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New Thinking on Hearing in Noise: A Generalized Articulation Index

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Mead Killon, PhD

> Killion, MC
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SOMETHING ABOUT MEAD

Mead was always forward-thinking, but in this paper on “Generalized AI,” he looked back to one of our oldest tools for predicting speech intelligibility: the Articulation Index (intentionally avoiding its updated name, the Speech Intelligibility Index). The article focused on a proposal to create a new version of the Articulation Index, applicable to individuals with SNR loss, called Perceptive AI. The crux of the idea is simple: the AI (a measure of speech audibility) can be multiplied by a clarity-related factor called 'channel capacity' that can be easily estimated using a speech-in-noise measure (e.g., the QuickSIN test), and this can be used to predict speech perception. In other words, he suggested that we predict speech perception based on speech audibility multiplied by speech clarity. The idea is so simple as to seem obvious (as is often the case with great ideas), and Mead makes it all easy to understand using the helpful count-the-dots audiogram approach he introduced with Gus Mueller in 1990.

SUMMARY (Transcribed)

The articulation index (AI) theory predicts word recognition scores when the number of speech cues is reduced by noise or by a lack of audibility. It fails to predict how poorly some subjects do in noise, even when all speech cues have been made audible with amplification. Such subjects require an unusually high signal-to-noise ratio (SNR) for a given performance level and are said to exhibit a large SNR loss. We have found that the AI can be generalized to predict word recognition scores in the case of missing (speech cue) dots. Some speech cues appear to be lost en route to the brain, even though they were audible. Corliss suggested the term channel capacity to describe this phenomenon, and we adopt that term for our use. In this article, the substantial psychoacoustic and physiological evidence in favour of this generalized AI is described. Perhaps the strongest evidence is (1) the SNR loss of subjects is poorly predicted by the degree of their audiometric loss, and (2) their wideband word recognition performance in noise can be predicted from their channel capacity inferred from filtered speech experiments.

Annotated by: Steve Aiken