



Relationship Between Working Memory and Temporal Information Processing in Individuals with Aphasia

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Objective

Aphasia is usually accompanied by deficits in non-linguistic cognitive functions, i.e., executive functions (Fridriksson et al., 2006), attention (Hula & McNeil, 2008) and working memory (WM; Kasselmiss et al., 2018; Potagas et al., 2011), as well as temporal information processing (TIP) in millisecond time range (Szelag et al., 2015).

The aim of the present study was to investigate the efficiency of verbal working memory (VWM) and spatial working memory (SWM) in aphasic subjects in the relation to the severity of language impairment and to the efficiency of TIP.

Participants

Thirty right-handed subjects (20 male) suffering from post-stroke aphasia after haemorrhage or infarction (lesion age: $M = 51$ weeks; $\pm SD = \pm 55$ weeks) participated in the study. They aged from 27 to 82 years ($M = 59$ years; $\pm SD = \pm 14$ years).

Methods

Two tests for assessing VWM and SWM were administered: (1) receptive verbal test and, (2) the Corsi Block-Tapping Test. Both these tests applied forward (addressing maintenance processes, i.e. i.e., storing, monitoring, and matching information) and backward (addressing manipulation beside maintenance processes, i.e., reordering and updating information) versions. Auditory Comprehension Index (ACI) was calculated based on applied speech reception tests. TIP efficiency was measured using the ability of temporal ordering in millisecond range for auditory stimuli.

Results

For VWM, both forward and backward tasks correlated with ACI and efficiency of TIP. In contrast, for SWM task such correlations were significant for the backward version only. Moreover, partial correlation analysis controlling for ACI revealed that correlations between TIP and SWM backward indices remained significant, while those for VWM (both forward and backward) became nonsignificant.

Conclusions

The results indicated that the level of verbal competency appears to play an important role in both VWM tasks, whereas TIP (which is associated with manipulation processes) appeared to be important for SWM, but only on the backward task.

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