



Contents lists available at SciVerse ScienceDirect

Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp



The development of working memory from kindergarten to first grade in children with different decoding skills

Einat Nevo*, Zvia Breznitz

Edmond J. Safra Brain Research Center for the Study of Learning Disabilities, University of Haifa, 31905 Haifa, Israel

ARTICLE INFO

Article history:

Received 26 April 2012

Revised 4 September 2012

Available online 13 October 2012

Keywords:

Working memory

Phonological complex memory

Reading skills

Decoding skills

Poor decoders

Developmental changes

ABSTRACT

This study investigated the development of working memory ability (measured by tasks assessing all four working memory components) from the end of kindergarten to the end of first grade—the first year reading is taught in school—and the relationship between working memory abilities in kindergarten and first grade and reading skills in first grade. A sample of 97 children who participated in Nevo and Breznitz's earlier study [*Journal of Experimental Child Psychology*, 109 (2011) 73–90] were divided into two groups according to their decoding skills, resulting in 24 poor decoders and 73 typical decoders. The entire cohort improved significantly on all of the working memory measures from kindergarten to first grade, with the phonological complex memory at both time points showing the highest correlations with reading skills at first grade. However, there were differences found between the two decoding groups, with poor decoders exhibiting lower working memory abilities in most working memory measures, performing significantly lower on tests of all three reading skills (decoding, reading comprehension, and reading speed), and showing higher correlation coefficients between reading skills. Findings suggest that even before formal teaching of reading begins, it is important to reinforce working memory abilities in order to maximize future reading achievements.

© 2012 Elsevier Inc. All rights reserved.

Introduction

Working memory is the ability to process and remember information. It is composed of multiple components whose coordinated activity is responsible for the temporary storage and manipulation

* Corresponding author. Fax: +972 04 824 9835.

E-mail address: einatn@research.haifa.ac.il (E. Nevo).

of information (Alloway & Alloway, 2010). Working memory has been found to be linked to reading skills (e.g., Gathercole, Alloway, Willis, & Adams, 2006; Seigneuric, Ehrlich, Oakhill, & Yuill, 2000) and math abilities (e.g., Alloway & Alloway, 2010; Swanson & Sachse-Lee, 2001), and its contribution to learning has been found to strengthen with time (Alloway & Alloway, 2010).

The developmental changes that accompany working memory abilities are commonly seen as an increase in the size of memory span. In general, memory span increases steeply from 4 to 8 years of age and improves more gradually thereafter up to approximately 12 years of age, when performance asymptotes around adult levels (Gathercole, 1999). The clear improvement in the performance on memory tasks from 4 years of age to adolescence was found for both verbal and visuospatial information using both short-term memory (STM) and complex memory tasks (e.g., Alloway, Gathercole, & Pickering, 2006; Conlin, Gathercole, & Adams, 2005; Gathercole, Pickering, Ambridge, & Wearing, 2004a; Luciana, Conklin, Hooper, & Yarger, 2005), but the asymptote in performance was achieved at different ages on the different components and the different tasks of the working memory system. In addition, although the associations between working memory and reading skills are well established (e.g., Cohen-Mimran & Sapir, 2007; Gathercole et al., 2006; Swanson & Jerman, 2007), the mechanism of their interaction is less clear. Some researchers claim that because reading acquisition during its early stages involves routing attentional resources in order to implement stable connections between phonemes and their graphemic presentations (Cohen-Mimran & Sapir, 2007), it is at this early stage that children with phonological deficits are likely to encounter reading difficulties (Snowling, Bishop, & Stothard, 2000). Others claim the opposite; for example, Ben-Yehudah and Fiez (2007) argued that because the most dramatic changes in verbal working memory span occur between the preschool and early school years—the time during which children typically learn to read—learning to read is the catalyst for the observed increase in children's memory. They based this argument on the view that awareness of sounds of the smallest size, phonemes, depends largely on direct instruction in reading and spelling and training at the phonemic level (Ziegler & Goswami, 2005). Ben-Yehudah and Fiez contended that this ability will influence the quality of the representations used to reconstruct (and maintain) the decaying memory trace and cause the improvements in memory span. We undertook to examine the relationship between increase in working memory and learning to read by testing children again toward the end of kindergarten and again toward the end of first grade.

Numerous studies during recent years have documented associations between working memory and children's achievements in different reading skills, including decoding, reading comprehension, speed of reading, and spelling (e.g., Bayliss, Jarrold, Gunn, & Baddeley, 2003; Cain, Oakhill, & Bryant, 2004). An interesting aspect of these links is the relationship between working memory abilities and reading acquisition during the first year of formal teaching. Thus, the aim of our study was to investigate changes in each one of the working memory components [based on Baddeley & Hitch's (1974) model] from the end of kindergarten to the end of first grade, the period when formal teaching of reading skills in the Hebrew language takes place. We aimed to determine whether working memory performance changes after children are exposed to formal teaching and learning to read. Following Swanson and Berninger's (1995) suggestion that the various components of working memory might be differently related to word recognition and reading comprehension skills, we examined reading skill achievements by three measures: decoding, reading comprehension, and reading time.

The research that investigated the relationships between working memory and reading skills enhancement was focused mainly on children with specific learning difficulties (e.g., Bayliss, Jarrold, Baddeley, & Leigh, 2005; Gathercole & Pickering, 2000). However, not much research has focused on participants with different decoding profiles, and none has used the decoding skill as the basic underlying factor for assessing typical and poor reading performance. Thus, in the current study, we aimed to examine the association between working memory and reading skills in poor and typical decoders. The definition of the two decoder groups in this study was based on Siegel (1999) and Shany and Share (2011), who used the 25th percentile low achievement on decoding measures as a cutoff point to categorize the participants into poor and typical decoders. Specifically, we aimed to examine the relationship between decoding and reading skills and to verify whether different decoding skills produce different developmental patterns in the performance of working memory tasks from late kindergarten to late first grade.

Download English Version:

<https://daneshyari.com/en/article/918305>

Download Persian Version:

<https://daneshyari.com/article/918305>

[Daneshyari.com](https://daneshyari.com)