

Measuring working memory in aphasia: Comparing performance on the complex span and N-back tasks

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Introduction

Deficits in working memory (WM) are amongst the most widely acknowledged cognitive impairments in aphasia. However, there is still on-going debate what tasks should be used to assess WM in aphasia (Wright & Fergadiotos, 2012). The two main alternatives for this purpose are simplified complex span tasks and N-back tasks. In a typical complex span task, a processing task (e.g., sentence reading), is given along with a set of stimuli (e.g., words) to be remembered for later recall. In N-back tasks, participants are instructed to judge whether an item matches a previous one presented n items before. Proponents of complex span tasks state that these tasks are the gold standard for assessing WM capacity in cognitive psychology and that variations of these tasks are endorsed as valid means of indexing WM capacity within different theoretical frameworks. On the other hand, researchers using N-back tasks state that since these tasks are more language-free in nature, they are more appropriate for indexing cognitive non-linguistic abilities with language-impaired populations. Several investigations comparing the two tasks in healthy controls have demonstrated no relationship between the two tasks (Jaeggi et al., 2010; Kane et al., 2007). Although, limited conflicting findings indicating a significant relationship between the two tasks have also been reported (Schmiedek et al., 2009). Additionally, performance on complex span task in aphasia studies have repeatedly been related to performance on standardized language tests (Sung et al. 2009; Wright & Fergadiotos, 2012), while similar correlations have never found for N-back tasks (Christensen, & Wright, 2010; Mayer & Murray, 2012). The aim of the present study was to directly investigate the relationship between performance on complex span tasks and N-back tasks in aphasia.

Methods

32 native speakers of Russian with aphasia following left hemisphere stroke participated. Complex span task (modified listening span task, Ivanova & Hallowell, 2014), 2-back and 0-back tasks with words, a test of auditory language comprehension – Quantitative Assessment of Speech in Aphasia (QASA; Tsvetkova et al., 1981) – were administered.

Results and discussion

No significant correlations were observed between performance on complex span task and N-back tasks. Furthermore, performance on the modified listening span was related to performance on the comprehension subtest of the QASA, while no relationship was found for 2-back and 0-back tasks. Our results mirror studies in healthy controls that demonstrated no relationship between performance on the two tasks (Jaeggi et al., 2010; Kane et al., 2007). Thus although N-back tasks seem similar to traditional complex span measures and may also index abilities related to cognitive processing, the evidence to date does not warrant their direct association with the construct of WM. Implications for future investigation of cognitive deficits in aphasia will be discussed.

Literature

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