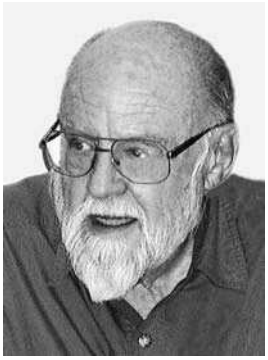
Editorial



Factors Affecting Word Recognition

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What is the best way to assess the adequacy of a hearing aid fitting? This question has permeated the thinking of audiologists, and the audiological literature, for more than half a century. Cordia C. Bunch, the first genuine clinical audiologist, made an early suggestion that speech audiometry should play a key role. In his now classic book, *Clinical Audiometry*, published in 1943 by the C.V. Mosby company, Bunch lamented the fact that there were, at that time, no standardized audiometric tests of speech recognition: he felt that such tests might have helped him to understand why some persons did not perform as well with hearing aids as others with the same degree of audiometric loss.

Word recognition tests were pioneered by Raymond Carhart toward the close of World War II. Drawing on word lists assembled at the Harvard Psychoacoustic Laboratory for the evaluation of radio communication systems, especially between ground controllers and flying aircraft, Carhart devised two now familiar measures: (1) the threshold for spondee words, often called the *speech reception threshold* or *SRT*; and (2) the maximum score for phonemically balanced (PB) words, often called the *speech discrimination score*. It is certainly the case that research over the intervening years has amassed a good deal of information about factors affecting word recognition, information not available to Carhart when he was directed to devise a rational method for dispensing hearing aids to servicemen and -women who had sustained hearing loss as a result of their wartime service.

We now know that word recognition may be influenced both by "bottom-up" processing of acoustic variables (rms power and duration) and phonetic variables (place, voicing, manner) and by a number of "top-down" lexical variables (word familiarity, word frequency, neighborhood frequency, and neighborhood density). In back-to-back articles in this issue of *JAAA*, investigators Rachel McArdle of the VA Healthcare System, Bay Pines, Florida; and Richard Wilson of the VA Medical Center, Mountain Home, Tennessee, ask how well each of these factors actually predicts word recognition in the presence of speech spectrum noise. In the first article, "A Comparison of Recognition Performances in Speech-Spectrum Noise by Listeners with Normal Hearing on PB-50, CID W-22, NU–6, W-1 Spondaic Words, and Monosyllabic Digits Spoken by the Same Speaker," to which Heidi Roberts, of the University of South Florida, Tampa, Florida, also contributes, the authors painstakingly catalogue the psychometric characteristics of these commonly employed word lists. In the second article, "Predicting Word-Recognition Performance in Noise by Young Listeners with Normal Hearing Using Acoustic, Phonetic, and Lexical Variables," the authors subject the data from the first article to regression analysis in order to determine how much of the total variance is explained by acoustic, phonetic, and lexical variables.

The most interesting findings, summarized in table 4 of the second paper, were that, of the total variance extracted, acoustic variables accounted for only 5% and lexical variables accounted for only 3%. Phonetic variables were by far the more important predictors, accounting for 40% of the total variance. Interestingly, of the latter variables, place of articulation contributed only 9% (initial phoneme 5%, final phoneme 4%) and voicing only 7%. Manner of articulation (affricate or stop), on the other hand, contributed 24%. Even more interesting was the fact that manner of articulation of the final phoneme contributed 14% while manner of the initial phoneme contributed only 10%. *To reiterate, place of articulation of the initial phoneme of the word contributed 5% to the total variance while manner of articulation of the final phoneme contributed 14%*. This is exceedingly interesting in view of the forest of trees sacrificed to publish research on "pa," "ta," and "ka" (not to mention "da").

The authors interpret their results in support of the idea, first suggested by Carhart so many years ago, that "when speech-in-noise testing is used in a pre- and post-hearing-aid-fitting format, the use of monosyllabic words may be sensitive to changes in audibility resulting from amplification."

In my view these two articles are landmark contributions to our understanding of the factors underlying word recognition in a noisy background: they warrant careful study.

James Jerger
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