Can a Test of Visual Memory Help Predict Success in Post-Lingually Deaf Adults Receiving Cochlear Implants?

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BACKGROUND
WHO USES CIs
People who have moderate-severe to profound sensorineural hearing loss, traditionally bilaterally.

WHAT ARE CURRENT PREDICTORS OF SUCCESS
Demographic/audiometric values (Moberly, Bates, Harris, & Pisoni, 2016)
• Chronological age
• Duration of auditory deprivation
• Severity of hearing loss
Technical factors (Moberly, Bates, Harris, & Pisoni, 2016)
• Depth of electrode insertion
• Insertion into the Scala Tympani
• Wrapping factors

WHY IS THIS A PROBLEM
• These recognized factors are considered to be “proxy variables” for actual causal underlying processes.
• Individuals receiving CI have varied outcomes not predicted by the proxy variables.

HYPOTHESIZED PREDICTORS OF SUCCESS
Working memory (Moberly, Bates, Harris, & Pisoni, 2016; Moberly, Pisoni, & Harris, 2018; Pisoni & Geers, 2000; Pisoni et al., 2018)
• Auditory
• Visual
Linguistic skills (Moberly, Bates, Harris, & Pisoni, 2016; Moberly, Pisoni, & Harris, 2018)
• Vocabulary size
• Grammatical knowledge
• Semantic knowledge

METHODS
PARTICIPANT DEMOGRAPHICS
• 32 participants
• Average age = 62 years (range 18-89)
• Average duration of CI use = 8 years (range 2-22 years)
• Bilateral CI users = 12
• Unilateral CI users = 20
• Normal cognitive status (MMSE average = 29)

MATERIALS
• CVLT Visual version
• Harvard Standard Words
• Harvard Standard Sentences
• Harvard Anomalous Key Words
• Harvard Anomalous Words
• Harvard Anomalous Sentences
• PRESTO

DATA ANALYSIS
• Correlations between total recall CVLT scores and speech perception scores

RESULTS
• Visual memory tasks are positively correlated with speech perception outcomes.
• Regression analysis using age, education, duration of CI use, and total recall showed none of these were significantly predictive of any speech perception outcome

DISCUSSION
• Speech perception does vary based on working memory, but is likely part of a complex system
• Visual working memory tasks can be used successfully with those with cochlear implants to measure working memory without the auditory confound

IMPLICATIONS & FUTURE DIRECTIONS
• Practitioners should consider visual working memory tests as part of the battery of assessments for determining candidacy for cochlear implantation
• Future studies should assess the connection between the visual memory performance and speech perception performance specifically evaluating individual participant data in light of demographic and hearing measures