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The centrality effect in poor comprehenders:

Evidence from an eye-tracking study

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Abstract

Many studies have demonstrated that readers recall central ideas that are important for understanding the overall meaning of the text, better than peripheral ideas that are less critical for understanding the text (Miller, Keenan, Betjemann, Willcutt, Pennington, & Olson, 2013; Yeari, van den Broek, & Oudega, 2013, 2014). This *centrality effect* has been observed among skilled as well as weaker readers, such as those with dyslexia (Miller & Keenan, 2009) and readers with attention deficit disorder (Miller et al., 2013). Nevertheless, the centrality effect found among weaker readers is less significant than the centrality effect among skilled readers (Curran, Kintsch, & Hedberg, 1996; Miller & Keenan, 2009; Miller et al., 2013). In other words, weaker readers experience difficulty in recalling central text ideas compared to skilled readers. Researchers had already identified this phenomenon, termed *centrality deficit*, in the 1970's (Eamon, 1978; Smiley, Oakley, Worthen, Campione, & Brown, 1977), but have not yet reached a conclusion regarding the source of this centrality deficit.

Furthermore, along with studies that examined the centrality effect among struggling readers, only one study examined centrality effect among poor comprehenders, also referred to as readers with specific reading comprehension deficit. These readers have adequate reading ability (i.e., word decoding), and normal (non-verbal) intelligence, but experience significant deficits in reading comprehension. Many studies have examined the source of poor comprehenders difficulty in reading comprehension (Nation & Snowling, 1998, 1999, 2000 ;Stothard & Hulme, 1992 ;Yuill & Oakhill, 1991 ;Cain, Oakhill & Bryant, 2004 ;Nation, Bowyer & Snowling, 1999 ;Oakhill, Cain & Oakhill, 2006 ;Locascio, Mahone, Eason, & Cutting, 2010), but only one study tested their ability to recall central text ideas (Yuill & Joscelyne, 1988). Therefore, the present study was intended to overcome this lack by testing adult poor comprehenders ability to identify, process and remember central ideas during and after reading comprehension.

In the present study centrality deficit was tested during reading among adult poor comprehenders, by using an eye tracking instrument. By this means we examined whether poor

comprehenders pay less attention to central ideas and spend less time reading them than normal comprehenders. In addition, we tested whether poor comprehenders demonstrate lower performance by comparison with normal comprehenders, both on the recognition and the recall tasks upon conclusion of reading, which test retention and recall, respectively, of ideas in long-term memory. Finally, this study examined whether poor comprehenders identify fewer central ideas in comparison with normal comprehenders, on a judgment test administered upon conclusion of reading.

Study results showed generally that the centrality effect exists among normal comprehenders as well as poor comprehenders on all measures. Participants recalled more central than peripheral ideas, both on the recognition and recall tests. Similarly, the ranking of centrality was significantly higher for central ideas as compared to peripheral ideas. Furthermore, overall reading time and re-reading time of central ideas was greater than (re)reading time for peripheral ideas, among normal and poor comprehenders. Nevertheless, the centrality deficit was found among poor comprehenders when recalling text ideas. The amount of central ideas recalled by poor comprehenders was significantly less than for normal comprehenders, whereas we found no difference between groups in recalling peripheral ideas. Centrality deficit was also found during first-pass reading time of central ideas, as compared to reading time for peripheral ideas, whereas among poor comprehenders no difference was found in first-pass reading time devoted to central and peripheral ideas.

Therefore, these results are likely to indicate that poor comprehenders have a specific difficulty in recall of central ideas that are available in their long term memory after reading. This deficit may be explained by their difficulty in creating connections between text ideas that would serve as retrieval cues after reading. Furthermore, this study is likely to provide support for the hypothesis according to which poor comprehenders have a deficit in executive function of the cognitive flexibility type, which interferes with their ability to control their attention flexibly and efficiently during first-pass reading time of a text.

These findings have important implications for developing intervention programs for poor comprehenders, which would enable adult poor comprehenders to process and understand central text ideas . This may be done by means of providing strategies for connecting central ideas with other ideas in the text, and also exercises for constructing a coherent representation of the text using guiding questions about connections between different parts of the text. Furthermore, it is recommended that future research examine which cues in the text enable poor comprehenders to identify central ideas, as well as whether previous knowledge influences their ability to process central text ideas.