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Word and pseudoword reading in children with specific speech and language impairment



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ABSTRACT

Children with specific language impairment frequently encounter difficulties in learning to read and in particular, in word recognition. The present study set out to determine the precise impact of language impairment on word reading skills. We investigated single-word reading in 27 French children with specific speech and language impairment (2SLI). Precise quantification of reading levels in the 2SLI group showed an average delay of 3.5 years. Approximately 90% of these children were affected by a reading disorder, whereas for the remaining 10%, reading performance was within normal limits. Word reading procedures are analyzed using the so-called 'dual route model', which proposes that reading is achieved through two processes, the phonological and the orthographic procedures. Group comparison analyses of 27 reading level-matched control children, revealed an increased lexicality effect in the 2SLI group, indicating a specific deficit in the phonological procedure. Moreover, multiple case analyses revealed interindividual differences among the children with 2SLI, with four reading subtypes. Approximately 60% of these children reached the standard levels expected of younger children with identical reading levels (delayed reading profile) in both procedures. Twenty percent displayed qualitatively different reading mechanisms, with a greater deficit in the phonological procedure (phonological profile). These children showed a severe impairment in language production at the phonological level. Ten percent exhibited a greater orthographic deficit (surface profile) and 10% had normal reading skills (normal profile). Further research is required to improve our understanding of the relationships between 2SLI or specific language impairment and reading acquisition. The present results suggest that in clinical practice, both reading procedures should be exercised, with emphasis on the phonological procedure for children with more severe deficits in phonological production.

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1. Introduction

1.1. Specific language impairment

Specific language impairment (SLI) is a disorder affecting language comprehension and/or production, which occurs in children with no serious sensory or nonverbal intellectual disability, brain damage, or psycho-affective or neurological disease (Bishop, 1997; Leonard, 1998, 2000; Schwartz, 2009). Language disorders in SLI are heterogeneous (Bishop & Snowling, 2004; Botting & Conti-Ramsden, 2004; Evans, 1996; Leonard, 2009), with a wide range of clinical manifestations that vary depending on which specific fields of language (phonology, morphosyntax, semantics, and pragmatics) are selectively or simultaneously affected. Given the relationship between spoken and written language, children with SLI are at high risk of literacy disabilities. They encounter difficulties in phonological awareness (Claessen & Leitão, 2012), reading (McArthur, Hogben, Edwards, Heath, & Mengler, 2000), spelling, and written narrative skills (Bishop & Clarkson, 2003; Broc et al., 2013). The aim of the present study was to conduct an in-depth investigation of reading-aloud mechanisms in these children.

1.2. Reading

Most research into reading acquisition is based on the general framework of the 'simple view of reading' proposed by Gough and Tunmer (1986) according to which, reading comprehension is the product of two components: word decoding and listening comprehension. Therefore, written comprehension skills cannot be clearly understood without a clear understanding of the written-word identification level.

One of the prevailing models used for studying written-word identification skills is the 'dual-route model' (Coltheart, Rastle, Perry, Langdon, & Ziegler, 2001), which stipulates that reading aloud is achieved through two procedures. On the one hand, the phonological (sublexical) procedure uses knowledge of grapheme–phoneme correspondence rules, which enable children to read pseudowords (items that do not belong to their mother tongue e.g., *napo*) and unknown regular words (words that respect these rules e.g., *crib*). On the other hand, by directly accessing the written-word representation stored in the orthographic lexicon, the orthographic (lexical) procedure makes it possible to read known, regular words, such as *cat*, and irregular words, which are words that do not respect the grapheme–phoneme conversion rules (e.g., *yacht*). Although most disabled readers display deficits in both procedures, some developmental dissociations may be evidenced (Sprenger-Charolles, Lacert, Béchennec, Colé, & Serniclaes, 2001). Depending on which deficit is identified, one of two types of reading disorder can be diagnosed; phonological and surface disorders correspond to a predominantly phonological or orthographic procedure deficit, respectively.

1.3. Written word identification assessment

Two complementary methods are frequently used to evaluate single word reading skills in children with a reading disorder.

The first method is group comparison analysis, whereby performance of children with a reading disorder, as a group, is compared with that of children with typical development. Performance with regard to the phonological procedure is generally assessed by measuring two effects: The lexicality effect compares word versus pseudoword reading skills, whereas the length effect compares performance on short versus long items (words or pseudowords). In contrast, the regularity effect serves to assess the orthographic procedure: Performance in reading regular words is compared with that of irregular words. Lexicality and length effects are stronger in children with a phonological procedure deficit (e.g., dyslexic children) than in controls (Martens & de Jong, 2006; Rack, Snowling, & Olson, 1992). Indeed, pseudoword reading deficits are more pronounced than word reading deficits in dyslexic children; the reading deficit in terms of long items (words or pseudowords) is greater than that for short items, indicating an extremely slow phonological decoding mechanism (Ziegler, Perry, Ma-Wyatt, Ladner, & Schulte-Körne, 2003). In the event of impaired orthographic procedure, the regularity effect is greater (Sprenger-Charolles & Colé, 2013); the reading deficit in terms of irregular words is more pronounced than that for regular words. However, such group analyses give no indication of whether the results reflect the skills of most children or just those of one subgroup.

The second method, multiple case analysis, fills this gap by identifying reading-disorder subtypes and their prevalence (Castles & Coltheart, 1993; Manis, Seidenberg, Doi, McBride-Chang, & Petersen, 1996; Sprenger-Charolles, Siegel, Jiménez, & Ziegler, 2011). This has led to the identification of three reading profiles. The first subgroup includes children with a delayed reading profile, that is, for both procedures, their reading performance is similar to that of younger children with typical development. The second and third subgroups correspond to children with phonological and surface reading disorders, respectively.

1.4. Reading in children with SLI

As mentioned in Section 1.1, children with SLI frequently suffer from reading disorders. Prevalence data from several studies show large discrepancies, ranging from 12.5% to 85% (McArthur et al., 2000), with figures for reading disorders and

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