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Naming of short words is (almost) the same as naming of alphanumeric symbols: Evidence from two orthographies

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ABSTRACT

Throughout reading development, a gradual shift is seen in the processes underlying word identification from serial decoding toward parallel processing or sight word reading. It has been argued that this shift can be detected in the correlations between serial and discrete naming of alphanumeric symbols (digits and letters) and words. In the current study, we examined the relations between alphanumeric symbol naming and reading of monosyllabic and multisyllabic words and nonwords in two languages that differ in orthographic consistency: English and Dutch. A sample of 92 English-speaking Canadian children and 101 Dutch children, all in Grade 5, were assessed on discrete and serial naming of digits and letters and on serial and discrete naming of monosyllabic and multisyllabic words and nonwords. Results showed that discrete naming of alphanumeric symbols closely resembled discrete reading of monosyllabic words, suggesting that these words are processed in parallel in both languages. Both serial and parallel reading processes were found to underlie identification of multisyllabic words as well as monosyllabic nonwords. However, differences between the two languages emerged when processing multisyllabic nonwords. Whereas English-speaking children relied more on parallel reading processes to read multisyllabic nonwords, Dutch-speaking children processed these items serially. Theoretical implications of these findings are discussed.

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Introduction

Rapid automatized naming (RAN), the ability to name as fast as possible a set of highly familiar stimuli (e.g., colors, objects, letters, digits), has been shown to be a strong concurrent and longitudinal predictor of reading performance across ages, languages, and ability levels (see Kirby, Georgiou, Martinussen, & Parrila, 2010, for a review). It has been suggested that the relation between RAN and reading is due to task similarities, such that "the seemingly simple task of naming a series of familiar items as quickly as possible appears to invoke a microcosm of the later developing, more elaborated reading circuit" (Norton & Wolf, 2012, p. 429). However, the cognitive processes underlying RAN performance, and consequently the nature of its relation with reading performance, are still under debate. Theoretical accounts proposed over the last three decades include, but are not limited to, factors such as speed of processing (Kail, Hall, & Caskey, 1999), working memory (Amtmann, Abbott, & Berninger, 2007), learning of arbitrary associations between symbols and their names (Manis, Seidenberg, & Doi, 1999), learning of orthographic codes (Bowers & Wolf, 1993), and the ability to access and retrieve phonological representations from long-term memory (Wagner & Torgesen, 1987).

Some findings concerning RAN, however, are largely undisputed. First, RAN predicts reading performance (particularly reading speed) even after controlling for other key predictors of reading such as phonological awareness (e.g., de Jong & van der Leij, 1999), letter knowledge (e.g., Kirby, Parrila, & Pfeiffer, 2003), phonological short-term memory (e.g., Parrila, Kirby, & McQuarrie, 2004), paired-associate learning (e.g., Lervåg, Bråten, & Hulme, 2009), orthographic knowledge (e.g., Moll, Fussenegger, Willburger, & Landerl, 2009), and speed of processing (e.g., Georgiou, Parrila, & Kirby, 2009). Second, although RAN is typically measured with objects, colors, letters, and digits, these four tasks load on two factors, namely alphanumeric naming (letters and digits) and non-alphanumeric naming (colors and pictures), of which alphanumeric RAN is the stronger predictor of reading performance (e.g., Närhi et al., 2005; Rodríguez, van den Boer, Jiménez, & de Jong, 2015; van den Bos, Zijlstra, & van den Broeck, 2003). Finally, several studies have shown that the format of RAN plays a role in the RAN–reading relation, such that the standard serial version of RAN is a stronger correlate of reading than discrete RAN, in which items are presented one at a time (e.g., Bowers & Swanson, 1991; Georgiou, Parrila, Cui, & Papadopoulos, 2013; Logan & Schatschneider, 2014).

More recently, however, de Jong (2011) argued that researchers should consider not only the format of the RAN tasks but also the format of the reading task because in his study discrete RAN emerged as a strong predictor of discrete word reading. Moreover, de Jong suggested that the relations of serial and discrete RAN with word reading may be used to delineate the underlying reading processes. If single words are read by sight, or processed in parallel, a high correlation should be found with discrete RAN because both tasks reflect a similar process of retrieving a pronunciation from memory. If, however, single words are read through serial decoding, a stronger correlation would be expected with serial RAN because both decoding and naming arrays of digits reflect a serial process.

In support of these hypotheses, de Jong (2011) found that for beginning readers in Grade 1, discrete reading of monosyllabic words was more strongly related to serial RAN, whereas discrete RAN was the strongest correlate among more advanced readers in Grades 2 and 4. These differences were confirmed through latent class analyses, which showed that children could be assigned to two classes of readers. For advanced readers, the relations between RAN and word reading were dependent on the format of both tasks, such that discrete word reading correlated most strongly with discrete RAN, whereas serial RAN correlated more strongly with serial word reading. In contrast, for beginning and poor readers, serial RAN was more strongly related to word reading than discrete RAN irrespective of the format in which words were presented. These results suggested that advanced readers processed words that were presented one by one in parallel, similar to naming of single digits, whereas beginning readers predominately relied on a decoding strategy more closely resembling serial naming of an array of digits.

In a follow-up study, van den Boer and de Jong (2015) examined the relations of serial and discrete RAN with discrete reading of monosyllabic nonwords in addition to words. Surprisingly, the results for nonwords were very similar to those for words, such that, for beginning readers, discrete nonword