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Title: Effects of noise type on speech quality ratings in older adults with hearing loss

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In previous work, we have quantified the cumulative effects of hearing aid signal processing and background noise level on listener ratings of speech quality. We have shown that listener ratings of speech quality are closely related to changes in the envelope modulation of the speech signal caused by the cumulative effects of hearing aid signal processing and the signal-to-noise ratio (SNR). These changes to the envelope modulation have been quantified using the cepstral correlation metric, on a scale of 0 to 1. In this metric, a 0 indicates no match between a reference signal and the processed signal and 1 indicates a perfect match between the reference and the processed signal. In these previous studies, sentences were the target signal, six-talker babble was the interference, and the cepstral correlation was used as the index of envelope modulation fidelity. In the present study, we consider whether older listeners rate speech quality differently when different types of noise are presented at the same SNR. Our working hypothesis is that the type of noise will matter due to differences in the temporal and spectral characteristics of specific types of noise.

Ratings for overall sound quality were collected for 11 older listeners with mild to moderately-severe hearing loss for five noise types (six-talker babble; competing 3-person conversation; traffic noise; fast-food restaurant noise; kitchen noise) at four SNRs: 3, 8, 12 and 20 dBA. Results show that for all noise types, overall quality ratings increase as both SNR increases and as the cepstral correlation increases. At the same SNR, average ratings for kitchen noise were highest, and average ratings for six-talker babble were lowest. The results support the use of six-talker babble as a lower-bound for sound quality ratings in clinical environments. Our analysis will include psychometric functions relating quality ratings to the cepstral correlation for each noise type.

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