short-term correlation-based back end, including STOI, the proposed model fails to account for the effects of room reverberation on speech intelligibility. Overall, the model might be valuable for evaluating the effects of a large range of interferers and distortions on speech intelligibility, including consequences of hearing impairment and hearing-instrument signal processing.

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