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Cognitive deficits and their influence on language processing in different types of aphasia

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The present study was devoted to investigation of the relationships between cognitive deficits and impaired language processing in individuals with fluent and non-fluent aphasia. The study consisted of the three stages.

First, given a paucity of standardized quantitative tools for cognitive neuropsychological assessment in Russian, a Russian version of the Birmingham Cognitive Screen (Rus-BCoS) was developed. The BCoS was chosen for adaptation into Russian because it contains a number of advantages, most critically, it is designed to be suitable for persons with aphasia (PWA). After adaptation, preliminary normative data for Rus-BCoS were gathered and the psychometric properties were determined. The first stage of the study established that Rus-BCoS is a reliable and valid tool that can benefit clinicians working with Russian speaking PWA experiencing aphasia following a stroke.

Second, the relationships between cognitive deficits and language comprehension in PWA were investigated partly to explore whether fluent and non-fluent PWA have distinctive relationships between cognitive and language skills. Some differences in task performance on the Rus-BCoS subtests were observed between groups. Non-fluent PWA were more impaired on tasks that required allocation of attention compared to fluent PWA and cognitive control was significantly related to language comprehension difficulties in non-fluent PWA. By contrast, performance on memory tasks was significantly related to disturbed language comprehension in fluent PWA. Thus, the second stage of the study established that cognitive deficits relate to language comprehension difficulties in fluent and non-fluent aphasia differently.

Third, we tested how cognitive control is related to language abilities and whether cognitive control deficits are domain-specific or domain-general for PWA. Both groups were impaired on verbal control tasks compared to neurologically healthy controls. On tasks with relatively high demands on the allocation of attention non-fluent PWA performed worse than fluent PWA and controls. Moreover, scores on verbal and non-verbal cognitive control tasks were significantly correlated for non-fluent PWA, whereas on verbal cognitive control tasks only were significantly correlated for fluent PWA. These findings suggest that PWA have cognitive control deficits that are not limited to the verbal domain in non-fluent PWA. For both groups, general non-verbal cognitive control was significantly related to language comprehension and verbal cognitive control was related to naming lending support to an attentional account of aphasia. However, performance on a non-verbal task tapping relational reasoning was related to language comprehension for non-fluent PWA only, suggesting attention deficits have a greater impact on language comprehension for non-fluent PWA.

Results overall highlight the importance of cognitive assessment in PWA and development of new strategies oriented towards differential cognitive processes for fluent and non-fluent PWA.