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In search of methods enhancing fluency in reading: An examination of the relations between time constraints and processes of reading in readers of German



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ABSTRACT

The attainment of fluency in reading is a major difficulty for reading-disabled people. Manipulations applied on the presentation of texts, leading to “on-line” effects on reading (i.e., while texts are manipulated), are one direction of examinations in search of methods affecting reading. The imposing of time constraints, by deleting one letter after the other from texts presented on a computer screen, has been established as such a method. In an attempt to further understand its nature, we tested the relations between time constraints and processes of reading: phonological decoding of small orthographic units and the addressing of orthographic representations from the mental lexicon. We also examined whether the type of orthographic unit deleted (lexical, sublexical, or nonlexical unit) has any additional effect. Participants were German fifth graders with ($n = 29$) or without ($n = 34$) reading disability. Time constraints enhanced fluency in reading in both groups, and to a similar extent, across conditions. Comprehension was unimpaired. These results place the very principle of time constraints, regardless of the orthographic unit manipulated, as a critical factor affecting fluency in reading. However, phonological decoding explained a significant amount of variance in fluency in reading across all conditions in reading-disabled children, whereas the addressing

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of orthographic representations was the consistent predictor of fluency in reading in regular readers. These results indicate a qualitative difference in the processes explaining the variance in fluency in reading in regular and reading-disabled readers and suggest that time constraints might not have an effect on the relations between these processes and reading performance.

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Introduction

The development of methods that have an effect on reading performance is highly challenging. To date, the most extensively studied methods are the training of phonological and orthographic skills. Phonological training has shown positive effects on decoding but limited effects on fluency in reading (for a review, see Meyer & Felton, 1999), which is a central skill of reading proficiency (Breznitz, 2006, 2008; Fletcher, 2009; Lyon, Shaywitz, & Shaywitz, 2003). The central assumption guiding the vast majority of studies focusing on improving fluency in reading is that it depends on the scope and quality of stored orthographic representations. Consequently, training consists mainly of repeated exposures to the same orthographic items (e.g., Kuhn & Stahl, 2003; Meyer & Felton, 1999; Roberts, Torgesen, Boardman, & Scammacca, 2008; Wolf & Katzir-Cohen, 2001). Positive effects were, however, found primarily on trained items (Roberts et al., 2008; Thaler, Ebner, Wimmer, & Landerl, 2004). Despite the important role of these types of training in advancing children with reading disability, they often require numerous sessions until progress is evident, as well as the mediation of a tutor, with its inevitable financial and logistic complications.

Different manipulations carried out on the presentation of texts, which lead to “on-line” effects on reading (i.e., while texts are manipulated), are another direction of examinations in search of methods affecting reading. Unless administered in the framework of a training program, such manipulations might not be expected to lead to long-term effects on reading or to effects of transfer to untrained material; nevertheless, they can be easily implemented using current technological devices, thereby having the potential of facilitating reading in everyday life settings. In addition, these methods do not require the mediation of a tutor and, therefore, are accessible for various populations. In such a recently examined manipulation, the mere increase of space between letters led to improved accuracy and fluency in reading in Italian and French reading-disabled children (8–14 years of age). The researchers suggested that the manipulation reduced negative effects on reading resulting from a difficulty of people with reading disability to process crowded visual information (Zorzi et al., 2012).

The current study focused on another example of this kind of manipulation, termed “reading acceleration” (Breznitz, 2006). This manipulation consists of time constraints imposed on reading by erasing texts presented on a computer screen one letter after the other. The pace at which the letters are deleted is based on the maximal (or mean; see Horowitz-Kraus, Cicchino, Amiel, Holland, & Breznitz, 2014) individual per-letter reading rate measured in a self-paced reading condition preceding the fast-paced condition. This manipulation was found to have positive on-line effects on fluency in reading while comprehension stays the same, and in some studies it was even found to improve compared with a self-paced reading condition and, therefore, was termed the “acceleration phenomenon” (Breznitz, 1987a, 1987b, 1988, 1997a, 1997b; Breznitz, DeMarco, & Hakerem, 1993; Breznitz, DeMarco, Shammi, & Hakerem, 1994). The time constraints were suggested to encourage fast processing, reduce distractibility, increase attention capacity, and increase the units available in short-term memory before they decay (Breznitz, 1988, 1997a, 2008; Breznitz & Leiken, 2000; Breznitz & Share, 1992; Leiken & Breznitz, 2001). Several other explanations were proposed relating the acceleration phenomenon to the processes underlying reading: phonological decoding and lexical access. The time constraints were suggested to enhance word retrieval from the mental lexicon and to shift the emphasis away from the impaired phonological route of reading-disabled children (Breznitz, 1987a, 1997b,

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