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The centrality effect in individuals with attention-deficit/hyperactivity disorder: Evidence from an eye-tracking study

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ABSTRACT

Many studies have shown that readers recall more central ideas that are important for understanding the general meaning of the text, than peripheral ideas that are less necessary for understanding the text (Miller, Keenan, Betjemann, Willcutt, Pennington, & Olson, 2013; Yeari, van den Broek, & Oudega, 2015). Increase in ability to recall as being dependent on the level of centrality of textual ideas is termed in professional literature as the "Centrality Effect" (Miller & Keenan, 2009). This Centrality Effect has been observed among skilled readers and readers with attention deficit/hyperactivity disorder (ADHD) (Miller et al., 2013), but when compared with skilled readers, readers with ADHD recall significantly fewer central ideas (Flake et al., 2007; Lorch, Diener, Sanchez, Milich, Welsh, & van den Broek, 1999; Lorch et al., 2004; Miller et al., 2013). Researchers had already identified this phenomenon, called "Centrality Deficit", in the '70's (Eamon, 1978; Smiley, Oakley, Worthen, Campione, & Brown, 1977), although they had not succeeded in explaining the source of this Centrality Deficit presented by readers with ADHD.

The present study was intended to examine the source of Centrality Deficit presented by readers with ADHD. For this purpose, 28 students with ADHD, and 27 normally developed students who constituted a control group, were asked to read three texts (consecutively) in order to summarize their central ideas. In order to test the degree to which readers with ADHD succeed in identifying central ideas while reading, and to pay more attention to them than to peripheral ideas, we used an eye-tracker instrument to record eye movements. Similarly, we tested to what extent readers with ADHD succeed in differentiating between central and peripheral ideas, consciously and intentionally. Upon completing the reading, readers were asked to estimate the level of centrality for each idea in the text they had read. Additionally, in order to test the extent to which readers with ADHD succeeded in storing central ideas in memory, we compared the performance of readers on recall tests and recognition tests for information that appeared in the text.

Results of the present study replicated findings of earlier studies which demonstrated that the centrality effect for recalling text ideas is found both among normally developed participants (Brown & Smiley, 1977; Curran et al. 1996; Espin et al. 2007; Keenan & Flake et al. 2007; Lorch, Diener, Sanchez, Milich, Welsh, & van den Broek, 1999; Lorch et al. 2004; Miller et al. 2013 Brown, 1984; Miller & Keenan, 2009), and among participants with ADHD (Flake et al., 2007; Lorch, Diener, Sanchez, Milich, Welsh, & van den Broek, 1999; Lorch et al., 2004; Miller et al., 2013). In this study the centrality effect was found even during reading. This effect was expressed in longer reading of central than peripheral ideas in each of the four measures examined (overall reading time, initial reading time, re-reading time and frequency of repetitions) among the two groups. Furthermore, it appears that in the task of ranking centrality, skilled readers and readers with ADHD presented the centrality effect, so that ranking of centrality was, as expected, significantly higher for central units as compared to peripheral units. Nevertheless, we found that centrality deficit was observed on the recall task. It would seem that students with ADHD recall fewer central ideas than the control group students, even though they recall more central than peripheral information. Centrality deficit was observed even though students had over the years developed learning skills and compensatory strategies in reading narrative and scientific texts, and even though participants had received explicit instructions to focus on central ideas in order to summarize them after reading.

These findings indicate that among adults with ADHD there is specific difficulty in recalling central ideas that are available in their long-term memory after reading. The centrality deficit found among the readers with ADHD can be explained as due to their creating fewer connections between the text ideas, particularly with central ones. These findings have important implications for development of intervention programs for readers with ADHD, that would enable them to process central text ideas optimally and to understand them better. These programs need to guide and teach how to identify and understand conceptual connections between text ideas during reading. Such intervention programs need to clarify and emphasize the importance of creating connections between

text ideas for understanding what's being read and remembering central ideas. Furthermore, it is recommended that future research examine the influence of conducting such intervention programs on the abilities of readers with ADHD to reconstruct texts, and that it should offer additional support to the present study's conclusion that readers with ADHD struggle with a dearth of recall cues to help them reconstruct text ideas.