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Predictive and concurrent relations between literacy skills in Grades 1 and 3: A longitudinal study of Italian children

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ABSTRACT

A sample of 170 Italian children was assessed for reading accuracy, reading speed, text comprehension and spelling in Grades 1 and 3 in order to investigate the concurrent and longitudinal relationships among literacy skills. Main results from multivariate analyses (regression, discriminant and path analyses) indicated that reading speed was the best predictor of later literacy and that spelling was the most stable measure and influenced text comprehension and reading speed. An asymmetry was also observed in the longitudinal relationship between reading and spelling errors, with reading errors predicting later spelling errors and a non-significant result in the opposite direction.

1. Introduction

Literacy involves different skills such as speed and accuracy in decoding print, text comprehension and spelling dictation. A range of cognitive and language pre-literacy abilities have been found to predict the development of literacy skills (see for recent reviews Kirby, Desrochers, Roth, & Lai, 2008; Pufpaff, 2009), but less is known about the predictive power of early reading and spelling measures on later literacy acquisition. In particular, there are two issues that have been less systematically examined despite their educational relevance. First, to what extent are early reading skills, including both accurate/fluent text reading (decoding) and effective reading comprehension, predictive of subsequent literacy skills? Second, is spelling a reliable early marker of children's typical literacy development? On the one hand answers to such questions could help teachers to identify children who are at risk of scholastic underachievement. Analyzing the predictive and concurrent relationships between different literacy skills and their changes across grades could also, on the other hand, help to enrich theoretical models of reading and spelling development.

In the following sections we will address these issues by overviewing the main results for the predictive and concurrent relations between accurate/fluent reading, text comprehension and spelling skills with special focus on early grades.

1.1. Predictors of later literacy acquisition

Although there are strong theoretical reasons to assume that individual differences in children's early academic skills are linked to subsequent achievement, little systematic research has been conducted to test this hypothesis. A recent and very extensive study was conducted by Duncan et al. (2007) on six longitudinal data sets for a total of more than 15,000 children from the United States, Canada and Great Britain, in order to assess the power of school-entry academic, attention, and socio-emotional skills to predict later school reading and math achievement. Across all six studies, a composite measure of reading was one of the strongest predictors (along with math and attention skills) of later achievement whereas measures of socio-emotional behaviours were generally insignificant predictors of later academic performance. Patterns of association were independent of gender and socio-economic background. Unfortunately no results are reported in this study for the predictive power of spelling measures or component skills of reading ability such as accuracy, speed or comprehension.

1.2. Stability of reading and spelling measures

Investigating which different early literacy skills significantly contribute to later academic performance can provide important information on early markers of children's subsequent underachievement. The stability of a particular literacy skill, on the other hand, is concerned with the probability that a child with poor performance in that skill in an earlier grade will perform poorly in

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the same skill in later grades. Thus it is important to know which is the most stable literacy skill.

Longitudinal studies carried out with different aims and analyzing different literacy skills (Badian, 2001; Caravolas, Hulme, & Snowling, 2001; Georgiou, Parrila, & Papadopoulos, 2008; Phillips, Norris, Osmond, & Maynard, 2002; Seigneuric & Ehrlich, 2005) found a significant link between a literacy skill assessed in Grade 1 and the same skill retested in a later grade *(autoregressive effect)*. Although these findings are suggestive of developmental stability of reading and spelling skills from Grade 1 to later grades, we do not actually know whether some measures are more stable than others, as such results come from different tests and age populations and the effects of other variables are controlled for in many studies.

1.3. Reading comprehension and other reading skills

To what extent does fast and accurate word decoding in early grades affect reading comprehension both at the same grade and later?

Although a wide range of heterogeneous linguistic and cognitive mechanisms affect reading comprehension (Goff, Pratt, & Ong, 2005; Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Klauda & Guthrie, 2008; Pazzaglia, Cornoldi, & Tressoldi, 1993; Verhoeven, Reitsma, & Siegel, 2011), it is clear that inaccurate word decoding impairs reading comprehension at an early stage of reading development (Storch & Whitehurst, 2002). The relationship between reading accuracy and reading comprehension, however, changes with development. In fact, reading accuracy accounts for a high proportion of reading comprehension variance in the lower grades, whereas factors other than word decoding contribute to reading comprehension among older children (Adlof, Catts, & Little, 2006; Gough, Hoover, & Peterson, 1996; Ouellette & Beers, 2010; Seigneuric & Ehrlich, 2005; Storch & Whitehurst, 2002). Paris, Carpenter, Paris, and Hamilton (2005) and Paris (2005) observe that this pattern of results is due to *codependency* between reading accuracy and text comprehension. Given that decoding the words is a necessary (but not sufficient) condition for understanding text, it should not be surprising that children who cannot recognize many words in a passage also cannot comprehend it. The authors claim that "… oral reading accuracy is not correlated usually or generally or simply with reading comprehension… instead it is the lack of accurate oral reading that is correlated with the lack of comprehension" (Paris et al., 2005, p. 140) thus the correlation would disappear when skilled readers are considered.

A number of researchers have also proposed a relationship between text comprehension and reading fluency, a composite measure of accuracy and speed scores (for reviews see Bashir & Hook, 2009). The best known theory concerning the role of fluency in text comprehension (LaBerge & Samuels, 1974) affirms that individuals have a limited pool of attentional resources available for any cognitive task and the more attention a reader has to focus on decoding each individual word, the less attention will be available for comprehension. Efficient fluent word recognition frees up processing resources to focus on comprehension whereas slow word recognition may place demands on remembering what is read and therefore interfere with effective comprehension. As noted earlier, factors other than decoding become important for good comprehension as decoding improves, thus the relation between fluency and text comprehension would weaken as proficiency in reading increases. This hypothesis is in agreement also with Paris et al. (2005) and Paris' (2005) *codependency* notion, described above. In fact, even though text comprehension is less dependent on reading speed than on reading accuracy (Paris, 2005), the fluency measure always includes accuracy assessment, thus the contributions of fluency and reading accuracy to text comprehension should show a similar trend. According to this view, a decline in the relationship between reading fluency and text comprehension across grades can be observed in the bivariate correlations or in the paths reported by Paris et al. (2005), Adlof et al. (2006) and Schwanenflugel et al. (2006).

As regards the longitudinal prediction of reading comprehension, Grade 1 reading accuracy seems, however, to have a significant influence on reading comprehension until Grade 3 (Muter, Hulme, Snowling, & Stevenson, 2004; Seigneuric & Ehrlich, 2005) and Grade 4 (Storch & Whitehurst, 2002). Significant correlations were also found between Grade 2 reading fluency and Grade 4 text comprehension (Adlof et al., 2006).

1.4. Studies on reading in transparent orthographic contexts

Transparent orthographies are those in which grapheme–phoneme correspondences are mainly one-to-one. Conversely, several graphemes may correspond to the same phoneme and several phonemes may be represented by the same grapheme in opaque orthographies. Some cross-linguistic studies have been conducted to explore whether the course of reading acquisition might differ across orthographies varying in the regularity between letters and sounds.

Seymour, Aro, and Erskine (2003) and Aro and Wimmer (2003) measured Grade 1 reading performance in several languages varying in orthographic depth. Results showed that reading accuracy decreased as orthographic depth increased, ranging from 90–98% of Finnish and Swedish children to 35–50% of English children. Aro and Wimmer (2003) claim that the complex grapheme–phoneme relations in the English orthography are confusing for beginning readers making phonological decoding very hard to acquire. Other cross-linguistic studies found lower reading levels for English-speaking children in early grades, comparing them with German- (Mann & Wimmer, 2002; Wimmer & Frith, 1997), Dutch- (Patel, Snowling, & de Jong, 2004), Greek- (Georgiou, Parrila, & Liao, 2008; Manolitsis, Georgiou, Stephenson, & Parrila, 2009) and Italian-speaking children (Romani, Zoccolotti, & Marinelli, 2011). Monolingual studies also confirmed Seymour et al. (2003) and Aro and Wimmer (2003) results showing that in transparent orthographic contexts reading accuracy is often close to or at ceiling before the end of the first year of formal instruction (e.g. Landerl & Wimmer, 2008; Orsolini, Fanari, Tosi, De Nigris, & Carrieri, 2006).

Other studies on transparent orthographies demonstrated that word-reading speed, not accuracy, is the reading measure differentiating between good and poor readers (e.g. Serrano & Defior, 2008; Zoccolotti et al., 1999). Moreover, Landerl and Wimmer (2008) observed high stability for word-reading speed development in a group of German children followed from Grade 1 to Grade 8.

The importance of reading speed as a marker of effective, typical reading development seems to have consequences for reading comprehension as well. Whereas several studies found significant associations between reading comprehension and reading accuracy in the opaque orthographic context (see Section 1.3), reading comprehension is more often or more strongly associated with reading speed, or reading fluency, in the transparent orthographic context (De Jong & van der Leij, 2002; Leppänen, Aunola, Niemi, & Nurmi, 2008; Müller & Brady, 2001; Verhoeven & van Leeuwe, 2008). However, some findings suggest that the contribution of reading fluency (or reading speed) to text comprehension decreases across grades even in transparent orthographies (e.g. Müller & Brady, 2001; Verhoeven & van Leeuwe, 2008). Given the importance of reading speed as marker of effective reading development in these contexts, more research is needed on the relationship between reading speed and text comprehension.