The Validation of the Newly Recorded AB Word Test Stimuli on Real Cochlear Implant Users

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Introduction

- The Arthur Boothroyd (AB) word test is a speech audiometry test using a series of 15-word lists each containing 10 monosyllabic word lists. It is used as part of the cochlear implant assessment for adults in the UK (NICE, 2019).
- Since its creation in 1968, it has not been updated and with its increased use limitations to the test have arisen (Boothroyd, 1968):
  - The stimulus was recorded with the influence of a Northern English accent which affects the pronunciation of certain vowels.
  - The stimulus is a male voice which does not represent everyday listening frequencies.
- The stimuli were re-recorded using all 150 words from the original 15-word lists using a British native female speaker with a Southern English accent. When tested on those with a simulated hearing loss, it was found that each list was of equal difficulty.

Project Aims

The aim of this project was to fully validate the new stimuli with individuals with cochlear implants (CIs) to see if there was good list equivalence for the potential use in future clinical practice.

Methodology

The new stimuli of all 15 lists was presented to 20 CI users aged between 19-81 and their responses were recorded. These recordings were listened to by three assessors and they each individually calculated the number of correct phonemes each participant scored for each list. Factors that may affect performance were analysed.

Results

- Mean scores for each list are shown in Figure 1. There was no significant difference between scores for each list across participants (p=0.495) therefore showing that each list was of equal difficulty.
- Although women appeared to be scoring better than men across lists (Figure 2) there was no significant difference in performance (p=0.480)
- Scores for participants under 55 years of age were compared to those over 55 (Figure 3). There was no significant difference between the groups (p=0.271)

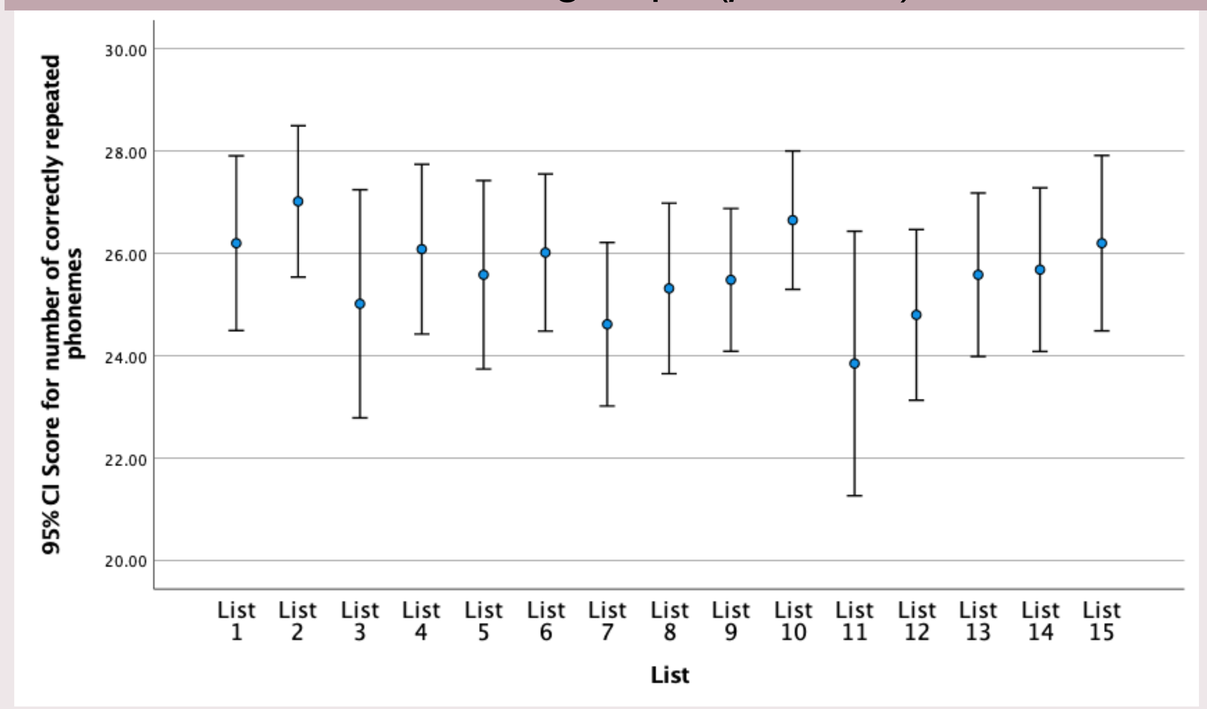

Figure 1: Error bar plot showing 95% confidence intervals from all the participants scores for each list

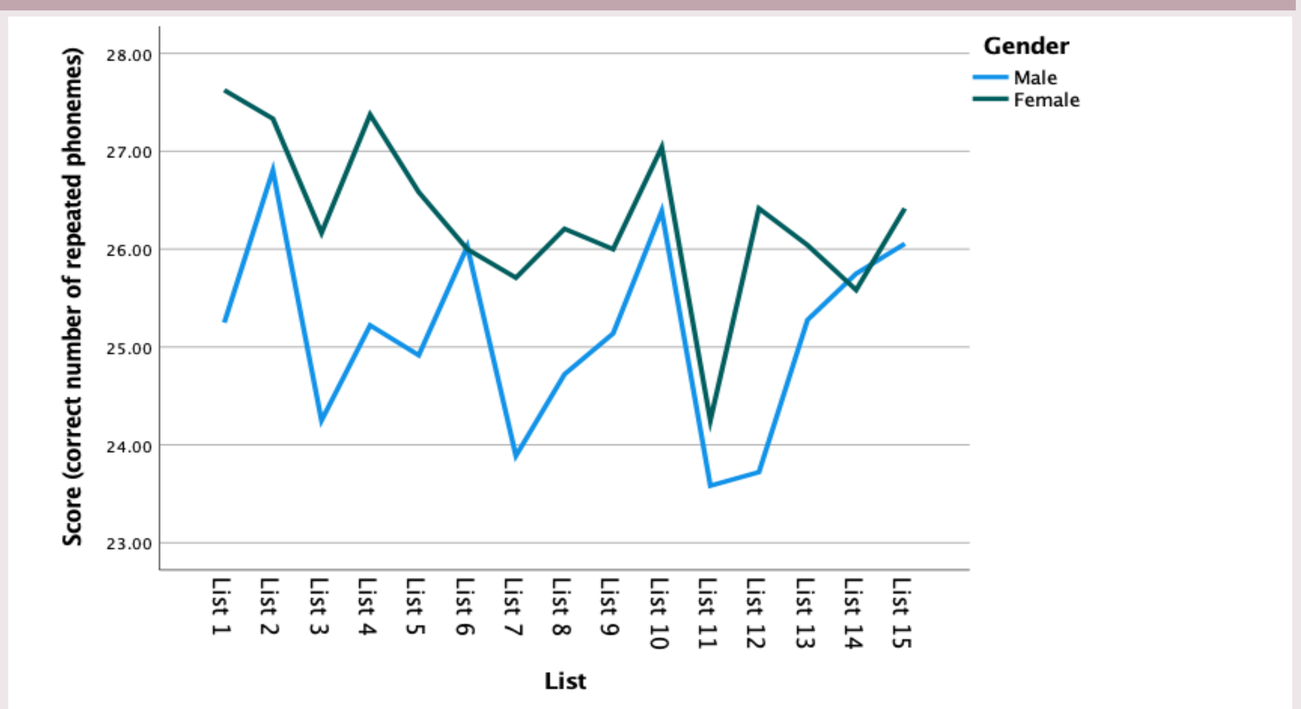

Figure 2: Line chart showing difference in list performance between genders

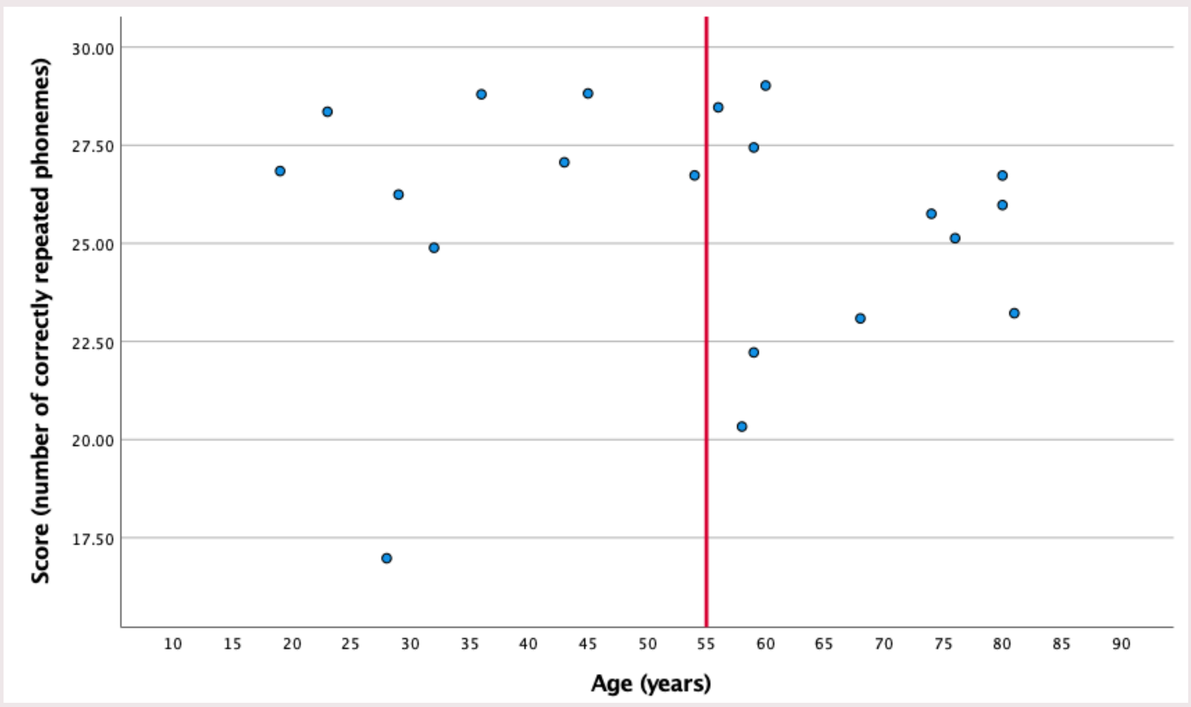

Figure 3: Scatterplot showing the spread of the participants' mean score against their age, with the red line indicating the cut-off point between the older and younger participants

Discussion

- This study has updated and validated a new version of the AB word lists in a clinical population.
- Statistical analysis showed that age and gender did not affect performance on speech testing.
- The effect of implant manufacturer, duration of implant use, and use of additional devices were explored and did not affect performance.
- The new stimuli will allow for greater personalisation of testing for patients.
- Further research is needed to compare the new stimuli with the original on a larger sample size.

References: :Boothroyd, A. (1968). Developments in Speech Audiometry. *British Journal of Audiology* , 368.
National Institute for Health and Care Excellence. (2019). Cochlear implants for children and adults with severe to profound deafness. Technology appraisal guidance [TA566]. https://www.nice.org.uk/guidance/ta566