

Capturing the nature of the spelling errors in Developmental Language Disorder

Lucie Broc^{1*}, Nelly Joye² Julie E Dockrell², & Thierry Olive³

¹Université Côte d'Azur & CNRS, France

²UCL, Institute of Education, UK

³CNRS & Université de Poitiers, France

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Authors Address

lucie.broc@univ-cotedazur.fr (corresponding author*). Bases, Corpus, Language laboratory. Campus Saint Jean d'Angely. Bâtiment de l'Horloge. 24, avenue des diables bleus. 06357 Nice CEDEX 4. France.

nelly.joye@ucl.ac.uk and j.dockrell@ucl.ac.uk. Centre for Language, Literacy and Numeracy: Research and Practice, Psychology and Human Development, UCL Institute of Education, 25 Woburn Square, London WC1H 0AA, UK.

thierry.olive@univ-poitiers.fr. Centre de Recherches sur la Cognition et l'Apprentissage. MSHS - Bâtiment A5, 5 rue T. Lefebvre, TSA 21103, 86073 Poitiers Cedex 9. France.

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Abstract

Purpose: This tutorial provides practitioners with guidelines to understand and analyse the nature of the spelling errors produced by children with Developmental Language Disorder (DLD) across different orthographies. The main focus is to examine the extent to which the spelling errors produced by children with DLD reflect difficulties with specific components of the language system. Three questions are addressed: Do phonological representation and morphological awareness difficulties in DLD impact on spelling? What are the patterns of spelling performance in DLD? Do comorbid difficulties impact on spelling in DLD?

Methods: Sixteen studies that provided a qualitative description of the nature of spelling errors produced by children and adolescents with DLD were identified. Spelling performance was examined in relation to the control groups that were matched on age, on language features (language, spelling or reading age matched) or on co-occurring difficulties.

Results: The results of the qualitative analyses indicate that when practitioners evaluate spelling performance in children or adolescents with DLD there are three factors which should be considered: phonological representations, morphological awareness and reading skills.

Conclusions and clinical implications: The present paper highlights the key elements that need to be considered when practitioners examine spelling difficulties and provides benchmarks for assessment in a range of alphabetic languages for school-aged children.

Why study spelling in Developmental Language Disorder?

Children with Developmental Language Disorders (DLD) experience difficulty in acquiring language at the same rate as their peers, despite appropriate environmental stimulation and in the absence of neurological impairments (Bishop, Snowling, Thompson, Greenhalgh, & CATALISE-2 Consortium, 2017; Leonard, 2014). Research has typically focused on children's oral production and comprehension capturing difficulties experienced with phonology and morphosyntax (Caccia & Lorusso, 2019; Delage & Durrleman, 2018; Macchi, Casalis & Schelstraete, 2019; Wright, Pring & Ebbels, 2018). More recently research has begun to show that, in addition to their difficulties with spoken language, children with DLD also encounter difficulties in producing written text (Dockrell, Lindsay, Connelly, & Mackie, 2007; Mackie, Dockell, & Lindsay, 2013; Puranik, Lombardino, Altmann, 2007; Scott & Windsor, 2000).

These difficulties with the production of written text manifest themselves from the initial stages of learning to write in preschool (Boudreau & Hedberg 1999; Cabell, Justice, Konold, & McGinty, 2011) and are associated with difficulties in other emergent literacy skills such as alphabet knowledge and the concept of print (Cabell, Lomax, Justice, Breit-Smith, Skibbe, & McGinty, 2010). Furthermore, compared to age-matched peers, children with DLD experience a delay in starting to write (Cordewener, Bosman, & Verhoeven, 2012a). Despite the increasing research examining the written texts of children with DLD, the factors which underpin the spelling errors produced by these children are underexplored. This is regrettable as spelling difficulties affect writing directly and school performance generally (Savolainen, Ahonen, Aro, Tolvanen, & Holopainen, 2008).

In a recent meta-analysis, Joye, Broc, Olive and Dockrell (2019) examined the developmental patterns of spelling development in children with DLD and the sources of variation in spelling performance across different orthographies. They confirmed that children

with DLD experienced problems with spelling in comparison to age-matched peers but not language-matched peers. Moreover, they corroborated the impact of phonological and reading skills on spelling in children with DLD and suggested that difficulties in nonphonological skills may also have an impact on spelling performance. The meta analysis highlighted the need for further studies to understand the nature of these spelling difficulties. Of particular relevance to the current tutorial, the authors emphasized the need for studies that focused on the nature of the students' spelling errors. Furthermore, it was recommended that future studies should provide a detailed description of the groups of children with DLD to capture comorbidity with other disorders (phonological or reading impairment for instance) and should include a spelling ability match, to understand the extent to which the spelling errors made by children with DLD reflect typical or atypical patterns of development.

The current tutorial focuses on a qualitative analysis of the spelling patterns of children with DLD. An important consideration for both theory and practice is whether the spelling errors of the children who are assessed reflect a difficulty with specific language components which, as a result, should be the target of intervention to support their spelling. Three questions are addressed: Do phonological representation and morphological awareness difficulties in DLD impact on spelling? What is the pattern of spelling performance in DLD? Do comorbid difficulties impact on spelling in DLD? We aim to address these questions by reviewing findings of sixteen studies¹ that were selected in the literature because they provided a qualitative description of the nature of spelling errors produced by children and adolescents with DLD. Spelling performance was examined in relation to the control groups that were matched on age, on language features (vocabulary, spelling or reading age matched) or on co-occurring difficulties.

¹ These studies are marked with asterisks in the reference list.

Do phonological representation and morphological awareness difficulties in DLD impact on spelling?

In alphabetic systems the combination of written symbols represents oral language (Treiman & Bourassa, 2000). In this way, phonological representations reflect both knowledge of how to segment spoken words and the knowledge of the correspondences from phonemes to graphemes in words (Bear, Invernizzi, Templeton, & Johnston, 2012). Usually, to correctly spell words, writers must resort to phonology but they also need to process word parts (morphemes) that signal grammar and meaning (Garcia, Abbott, & Berninger, 2010). Writing words therefore requires sensitivity to letter sequences and to clusters of letters within a word, and also engages morphological knowledge, namely the capacity to analyse and manipulate the morphemic elements in words (Bahr, Silliman, Berninger & Dow, 2012). A deficit in any of these skills therefore can impact on the ability to write and spell words correctly.

To further understand whether the difficulties that children with DLD have with phonological representation and morphological awareness impact on spelling, some authors compared them to spelling-matched peers. Silliman, Bahr and Peters (2006) assessed different type of spelling errors produced by English children with DLD from 6 to 11 years old and their spelling-matched peers: phonological accuracy (e.g. “*kep*” for “*keep*”), orthography legality (e.g. “*pri*” is orthographically legal, but “*tdpmnf*” is orthographically illegal) and morphological spelling errors (e.g. “*fowned*” for “*found*”). Thirty words were dictated within a sentence context to the participants. English children with DLD produced more morphological spelling errors (26%) than their spelling-matched peers (17%). In contrast there was no difference between children with DLD and their spelling-matched peers in orthographical legality. These results suggest that, compared to spelling-matched peers,

English children with DLD are specifically challenged by inflexional morphology in their spelling. The authors suggested that this finding could reflect a morphological deficit.

In another study conducted in English, Larkin, Williams and Blaggan (2013) asked children with DLD (9 years old) and spelling-matched peers (7 years old) to perform a non-word spelling task and a morphological spelling task. In the non-word spelling task, the participants had to write 10 nonwords from Treiman and Bourassa (2000) early spelling task, and in the morphological spelling task the children had to write 6 words (sail, chase, race, puff, kick and bake) as bare stems and with inflected forms *ed*, *-ing* and *-3s*. The authors measured the number of phonologically unacceptable spelling errors, orthographic spelling errors (to assess their ability to apply orthographic rules with unfamiliar items), and morphological spelling errors. Children with DLD made more phonologically unacceptable spelling errors on the nonwords (20.06%) than their spelling-matched peers (4.59%). Furthermore, with morphological spelling, children with DLD spelled stem words less accurately (19.3%) than their spelling-matched peers (29.3%). They were also poorer in producing verb inflexions “*-ed*” and “*-ing*” with more omissions and errors than their spelling-matched peers. Both the data from Larkin et al. (2013) and Silliman et al. (2006) indicate that compared to spelling matched peers children with DLD experience problems with inflexional morphology. There is less consistency between the studies in terms of phonology. This may reflect the fact that Larkin et al. (2013) used non-words which children must use phonology to spell.

Because reading proficiency is known to support spelling development, Mackie, Dockrell and Lindsay (2013) compared English children with DLD to reading-matched peers. The authors assessed the nature of spelling errors produced in a written text by English children with DLD (*Mean Age* = 10.8 years old) and children matched on single word reading (*Mean Age* = 7.8 years old). They counted the proportion of phonologically unacceptable

spelling errors (when there was no possible sound for grapheme correspondence, e.g. “*clars*” for “*clouds*”), orthographically unacceptable spelling errors (when the sequence of letters was not permissible in English, e.g. “*wusz*” for “*once*”) and inflectional morphological spelling errors (omissions of “*-ed*”, “*-ing*” on the verb and “*-s*” on the nouns). English children with DLD produced more phonologically unacceptable spelling errors ($M = 0.59$; $SD = 0.35$) and more inflectional morpheme omissions on past tense “*-ed*” ($M = 0.22$; $SD = 0.01$) than their reading-matched peers (respectively $M = 0.45$; $SD = 0.35$ and $M = 0.03$; $SD = 0.22$). By contrast, children with DLD did not produce more orthographically unacceptable spelling errors ($M=0.07$; $SD = 0.13$) than their reading-matched peers ($M = 0.03$; $SD = 0.09$).

Tasks to assess spelling difficulties in children with DLD vary but overall the data suggest that at the end of elementary schools problems in spelling are evident across both phonological and morphological aspects of spelling in English. These difficulties in written word production reflect the problems that children with DLD have with oral language (Bishop, 1992; Botting & Conti-Ramsden, 2004; Leonard, 2014).

Patterns of spelling performance in DLD

Most recent model of spelling development, Triple Word Form Theory (Berninger & Abbott, 2010; Garcia, Abbott, & Berninger, 2010; Richards et al., 2006) suggests that children are able to use phonological, lexical and morphological skills in parallel early on and coordinate these skills to produce words on paper accurately. As children develop, they gain more explicit control over these skills. In this model both the phonological (phoneme to grapheme conversion: e.g. translate /sku:l/ in “school”) and the lexical (recognition of known words by sight alone) routes process information in parallel (Daffern, Mackenzie, & Hemmings, 2015). Learning to spell includes the acquisition of specific features in term of word roots spelling (phonological and lexical routes; e. g. “boy”) but also of inflexional morphological spelling and derivational morphological spelling (ref). Inflectional

morphological spelling corresponds to the variable part in the end of the word, the one that marks a grammatical function (e.g. “two boys”). In contrast, Derivational morphology occurs at the beginning or end of a word and produces semantic changes by transforming the grammatical form of a word (e.g. “**school**boy”). However languages differ in their orthographic depth and this has a direct impact spelling development (Katz & Frost, 1992, Schmalz, Marinus, Coltheart, & Castles, 2015; Ziegler & Goswami, 2005).

Seymour, Aro and Erskine (2003) defined orthographic depth as the contrast between alphabetic writing systems with one-to-one phoneme-grapheme correspondence (e.g. Spanish and Italian) and those with inconsistent and complex orthographies (e.g. English and French). The authors suggested a continuum to classify languages orthographic depth from the more transparent to the more opaqueopaque. Table 1 shows an excerpt of the orthographic depth classification from Seymour, Aro, and Erskine (2003).

Table 1. Excerpt of the languages classification relative to orthographic depth, from Seymour, Aro and Erskine (2003). A continuum from transparent to opaque orthographies.

Transparent orthography		Opaque orthography	
--	-	+	++
Italian	Swedish	French	English
Spanish			

In transparent orthographies, such as Italian, spelling is based on the word pronunciation, whereas in opaque orthographies, such as English or French, these consistencies are less evident. The majority of studies on spelling of children and adolescents with DLD have been conducted in English. Importantly studies conducted in other languages such as Italian, Spanish, Swedish and French can establish whether the difficulties experienced in the spelling of participants with DLD in English are a general feature of DLD or are manifested in different ways across orthographies.

Given the variability between studies in terms of tasks used, language target, age of DLD participants and age of their matched peers, detailed analysis of the results is needed. The sections below considers the impact of studies characteristics on the spelling performance in turn. Studies have been conducted in dictated tasks will be presented in first and then those conducted in written narratives. Indeed the results obtained in these two types of tasks cannot be analyzed in the same way because they do not mobilize the same written constraints: in dictated task the words to be written are imposed, while in written narratives the children choose their words.

When written task is dictated

Because it can be assume that difficulties in spelling performance in children with DLD do not appear in the same proportion depending on the orthographic depth of language target, studies conducted in opaque orthographies (English and French) will be presented in first and then these conducted in transparent orthographies (Sweden, Spanish and Italian), based on the orthographic depht continuum from Seymour, Aro and Erskine (2003).

In opaque orthography, Critten, Connelly, Dockrell and Walter (2014) asked to English children with DLD from nine to 10 years old matched on both language-age from six to eight years old and chronological-age, to write 24 dictated words containing inflectional morphemes (12 regular past tense *-ed* and 12 regular plural *-s*) and 18 words containing derivational morphemes (6 with orthographic shift, 6 with phonological shift and 6 with phonological and orthographic shifts). Authors assessed the phonologically acceptability of the spelling errors and the grapheme omissions. Regarding the phonologically acceptability children with DLD produced more phonologically unacceptable spelling errors than both their age-matched and their younger language-matched peers. Regarding the production of spelling errors in inflexional morphology children produced more spelling errors than their age-

matched peers but not than their language-age matched. On contrary, in derivational morphology children with DLD produced more spelling errors than both their age-matched peers and their younger language-age matched peers.

In French, Broc et al. (2013) compared spelling performance of children with DLD from seven to 11 years old and teenagers from 12 to 18 years old to both their age-matched peers in a dictation of ten regular words and ten irregular words. In regular words the spelling can be derived applying one-to-one sound-letter correspondences when in irregular words it can't. From seven to 18 years old participants with DLD and their age-matched peers produced both more spelling errors on irregular words than on regular words. About the phonologically acceptability of spelling errors the spelling performance of children with DLD differ between childhood and adolescence. From seven to 11 years children with DLD produced more phonologically unacceptable spelling errors per word than their age-matched peers both in regular and in irregular words. From 12 to 18 years old it can be observed the proportion of phonologically unacceptable spelling errors decreases in both participants with DLD and their age-matched peers. Teenagers with DLD produced not very many phonologically unacceptable spelling errors as their age-matched peers.

In transparent orthography, Nauc ler (2004) assessed spelling performance of Swedish children with DLD from six, eight, nine and 17 years old matched on age-matched peers. The authors did not specify the nature of words dictated. In every age group participants with DLD produced twice as many phonologically unacceptable spelling errors than their age-matched peers did (Nauc ler, 2004). This longitudinal study has shown that the number of phonologically unacceptable spelling errors decreases with age: participants with DLD produced 67% of phonologically unacceptable spelling errors at the age of six but only 37% at 17 years old (Nauc ler, 2004).

In Italian, Brizzolara et al. (2011) asked to adolescents with DLD (Mean Age: 16.5 years old) matched on age-matched peers to write 70 regular words for which the correct orthography could be derived applying one-to-one sound-letter correspondences (e.g., “s/o/l/e” -sun), 10 regular words requiring syllabic conversion rules (e.g., “gh/i/r/o” - dormouse) and 55 irregular words with unpredictable transcription according to phonology-to-orthography conversion rule (e.g., “cuore” -heart- may be phonologically plausible written either as “cuore” or “quore”). The results indicated that adolescents with DLD as their age-matched peers performed perfectly in spelling of regular words with one-to-one sound-letter correspondences. In irregular words even if adolescents with DLD produced just 12% of misspelled words they performed worst than their age-matched peers (6% of misspelled words).

In sum in written tasks dictated, one of the spelling errors patterns of children with DLD is that they produce phonologically unacceptable spelling errors. However this error pattern did not appear in the same proportion depending of the age of the participants and the nature of the words dictated. First, on growing up participants with DLD, as their age-matched peers, produced less and less phonologically unacceptable spelling errors. Secondly, children with DLD produced less phonologically unacceptable spelling errors when the spelling can be derived applying one-to-one sound-letter correspondences than when the phoneme-grapheme correspondence is irregular. And finally, children with DLD seem to be more in difficulty in derivational morphological spelling than in inflexional morphological spelling. This last point have to be completed by results obtained in written narrative tasks.

When task is written narrative

Studies used written narratives in participants with DLD have been mainly conducted in opaque orthographies, only one has been conducted in transparent orthography. On one

hand, authors focused on phonologically unacceptable spelling errors produced. And on the other hand they focused on inflexional morphological spelling errors produced.

Phonologically unacceptable spelling errors.

In opaque orthographies, Mackie and Dockrell (2004) compared in narratives from pictures, spelling performance of English children with DLD (*Mean Age* = 11 years old) matched on language-peers (*Mean Age* = 7.3 years old) and age-peers. Children with DLD produced more phonologically unacceptable spelling errors both than their language-matched peers and their age-matched peers. This pattern of spelling errors did not found in the same proportion by Dockrell and Connelly (2015) in standardized narrative task.

Dockrell and Connelly (2015) compared spelling performance of English children with DLD who were 10 years old to both their vocabulary-matched peers who were 7.11 years old and their age-matched peers. Children with DLD did not produce more phonologically unacceptable spelling errors than their younger vocabulary-matched peers but more than their age-matched peers.

In narrative of personal event, Broc et al. (2013) compared the number of phonologically unacceptable spelling errors produced by French participants with DLD from seven to 11 years old and from 12 to 18 years old to those produced by their age-matched peers. They did not find significant difference between the two groups in childhood and in adolescence (Broc et al., 2013).

In transparent orthography, based on a tale, Soriano-Ferrer and Contreras-González (2011) assessed the number of phonologically unacceptable spelling errors produced by Spanish children with DLD aged from 7 to 9 years old compared to age-matched peers. Children with DLD produced more phonologically unacceptable spelling errors than their age-matched peers but, like them, children with DLD performed better when phoneme-

grapheme correspondance was regular than in arbitrary spelling when the phoneme-grapheme correspondance was irregular. The regularity of the phoneme-grapheme correspondance is very common in Spanish. The authors showed that children with DLD, as their age-matched peers, are sensitive to this regularity because they produced four times as many errors when the phoneme correspondance was irregular than when when phoneme-grapheme correspondance was regular.

In written narrative task children with DLD produced phonologically unacceptable spelling errors. This spelling pattern has been observed in childhood and in standardised narrative task. When author used narrative of personal event phonologically unacceptable spelling errors did not appear. Furthermore the only one study conducted in transparent orthography allows to highlight that children with DLD are sensitive to the regularity of the phoneme-grapheme correspondance.

Inflexional morphological spelling errors.

Only studies conducted in opaque orthographies have been looking for inflexional morphological spelling errors. In Mackie and Dockrell (2004) children with DLD produced more grammatical omissions than their both language-age and chronological age-matched peers. These omissions were either ending omissions such as *-ing* and plural *-s*, or omissions of the verb “*to be*” when it was necessary in past tense. In Dockrell and Connelly (2015) children with DLD did not produce more grammatical spelling errors than their vocabulary-matched peers but they produced more than their âge-matched peers. These results converge with those of Windsor, Scott, and Street (2000) who assessed, in written spontaneous narrative, spelling performance of children with DLD from 10 to 12 years old compared to both younger children from seven to 10 years old matched on language level and age-matched peers.

Indeed, Windsor, Scott, and Street (2000) have found that spelling performance of children with DLD did not differ to their younger language-matched peers for the third person singular “-s”, use of the verb “*to be*”, and use of articles (a, an, the). In contrast, when authors compared children with DLD to participants matched on chronological age their inflectional morphological spelling performance was always worse: children with DLD produced more omission on “-ed” and more omission on “-s” in regular plural nouns than their age-matched-peers. With irregular verbs children with DLD omitted the irregular verbal mark (“*grow up*” instead of “*grew*”) and when participants attempted to mark tense it was based on the regular ‘ed’ form instead of the irregular form (“*he standed*” instead of “stood”). Errors were also produced on the noun composite in children with DLD, with a majority being omissions of the plural mark (-s).

Broc et al. (2014) compared inflexional morphological spelling errors in narrative of personal event produced by French participants with DLD from seven to 11 years old and from 12 to 18 years old to those produced by their age-matched peers. French children with DLD also produced more inflectional spelling errors than their age-matched peers but just between the ages of 7 and 11. In adolescence, from 12 to 18 years old, there were no significant difference between children with DLD and their age-matched peers.

Results suggest that participants with DLD experience a developmental delay in their accurate spelling of inflexions. Error patterns are similar to younger language matched peers but more frequent than their age-matched peers. This results is in favour to a developmental delay in DLD in morphological spelling.

Do comorbid difficulties impact on spelling in DLD?

Traditionally the identification of ‘Specific Language Impairment’ (SLI) involved the use of exclusionary (e.g. absence of behavior problems) and inclusionary criteria (e.g average non- verbal ability). However, research has shown that these criteria were often arbitrary and

did not reflect clinical reality. Bishop, Snowling, Thompson, and Greenhalgh (2016) highlighted that assessment and intervention have to give a full picture of the child's needs. Indeed, if the co-occurring problems were documented, practitioners could adapt their intervention strategies as required. Bishop, Snowling, Thompson, and Greenhalgh (2017) suggested to use the term of 'Developmental Language Disorder' (DLD) which can be endorsed when the language disorder co-occurs with other developmental difficulties. Few studies have included participants with DLD and with another difficulty: phonological impairment or dyslexia. The following section examines these studies and assesses the impact of phonological impairment and dyslexia on the spelling performance of children with DLD.

Phonological impairment

Bishop and Clarkson (2003) compared the nature of the spelling errors produced by twin children with DLD from 7.5 to 13 years (pure DLD, DLD with phonological impairment, pure phonological impairment resolved DLD) and their language-matched peers from seven to 12 years old. The authors examined whether spelling difficulties related to the severity of DLD or to their phonological problems. They measured phonologically unacceptable spelling errors and grammatical errors (omissions of obligatory word / inflections produced on inflectional morphology on verb/pronoun agreement/tense/case). The results showed that the English children with only DLD and children with DLD and phonological impairment produced a higher proportion of phonologically unacceptable spelling errors than their controls. On contrary, children with only a phonological impairment and children with resolved DLD did not produce more phonologically unacceptable spelling errors than their language-matched peers. In inflectional morphological spelling, there was no difference between any of the children. This highlights that in English, phonological impairments added

to the impact of DLD in the production of phonologically unacceptable spelling errors but not in the production of inflexional morphologically spelling errors.

Dyslexia

Caravolas, Hulme, and Snowling (2001) showed that reading supports orthographic knowledge in spelling development, suggesting that decoding is a good predictor of learning orthography consistent rules. Some authors have compared spelling performance between children only with DLD, children with DLD and dyslexia, and children only with dyslexia. Results do not vary depending on the language target.

In opaque orthography, McCarthy, Hogan, and Catts (2012) compared the nature of spelling errors produced by English children with DLD, children with dyslexia, children with both DLD and dyslexia (D + DLD) and their age-matched peers (9 years old) in a word dictation task. The authors explored whether the groups of children had the same spelling errors patterns. They assessed phonological unacceptable errors (with added or omitted grapheme), orthographical unacceptable errors (incorrect sound-symbol correspondences, incorrect rules for combining letters, incorrect patterns that govern spelling within the root or base word, and incorrect positional constraints on spelling patterns), mental-graphemic representation errors (phonetic spelling of a non-phonetic word, incorrect spelling of unstressed syllables and vowels preceding “n”, “g”, “r”, “l”, and any example of where one “just needs to know it is spelled that way”), and semantic awareness errors (correct spelling that indicates the wrong meaning of the word used). Children with DLD and dyslexia and the children only with dyslexia produced more phonologically unacceptable spelling errors than children only with DLD and their age-matched control. In English, dyslexia increased the spelling difficulties and led to the production of more phonologically unacceptable errors.

In transparent orthography, in both Scuccimara et al. (2008) and Chilosi et al. (2009) compared spelling performance in Italian children with only dyslexia, children with dyslexia and a history of DLD children, and age-matched peers. Scuccimara et al. (2008) dictated 40 high frequency, concrete words with a regular orthographic structure and 40 nonwords) to seven year olds. The authors categorized the nature of spelling errors as phonologically unacceptable spelling errors (substitution, omission, insertion or inversion of vowel, consonant, or syllable) and non-phonological spelling errors (incorrect grapheme, illegal segmentation, stress misplacement or insertion of double consonant). Both the children only with dyslexia and those with dyslexia and a history of DLD produced more spelling errors across the categories than their age-matched peers. Moreover, in terms of the production of non-phonological spelling errors children with dyslexia with a history of DLD produced more spelling errors (22%) than children only with dyslexia (14%). However, there were no differences between the two dyslexic groups in phonologically unacceptable spelling errors.

These results indicate that in Italian, as in English, when children with dyslexia and a history of DLD and children only with dyslexia are compared to age-matched peers phonologically unacceptable spelling errors are an area of significant weakness for both cohorts. Chilosi et al. (2009) dictated 48 words and 24 nonwords to 26 children dyslexia and DLD and 20 children only with dyslexia (*mean age* = 10.4 years old). Both groups produced more spelling errors on non-words (respectively 32% and 29% of spelling errors) than on real words (respectively 26% and 22% of spelling errors). In sum, studies conducted with English and Italian children comparing children with DLD, DLD and dyslexia and dyslexia alone highlight three points: children with DLD, dyslexia and both DLD and dyslexia perform more poorly than the control groups; children with DLD only perform better than children with DLD and dyslexia and those with dyslexia alone; and no differences have been noted between children with DLD and dyslexia and children only with dyslexia. Co-occurring difficulties

with reading and DLD impact on spelling performance in both opaque (English) and transparent (Italian) orthographies.

Conclusions and clinical implications

The aim of this tutorial was to examine the nature of the spelling errors produced by children DLD. The objective is to consider the influence of the language target and comorbid difficulties in phonology and literacy.

- 1) Phonological representations and morphological awareness are features of the children's language difficulties which impact on spelling. English children with DLD experience a deficit with both phonological representation and morphological awareness in comparison with younger children matched on spelling level and matched and on reading level. Practitioners have to consider both of them when they evaluate language in children with DLD.
- 2) Overall, across tasks used and languages, one of the spelling errors patterns found in the written of children with DLD is that they produce phonologically unacceptable spelling errors. This error pattern has been considered to be a hallmark of DLD. Furthermore, there is a delay in inflexional morphological spelling development in children with DLD. Finally, it can be noticed that in derivational morphological children with DLD seem to experience language-base problem. Indeed, they produce more derivational morphological spelling errors than their younger peers matched on language level.
- 3) When children with DLD have comorbid problems with phonology or dyslexia these comorbid problems impact on spelling. Phonological impairments in children with DLD increases the number of phonologically unacceptable spelling errors. When children have both dyslexia and DLD, they produce more phonologically unacceptable spelling errors than when they have dyslexia only.

Accordingly, we suggest the following checklist for the assessment of spelling skills in children with DLD (see Figure 1). It is evident that the suggested procedure will be relevant to other populations and indeed form the core of most spelling assessments. However, in the light of the literature reviewed in the present paper, we wish to stress the importance of identifying specifically the type of phonological and morphological errors produced by children with known or suspected language difficulties. This should allow practitioners tailoring interventions that target specifically those phonological and morphological features difficult to them.

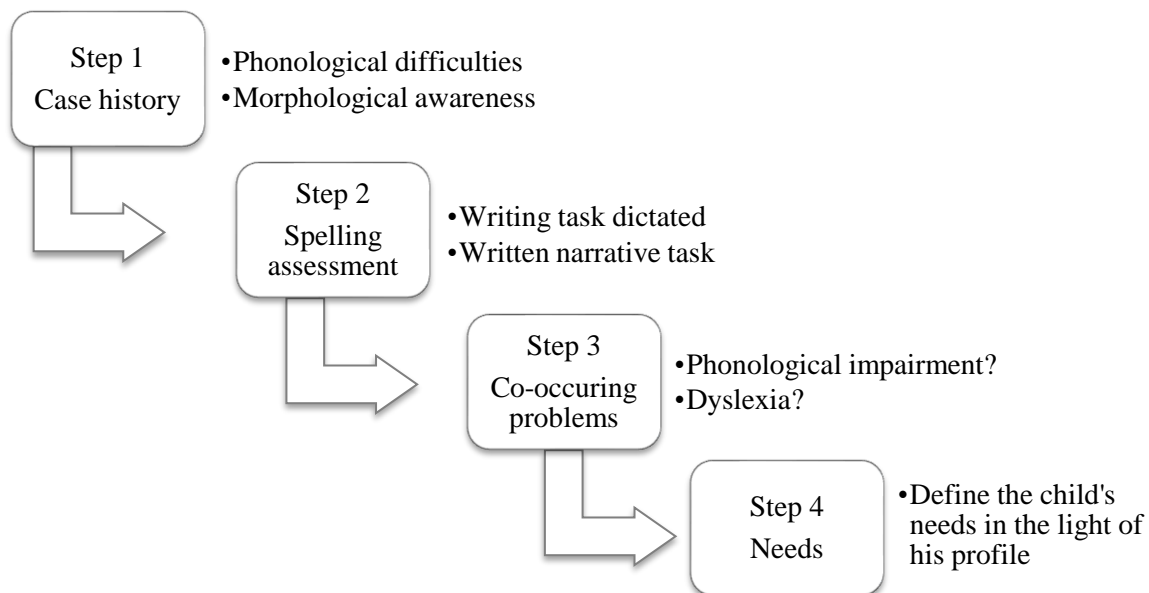


Figure 1. Spelling assessment steps.

In Step 1, it is important to capture information about the child's history with language difficulties.

- Are there difficulties in phonological representations?
- Are there difficulties in morphological awareness?

In Step 2, a qualitative analysis of the child's spelling errors is important.

- Phonological acceptance of spelling errors could be assessed by both dictated task or written narrative task. It should be noted that written narrative of personal event task appears to be less sensitive than others types of written narratives tasks (from pictures, based on tale or standardised).
- Inflexional morphological spelling could be assessed in written task narratives. . Practitionners may assess and control the presence of grammatical word ending omissions (-s, -ing and -ed in English but vary depending on the language target).
- Derivational morphological spelling could be assessed in task dictated with a context sentence. Practitionners may assess the knowledge of word base and derivational prefixes/suffixes spellings.
- When scores are below standard scores in words dictation or in writing text or in both, go to Step 3. In this step, we suggest to control the presence of co-occurring problems. Firstly, we suggest to control whther children encounter phonological impairments and/or dyslexia. A co-occurring problem could explain part of their spelling difficulties and should therefore generate specific care needs for the child.

Finally in Step 4, practicionners can determine a complete spelling needs profile with regard of history and language features, by taking into account the presence or not of a co-occurring problem. This complete spelling profile has to allow practicionners to define a care as close as possible to the child's needs.

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Conflict of interest: The authors declare that they have no conflict of interest in relation to this article

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