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Development of a Quick Speech-In-Noise Test for Measuring Signal-To-Noise Ratio Loss In Normal-Hearing and Hearing-Impaired Listeners

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SOMETHING ABOUT MEAD

One of Mead's long-term visions for audiological practice has been to elevate the testing of a person's ability to hear in noise as a highly important component in the process of selecting and fitting hearing aids. (See "Hearing Aids - Past, Present and Future: SNR Loss Comes of Age" in this issue.) This article describes the development and testing of the Quick Speech in Noise (QuickSIN) test, a time-efficient means of achieving that goal. The test takes only about one minute to administer, but the path to arriving at 15 equivalent lists of sentences was an arduous one, involving many iterations of arranging (re-recording) sentences and noise (four-talker babble) in various configurations. Mead demanded the highest possible accuracy in the re-recording process. At the time, Digital Audio Workstation software on computers had not yet come of age, so all the recording work had to be done manually, using mixing boards, sliding faders, and VU meters (performed by Larry Revitt). An interesting anecdote: An early, subjective part of the process involved disqualifying sentences that used dated or inappropriate (even misogynist) language, as the sentences had been compiled in the 1940s and 1950s. One memorable disqualified example: "Her purse was filled with useless trash."

SUMMARY (Transcribed Abstract)

Hearing aid wearers report that their biggest problem with their hearing aids is understanding speech in background noise, and consumer surveys polling approximately 80,000 households have consistently revealed dissatisfaction with hearing aids in noisy environments. …Kochkin (2002) reported that only 30% of hearing aid wearers were satisfied with their hearing aids in noisy situations. This paper describes a shortened and improved version of the Speech in Noise (SIN™) Test (Etymotic Research, 1993). In the first two of four experiments, the level of a female talker relative to that of four-talker babble was adjusted sentence by sentence to produce 50% correct

scores for normal-hearing subjects. In the second two experiments, those sentences-in-babble that produced either lack of equivalence or high across-subject variability in scores were discarded. These experiments produced 12 equivalent lists, each containing six sentences, with one sentence at each of the adjusted signal-to-noise ratios 25, 20, 15, 10, 5, and 0 dB. Six additional lists were also made equivalent when the scores of particular pairs were averaged. The final lists comprise the “QuickSIN” test that measures the SNRs a listener requires to understand 50% of key words in sentences in a background of babble. The standard deviation of single-list scores is 1.4 dB SNR for hearing-impaired subjects, based on test-retest data. A single QuickSIN lists takes approximately one minute to administer and provides an estimate of SNR loss accurate to +/-2.7 dB at the 95% confidence level.

> Annotated by: Larry Revit