

Effects of working memory training on reading in children with special needs

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{Reading and Writing}

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1. Abstract

Purpose: Working memory of children with special needs could be enhanced by a cognitive training program

Hypothesis: **High correlations** between working memory and reading comprehension skills

Methods: **Neuropsychological** measures and **Reading** measures

Results: Working memory works as a crucial factor in the reading development

2. Introduction

Past

- Working memory has a limited capacity

Present studies

- children with ADHD may benefit in their behavior from working memory training
- Increased brain activity is associated with working memory functions

3. Hypothesis

- Working Memory ability would **increase** through the training with **a positive effect** on children's reading comprehension skills

4. Methods

- Fifty-seven children with special education needs

4. Methods

4-1. Neuropsychological Measures

- A. Nonverbal reasoning ability
- B. Verbal working memory
- C. Visual-spatial working memory
- D. Response inhibition

4. Methods

A. Nonverbal reasoning ability

- a. Raven's Coloured Progressive Matrices

B. Verbal working memory

- a. Digit Span

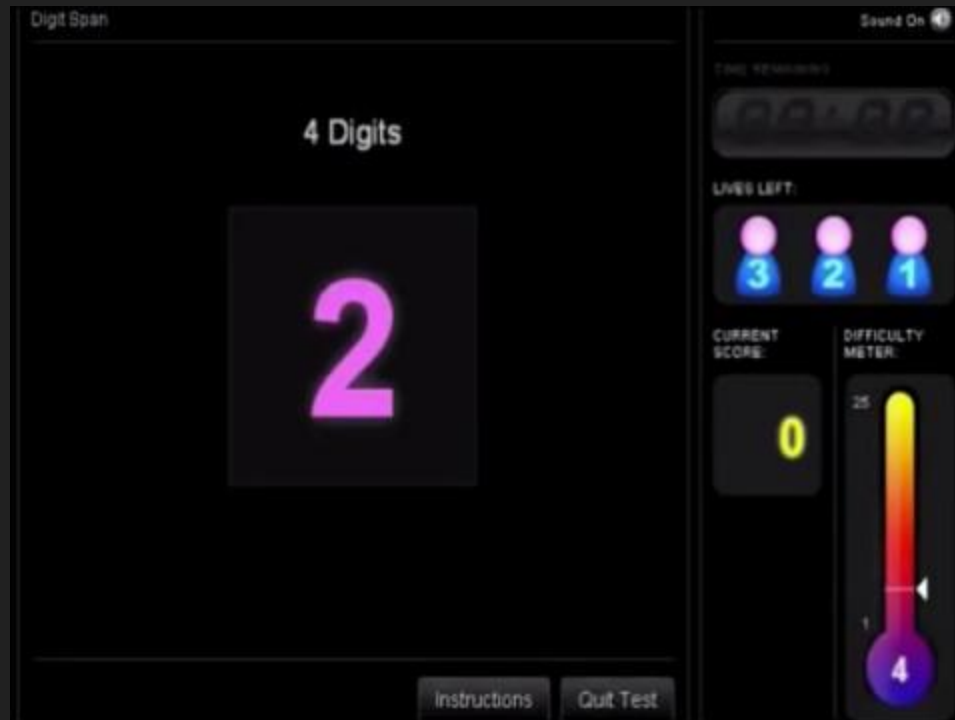
C. Visual-spatial working memory

- a. Span Board

D. Response inhibition

- a. Stroop

Digit Span



Spatial Span



Stroop

RED BLUE PURPLE YELLOW
BLACK GREEN PURPLE ORANGE
RED GREEN BLACK BLUE
YELLOW PURPLE PURPLE RED
ORANGE PURPLE BLUE GREEN
BLACK BLACK ORANGE RED

4. Methods

4-2. Reading Measures

- a. Reading comprehension
- b. Word decoding
- c. Orthographic knowledge

4. Methods

A. Reading Comprehension

- a. Narrative texts from the Progress in International Reading Literacy Study

B. Word Decoding

- a. the Phonological non-word reading test

C. Orthographic knowledge

- a. The Orthographic verification test

4. Methods

1. Completing a set of assessments

- a. nonverbal reasoning
- b. working memory
- c. Reading

2. Within the same time intervals

- a. Pre-test
- b. post-test, 5–6 weeks later
- c. Post-test, 6–7 months later.

5. Results

- The effect of training was tested by **comparing the outcome score at post-test** in the treatment group scores **at pre-test**.
- Four measurements were improved
 - Span Board forward
 - Span Board backward
 - Digit backward
 - Nonverbal problem solving (Raven)

5. Results

- The treatment group enhanced its results of working memory measures
- The WM measures Span board forward and back were related to reading comprehension
- Comparison of the experimental group with an additional control group showed that the training indeed enhanced children's working memory.

6. Discussion

1. Limitation

- a. a **large difference in size** between the treatment group and the control group
 - i. including more children in the treatment group.

2. Practical Implication

- a. WM training may **facilitate** reading comprehension processes **directly**, and not via improvements in word-level reading processes.

Thank you

For Your Attention