Working Memory and Comprehension of Individuals with Reading Disabilities

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Purpose

- Reading comprehension is a complex task that is critical for students’ academic success.
- Many learners perform below a proficient level in reading; the majority of students with disabilities perform below a basic level (The Nation’s Report Card, 2015).
- Despite myriad reading comprehension interventions, many students still struggle.

Research Question

How, or to what extent, do individuals with learning disabilities in reading comprehension (RD) differ in working memory (WM) performance from their non-disabled peers?

Theoretical Background

- The Simple View of Reading (Hoover & Gough, 1990)
  Reading Comprehension = Decoding × Linguistic Comprehension
- WM is a core foundational skill for linguistic comprehension with a total direct and indirect effect of .51 (Kim, 2017).
- Individuals with RD-comp have shown performance deficits on WM tasks (e.g., Peng & Fuchs, 2016).

Relations have been found between WM and:
  - overall text processing and comprehension
  - ability to adjust processing to match reading purpose
  - ability to infer meaning from text
  - prior knowledge
  - strategy use
  (Budd, Whitney, & Turley, 1996; Whitney, Ritchie, & Clark, 1991; Lindenholm, Cong, & Zhao, 2008; Lindenholm & van den Broek, 2002; Cain, Oakhill, & Lemmon, 2004; Fincher-Kiefer, Post, Greene, & Voss, 1988; Lindenholm & Zhao, 2008)

Working Memory (WM) (Baddeley, 1992)

- Central Executive
  limited capacity control system
- Visuospatial Sketchpad
  manipulates visual images
- Phonological Loop
  manipulates verbal information

Limited WM capacity constrains comprehension (Just & Carpenter, 1992)

Method

Systematic literature search: PsycINFO, ERIC, Education Source, Academic Search Premier.
Limited to peer reviewed articles written in English.

- Inclusion Criteria: experimental or correlational, compare/contrast participants on WM, verbal complex span task, capacity view of WM, passage level comprehension

Preliminary results: 211 publications screened and 10 included, three with participants with RD-comp

Results

Relation between RD-comp & WM
  - Verbal WM deficits were found for children with RD-comp compared to their chronologically age-matched peers
  - Children with RD-comp displayed superior verbal and visual-spatial WM when compared to younger, non-disabled children matched in reading comprehension (Swanson and Berninger, 1995)

Relation between RD-comp & WM (cont.)
  - Children with RD in comprehension only outperformed those with RD in comprehension and word recognition deficits who outperformed those with poor comprehension, word recognition, and verbal IQ.
  - Storage may be superior to processing in RD-comp. only (Swanson, Howard, and Sáez, 2006)

Relation between WM & Strategy Instruction
  - Both skilled and RD-comp readers benefitted from cueing and rehearsal strategy instruction but between-group variation on WM tasks remained.
  - Processing constraints of a limited capacity system seemed to account for this important between-group variance (Swanson, Kehler, and Jerman, 2010)

Discussion & Next Steps

- Cannot assume the relation between WM and reading comprehension in the general population extends to those with RD-comp
  - There are many unanswered questions regarding this relation
  - Need for analysis of results by LD subgroups
  - The foundational role of WM in linguistic comprehension suggests a clearer understanding of its relation to RD-comp can be beneficial in intervention research
  - What is the effect of strategy instruction and WM for those with RD-comp? What is the effect of instructional format?

Next steps.
  - Since this was a preliminary literature review, I am currently re-doing this review with colleagues.