Clinical Applications for Time-Compressed Speech Tests (PI: Marjorie Leek)

**Objectives:** This study extends the findings of previous research on the role of cognitive decline in speech understanding deficits of older listeners, and begins to explore clinical applications for time-compressed speech testing. Age-related changes in central auditory and cognitive processing are not well-addressed by current hearing aids, and are most likely responsible for the widespread dissatisfaction with hearing aids among elderly hearing-impaired people. The objectives of the study are: 1) to validate speech recognition performance with speeded speech as a valid measure of cognitive deficits, and 2) to evaluate hearing aid benefit using speeded speech tests as a sensitive measure of the benefits derived from various signal processing algorithms in hearing aids.

**Plan:** Participants with hearing loss, aged 50 through 75 years old, will be tested over a three-year period with three separate test batteries: time-compressed speech recognition tests, neurocognitive tests, and hearing aid performance tests and questionnaires. After completing the initial battery of tests, participants will be evaluated further under two different signal processing types of hearing aid settings.

**Methods:** The test battery is designed to expand on the previous findings that time-compressed speech test results provide information about cognitive processing that is relevant to age-related speech understanding deficits. Additional cognitive measures such as the classic reading span test of working memory and two subtests of the Wechsler Adult Intelligence Scale-Third Addition; Letter-Number Sequencing and Digit Span, will be included. To determine the participant’s temporal processing ability two auditory processing tasks will be administered, Gaps in Noise and Duration Pattern Test. Hearing aid testing will determine whether the time-compressed speech test can be used to predict individual listeners’ sensitivity to temporal distortions introduced into amplified speech by signal processing algorithms.

**Findings to date:** A total of 62 participants have completed all three visits of experimental testing. Preliminary data suggests that the currently sampled hearing impaired population has more difficulty than normal-hearing listeners on rapid speech processing tasks. As expected, an increasing amount of hearing loss negatively affects the ability to recognize words in sentences at increased rates of speech. Comparisons of the different tasks indicate the ability to recognize rapid speech appears to be unrelated to working memory abilities and weakly correlated to temporal processing skills.

**Clinical Relevance:** Hearing aids are the primary treatment for hearing loss among Veterans. It is critical that the settings programmed into each hearing aid are appropriate for the individual patient. This research is aimed at determining aspects of the appropriate hearing aid fittings for elderly Veteran patients.

**Relevance to VA Mission:** In the Veteran population, hearing loss is the second most prevalent service connected condition. This study will support patient care by providing a test that can assess individual auditory processing abilities and aid clinicians in evaluating hearing aid benefit which will in turn increase customer satisfaction.