

Phonological Encoding and Working Memory in Kannada Speaking Adults Who Stutter

Authors : Nirmal Sugathan, Santosh Maruthy

Abstract : Background: A considerable number of studies have evidenced that phonological encoding (PE) and working memory (WM) skills operate differently in adults who stutter (AWS). In order to tap these skills, several paradigms have been employed such as phonological priming, phoneme monitoring, and nonword repetition tasks. This study, however, utilizes a word jumble paradigm to assess both PE and WM using different modalities and this may give a better understanding of phonological processing deficits in AWS. Aim: The present study investigated PE and WM abilities in conjunction with lexical access in AWS using jumbled words. The study also aimed at investigating the effect of increase in cognitive load on phonological processing in AWS by comparing the speech reaction time (SRT) and accuracy scores across various syllable lengths. Method: Participants were 11 AWS (Age range=19-26) and 11 adults who do not stutter (AWNS) (Age range=19-26) matched for age, gender and handedness. Stimuli: Ninety 3-, 4-, and 5-syllable jumbled words (JWs) (n=30 per syllable length category) constructed from Kannada words served as stimuli for jumbled word paradigm. In order to generate jumbled words (JWs), the syllables in the real words were randomly transpositioned. Procedures: To assess PE, the JWs were presently visually using DMDX software and for WM task, JWs were presented through auditory mode through headphones. The participants were asked to silently manipulate the jumbled words to form a Kannada real word and verbally respond once. The responses for both tasks were audio recorded using record function in DMDX software and the recorded responses were analyzed using PRAAT software to calculate the SRT. Results: SRT: Mann-Whitney test results demonstrated that AWS performed significantly slower on both tasks ($p < 0.001$) as indicated by increased SRT. Also, AWS presented with increased SRT on both the tasks in all syllable length conditions ($p < 0.001$). Effect of syllable length: Wilcoxon signed rank test was carried out revealed that, on task assessing PE, the SRT of 4syllable JWs were significantly higher in both AWS ($Z = -2.93, p = .003$) and AWNS ($Z = -2.41, p = .003$) when compared to 3-syllable words. However, the findings for 4- and 5-syllable words were not significant. Task Accuracy: The accuracy scores were calculated for three syllable length conditions for both PE and PM tasks and were compared across the groups using Mann-Whitney test. The results indicated that the accuracy scores of AWS were significantly below that of AWNS in all the three syllable conditions for both the tasks ($p < 0.001$). Conclusion: The above findings suggest that PE and WM skills are compromised in AWS as indicated by increased SRT. Also, AWS were progressively less accurate in descrambling JWs of increasing syllable length and this may be interpreted as, rather than existing as a uniform deficiency, PE and WM deficits emerge when the cognitive load is increased. AWNS exhibited increased SRT and increased accuracy for JWs of longer syllable length whereas AWS was not benefited from increasing the reaction time, thus AWS had to compromise for both SRT and accuracy while solving JWs of longer syllable length.

Keywords : adults who stutter, phonological ability, working memory, encoding, jumbled words

Conference Title : ICSHS 2018 : International Conference on Speech and Hearing Sciences

Conference Location : Venice, Italy

Conference Dates : November 14-15, 2018