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Effects of fluency training on reading competence in primary school children: The role of prosody

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ABSTRACT

Reading fluency defined as speed, accuracy, and prosody, is a critical component of reading development. The purpose of this research was to compare the efficacy of automaticity versus prosody programmes on reading comprehension. The study included 122 Spanish primary-school children (74 second and 48 fourth graders), randomly assigned to one of three groups: (a) automaticity training, which consisted of repeated reading with a focus on speed and accuracy plus phonological and orthographic awareness activities; (b) prosody training, which consisted of repeated reading with a focus on expressiveness plus prosody sensitivity activities; and a (c) 'no treatment' control group. Multiple measures were used to determine pre-post training performance in reading fluency—automaticity and prosody—and comprehension. Prosody training proved superior to automaticity training in promoting automaticity and prosody. Prosody and automaticity training in fourth graders resulted in superior sentence comprehension compared to controls. The importance of prosody for reading development in primary school is discussed.

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1. Introduction

Fluency is a central component of success in reading and has been included as one of the five basic areas of literacy (National Reading Panel, 2000). Nevertheless, there are still unanswered questions concerning its definition, processing and intervention (Kuhn, Schwanenflugel, & Meisinger, 2010).

Fluency, broadly defined as a combination of speed and accuracy, has traditionally been considered an indicator of overall reading ability (Fuchs, Fuchs, Hosp, & Jenkins, 2001). However, this view represents a relatively narrow definition of fluency. Prosodic reading, or reading with expressiveness, has recently come to be recognized as yet another critical dimension of reading fluency (Rasinski, Reutzel, Chard, & Linan-Thompson, 2011). Prosodic reading involves using a language's prosodic features, such as appropriate phrasing (to group a passage into meaningful phrases), pauses, stress, and intonation (Dowhower, 1991). Although prosody is considered to be a crucial component of fluency (Kuhn et al., 2010), research has mostly focused on fluency's more quantifiable components, namely, speed and accuracy. In this study, we focus on

prosody as another key component within reading fluency. Therefore, being necessary for fluent reading, prosody can be expected to be significant for reading comprehension (e.g., Álvarez-Cañizo, Suárez-Coalla, & Cuetos, 2015; Miller & Schwanenflugel, 2006; Veenendaal, Groen, & Verhoeven, 2014). Moreover, taking all these three components into account—speed, accuracy, and prosody—more completely conceptualizes the fluency construct, which is critical to making comprehensive assessment and instructional decisions.

Two main theoretical perspectives have been adopted regarding the contribution of reading fluency to reading comprehension (Kuhn & Stahl, 2003), each focusing on different dimensions. The first and better known approach is that reading with automaticity (i.e., with appropriate speed and accuracy) frees resources that can be dedicated to reading comprehension (LaBerge & Samuels, 1974; Perfetti, 1985; Perfetti & Hart, 2002). Word reading fluency is the central skill on which reading fluency is built and is, furthermore, an important skill for predicting reading comprehension (Adlof, Catts, & Little, 2006; Gough, 1996; LaBerge & Samuels, 1974; Perfetti, 1985; Perfetti & Hogaboam, 1975; Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004; Schwanenflugel et al., 2006). The automaticity theory is supported by studies that report positive correlations between wordlist reading rates and

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reading comprehension (De Jong & van der Leij, 2002; Perfetti & Hogaboam, 1975). Nevertheless, improvements in the reading rate (the combined measure of speed and accuracy) is not necessarily translated to reading comprehension in poor readers (for a review, see Kuhn & Stahl, 2003; Wexler, Vaughn, Edmonds, & Reutebuch, 2008).

The second perspective on fluency acknowledges the contribution of prosody. According to this view, prosodic reading may enhance reading comprehension, since it helps with syntactic parsing (Kuhn & Stahl, 2003). As syntactic processing is necessary for reading comprehension, it could be argued that one link between fluency and reading comprehension could be through prosody and syntax. The assignment of syntactic roles is a key component of microprocessing, i.e., parsing the text into hierarchically ordered propositions (Kintsch, 1999). In line with this view, it has been demonstrated that training readers to segment text into meaningful phrases results in better comprehension (Arcand et al., 2014; Cromer, 1970). There is another possible link—further to syntactic parsing—between prosody and reading comprehension: prosody may provide a scaffold that allows an auditory sequence to be held in working memory (Frazier, Carlson, & Clifton, 2006; Swets, Desmet, Hambrick, & Ferreira, 2007), allowing the sequence to be analysed for further processing (Koriat, Greenberg, & Kreiner, 2002). Complex sentences require such prosodic scaffolding to be understood. In this sense, Benjamin and Schwanenflugel (2010) showed that prosodic reading was a good predictor of reading comprehension of difficult texts, even when speed and accuracy were controlled for.

Another series of studies have demonstrated that prosody sensitivity is a key aspect of the relationship between prosody and reading comprehension and that prosody sensitivity is directly related to literacy performance (e.g., Holliman, Wood, & Sheehy, 2010a,b; Whalley & Hansen, 2006; Wood, 2006). In Spanish, for example, sensitivity to stress means that stress is assigned more accurately and reading is more fluent (e.g., Gutiérrez-Palma, Raya-García, & Palma-Reyes, 2009), thereby improving reading comprehension. Consequently, reading fluency and comprehension may benefit from higher levels of prosodic sensitivity.

Regarding the interaction between prosodic reading and reading comprehension, several studies have demonstrated how prosodic reading affects reading comprehension (Lai, Benjamin, Schwanenflugel, & Kuhn, 2014; Miller & Schwanenflugel, 2006; Miller & Schwanenflugel, 2008; Schwanenflugel et al., 2004); however, the issue of directionality between reading prosody and comprehension is still unclear (Kuhn et al., 2010). The precise mechanisms by which reading fluency may assist in reading comprehension are also unclear. Some researchers have suggested that, to glean some insights into this relationship, the link between the different components of fluency and reading comprehension should be examined, considering the school age of children (Klauda & Guthrie, 2008). Rasinski, Rikli, and Johnston (2009) carried out a correlational study to examine the relationship between reading comprehension and fluency for third, fifth, and seventh graders, finding that, for the higher grades, prosody was the fluency dimension most closely related to comprehension. Valencia et al. (2010), who measured reading rates, accuracy, prosody, and comprehension in second, fourth, and sixth graders, found that prosody increasingly contributed to comprehension across the grades, whereas the contribution of accuracy decreased after the fourth grade. Similarly, Schwanenflugel et al. (2006) showed that automaticity in word reading aided text comprehension in early elementary education (first to third grades); however, its role in comprehension gradually reduced as education advanced. Here, other components (for instance, prosody) may become more important.

In the same vein, most studies agree that once automatic word reading skills are acquired, more adult-like prosodic reading starts to emerge (e.g., Chall, 1996; Kuhn & Stahl, 2003; Miller & Schwanenflugel, 2006; Miller & Schwanenflugel, 2008; Schwanenflugel et al., 2004). It seems that children who decode faster are also more likely to read more prosodically; it also appears that a certain level of automaticity in reading is necessary to read with expressiveness. However, according to Cowie, Douglas-Cowie, and Wichmann (2002), prosodic reading and automaticity in reading are to some extent independent, as it is possible to read with automaticity but without expressiveness.

As shown by previous studies (Rasinski et al., 2009; Schwanenflugel et al., 2006; Valencia et al., 2010), grade level appears to be an intermediate variable between the fluency components and reading comprehension, a conclusion that would corroborate Chall's reading development stages model (1996). As two general stages in reading acquisition, Chall distinguishes between learning to read (grades 1 to 3), when children focus on decoding, and reading to learn (grades 4 to 6), when children concentrate on meaning. Automaticity in word reading may play a more relevant role in reading comprehension in the first stage, whereas prosody may be more helpful in the second stage when children have already acquired automaticity in reading. Accordingly, speed and accuracy show greatest improvement in the early primary grades, although the learning curve subsequently levels off (Fuchs et al., 2001).

Another aspect to consider when explaining how reading develops is the characteristics of a particular language. Spanish is a language with a transparent orthography, and children soon achieve a high level of accuracy. After the first year of learning to read, Spanish children typically achieve a reading accuracy of 95% of words; in contrast, accuracy is about 35% of the words read in more opaque languages (Aro & Wimmer, 2003; Seymour, Aro, & Erskine, 2003). Regarding speed of reading, this seems to develop more slowly than accuracy. In fact, studies in transparent systems often rely on reading speed as an indicator of individual differences in reading skills (e.g., Cuetos & Suárez-Coalla, 2009; De Jong & van der Leij, 2002; Serrano & Defior, 2008).

The literature overall would suggest that fluency is a complex variable, consisting of several components that develop at different stages (Marciarielle-LeVasseur, Macaruso, Conway-Palumbo, & Shankwiler, 2006; Schwanenflugel et al., 2004). However, previous studies are correlational. Training studies, in particular, are considered more appropriate for exploring causal hypotheses (Castles & Coltheart, 2004); for this reason, in this study we use the training approach to complement previous correlational research on this topic (Calet, Gutiérrez-Palma, & Defior, 2015; Rasinski et al., 2009; Valencia et al., 2010).

The most commonly used method for enhancing reading fluency is repeated reading of passages, i.e., a child reads a short passage repeatedly until they fulfil a speed criterion—as first described by Samuels (1979) and Dahl (1979). Overall, this approach has been shown to have positive effects on children's reading fluency (e.g., Ardoin, Morena, Binder, & Foster, 2013; Kuhn & Stahl, 2003; Meyer & Felton, 1999; Therrien, 2004); however, findings with regard to reading comprehension have been inconsistent, with some studies reporting improved reading comprehension (Chard, Vaughn, & Tyler, 2002; Kuhn et al., 2006; Schwanenflugel et al., 2009) and others reporting no benefits at all (Kuhn & Stahl, 2003; Soriano, Miranda, Soriano, Nieves, & Féliz, 2011; Wexler et al., 2008). Those results may be inconsistent for methodological reasons: not all the fluency training studies had a control group and/or random assignment to groups (Gersten et al., 2005; Therrien, 2004). The results may also be inconsistent because of the diversity of the samples used (e.g., secondary school pupils or

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