Variability in hearing aid outcomes in older adults

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Abstract:

Over the past decade, there has been growing interest in customizing hearing aid signal processing parameters to individual abilities. In particular, working memory capacity has been linked to poorer performance when specific types of signal processing cause greater amounts of signal modification. It has been theorized that individuals with lower working memory capacity have difficulty reconciling a modified acoustic signal with its lexical representation. Previous research using hearing aid simulations has shown that age, degree of hearing loss, and working memory are significant factors in the prediction of listener response to the amount of hearing aid signal processing, including wide-dynamic range compression (WDRC) speed, degree of frequency compression, and strength of digital noise reduction. The study I will be presenting is based on the hypothesis that amount of signal modification caused by signal processing in commercially available hearing aids will relate to listener factors of audiogram, working memory capacity, age, and spectro-temporal processing. Using a double-blind trial design, adults with mild-to-moderate symmetrical sensorineural loss are fit with behind-the-ear hearing aids programmed for high signal modification (fast-acting WDRC plus frequency compression) or low signal modification (slow-acting WDRC with no frequency compression). Each processing condition is worn for an average of 5 weeks, during which adherence data are collected to ensure acclimatization. Each individual completes baseline tests including a full audiometric battery, measures of working memory capacity, and measures of spectro-temporal resolution. Outcome measures completed at the end of each trial include objective and subjective aided intelligibility.
and listening effort measured using a dual-task paradigm. Data collection is ongoing, but the results to date are consistent with laboratory findings, such that individuals with lower working memory capacity perform better (higher intelligibility scores, reduced listening effort) with lesser amounts of signal modification. The data serve as proof-of-concept regarding translation of demonstrated relationships between individual abilities and the choice of amplification signal processing into more realistic hearing aid experiences.