Effects of fluency, oral language, and executive function on reading comprehension performance

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General Terms

Typically Developing (TD)

Reading Disability (RD)

: deficits in word reading accuracy and/or reading comprehension

General Reading Disability (GRD)

Specific-Reading Comprehension Deficits (S-RCD)

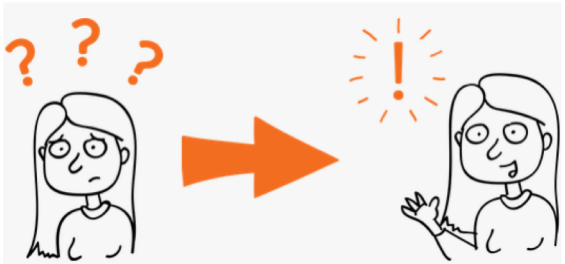
Introduction

Investigate word fluency, oral language proficiencies, and executive function on reading comprehension performance in children who are:

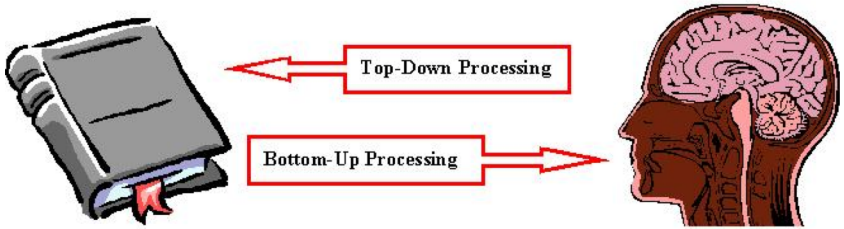
- typically developing (TD)
- have general reading disability (GRD)
- have specific reading comprehension deficits (S-RCD)
    - Involvement of bottom-up process

Hypotheses

1. Comprehension failure is primarily due to a processing bottleneck even in poor comprehenders with apparent normal word recognition/decoding abilities (i.e. S-RCD)



1. Bottom-up processes cannot fully explain reading comprehension failure; thus, other higher level processes and executive function domains are associated with reading comprehension failure



Hypotheses cont.

Bottom-Up Skills

- Accuracy
- Efficiency
- Speed

High demand on other process

(ex. Working memory)

Poses difficulty comprehending connected text

→ processing bottleneck

Participants

56 children from ages 9-14 who did NOT meet the set of descriptions below:

- Full-scale intelligence quotient (FSIQ)<80
- Previous diagnosis of mental retardation
- Known uncorrectable visual or hearing impairment
- Treatment of any psychiatric disorder with psychotropic medication
- Diagnosis or developmental disability
- History of neurological impairment
- Non-native English speakers
- Basic reading standard scores between the 25th and 40th percentile

Method

1. Word Reading and Reading Comprehension Test
   Woodcock Reading Mastery Test
   Gray Oral Reading Test
2. Placed into group (TD, GRD, S-RCD)
3. Attention Deficit Hyperactivity Rating Scale
   (DuPaul, Power, Anastopoulos, & Reid, 1998)
4. IQ- The Wechsler Intelligence Scale for Children - III
   (Wechsler, 1991)
5. Test of Word Reading and Efficiency (TOWRE)
   (Torgesen, Wagner, & Rashotte, 1999)

Method cont.

6.

Peabody Picture Vocabulary Test (PPVT)
(Dunn & Dunn, 1997)
Test of Language Development (TOLD)
(Newcomer & Hammill, 1997)
Test of Language Competence (TLC)
(Wiig & Secord, 1989)

7.

Tower of London (TOL)
(Shallice, 1982)
Elithorn Perceptual Maze Test
(Kaplan, Fein, Kramer, Delis, & Morris, 1999)
Digit Span Backwards
(Wechsler, 1991, 2003)

MANOVA

Multivariate Analyses of Variance

Analyze data of independent measures

Results

ADHD symptomatology

- No significant difference

Word Reading and Reading Comprehension Test

- TD > GRD and S-RCD (p<.0001)

Word Fluency Measures

- TD > S-RCD > GRD (all p<.0001)

Results

Oral Language Measures

- TD > GRD and S-RCD
  - PPVT $p<.001$
  - TLC-inferencing $p<.004$/TLC-ambiguous sentence $p<.03$
  - TOLD $p<.003$
- GRD and S-RCD
  - No statistical significance $p<.40$

Executive Function Measures

- S-RCD most TOL excess moves (GRD $p<.04$, TD $p<.001$)
- TD > S-RCD ($p<.004$) on maze
  - No significance between GRD and S-RCD

Regression Analyses

Measure contribution of fluency, oral language, and executive function to reading comprehension

Results

Table 6 Hierarchical regression models predicting reading comprehension

Step and predictors entered	GORT-4 comprehension								WRMT/NU passage comprehension							
	R^2	F	p	R^2+	▲F	▲p	β	$p(\beta)$	R^2	F	p	R^2+	▲F	▲p	β	$p(\beta)$
Model 1A	0.12	5.60	0.02	0.12	5.60	0.02			0.44	32.01	0.00	0.44	32.01	0.00		
TOWRE composite							0.35	0.02							0.66	0.00
Model 1B	0.29	8.19	0.00	0.17	9.61	0.00			0.58	27.63	0.00	0.14	13.49	0.00		
TOWRE composite							−0.23	0.33							0.14	0.43
GORT-4 fluency							0.71	0.00							0.64	0.00
Model 1C	0.45	10.79	0.00	0.16	11.63	0.00			0.67	26.49	0.00	0.09	10.75	0.00		
TOWRE composite							−0.07	0.76							0.26	0.11
GORT-4 fluency							0.17	0.52							0.24	0.23
Oral language composite							0.58	0.00							0.43	0.00
Model 1D	0.52	7.99	0.00	0.07	2.53	0.09			0.68	15.97	0.00	0.01	0.73	0.49		
TOWRE composite							−0.07	0.73							0.27	0.11
GORT-4 fluency							0.58	0.57							0.24	0.25
Oral language composite							0.51	0.00							0.42	0.00
TOL excess moves							−0.28	0.05							−0.14	0.24
Mazes							−0.01	0.93							−0.07	0.57

N=46

1.

Comprehension failure is primarily due to a processing bottleneck even in poor comprehenders with apparent normal word recognition/decoding abilities (i.e. S-RCD)

Not supported

TD = S-RCD > GRD on isolated word fluency tasks

TD > S-RCD > GRD on contextual word fluency tasks

2.

Bottom-up processes cannot fully explain reading comprehension failure; thus, other higher level processes and executive function domains are associated with reading comprehension failure

Supported

reading comprehension measures may vary significantly in their executive demands


Thank you!