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Effect of test realism on speech-in-noise outcomes with bilateral cochlear implant users

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ABSTRACT

Current speech intelligibility tests conducted in the laboratory employ target speech and interfering noise signals that do not resemble what a person encounters in their daily lives. This study explores the effect of the realism of the target speech and noise signals on word recall performance of bilateral cochlear implant users. Speech intelligibility scores of 15 bilateral cochlear implantees under three different test realism levels were compared at two different SNRs (i.e., at 1.4 dB and -2.2 dB). The levels included (1) standard BKB-like sentences with standard babble noise, (2) standard BKB-like sentences with three-dimensional recordings of actual situations and (3) a variation of the second realism level where the sentences were obtained from natural effortful conversations. Speech intelligibility was consistently easiest in the most artificial test and hardest in the most realistic test. These results indicate that participants could more easily deal with babble noise than with more realistic noisy situations, and that they could understand more easily BKB-like sentences than more realistic speech. The effect of the more realistic noise on SI was fully explained by the U50 of the acoustic signals that arrived at the directional input of the speech processor. However, the U50 was not able to explain the effect of the more realistic speech material. A correlation analysis between the different test conditions revealed a particularly low correlation between the most realistic and the least realistic (or standard) test condition for the low SNR of -2.2 dB, indicating a low consistency of subjects' performance attained between them. This low consistency may suggest that the more realistic test assesses other auditory processes than the standard test, but further studies with more subjects are required to substantiate this hypothesis. The findings are discussed alongside potential implications and limitations.

Keywords: Speech intelligibility, cochlear implants, realistic acoustic environments