



Individual differences in lexical and grammar spelling across primary school

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ABSTRACT

To successfully spell in an inconsistent orthography like French, students must learn to negotiate not only lexical spelling but grammatical spelling, too, with morphological markers that are often silent. We sought to examine different acquisition profiles, based on children's lexical and grammatical spelling development in Grades Three and Five. We used latent profile analysis to examine the relationship between lexical and grammatical spelling development in primary schoolchildren in France, by asking 244 children third and fifth graders to complete a series of tasks assessing their lexical and grammatical spelling performances. The latent profile analysis revealed different groups of spellers who differentially managed lexical and grammatical spelling, and more individual differences in spelling performances in Grade Three than in Grade Five. These findings are discussed in the light of previous findings on spelling development in nontransparent orthographies, in terms of different profiles in learning and mastering written language.

1. Introduction

The development of orthographic skills is crucial for children's literacy acquisition, as it gradually facilitates writing processes and reading activities (Graham & Santangelo, 2014; Stage & Wagner, 1992). However, producing correct orthographic forms can take many years, particularly when children have to learn a written language that is characterised by an inconsistent orthography at the lexical (e.g., English, French and, to a lesser extent, Danish and Portuguese) and/or grammatical (e.g., French, where morphological markers are often silent) level.

Owing to their respective characteristics, lexical spelling and grammatical spelling appear to have different developmental curves, characterised by individual differences stemming from the use of different strategies at different moments (Chambers, 1910; Juul & Elbro, 2004; Keuning & Verhoeven, 2008; McGeown, Medford, & Moxon, 2013; Norwalk, DiPerna, Lei, & Wu, 2012; Steacy et al., 2017). These observations raise the question of the nature of the skills involved in these two kinds of spelling. Does the processing of different aspects of the written language rely on a single set of skills or on two different skill sets? If we are to answer this question, which has major implications at the educational level, we need to identify students' different lexical and grammatical spelling profiles, and find out whether there is a

dissociation between lexical and grammatical performances. The fact that some children can be proficient in lexical processing but not in grammar, and vice versa, certainly suggests that two different skill sets are involved in the development of children's orthographic expertise in French.

1.1. Development of orthographic skills and individual differences

For many alphabetic languages, particularly French, producing words in sentences requires two main categories of orthographic knowledge: knowledge about words as isolated units, and knowledge about how to inflect and link words in a sentence using adequate morphological rules. These two main categories of knowledge subtend lexical and grammatical spelling, respectively.

1.1.1. Lexical spelling

Learning any alphabetical writing system means understanding how the written language represents the spoken language, and beginning readers and spellers rely heavily on the phonological rules that describe letter-sound correspondences (Sprenger-Charolles, Siegel, & Bonnet, 1998). In the case of transparent languages such as German, Croatian or even Finnish, the quasi-bijection of grapheme-phoneme correspondences allows learners to read and write a great many words

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simply by establishing correspondences. In nontransparent languages such as English, French and, to a lesser extent, Portuguese and Danish, using phoneme-grapheme correspondences allows phonologically plausible spellings to be produced, but not necessarily proper spellings. In French, for example, this strategy only allows about half of all words to be properly spelled (Véronis, 1988). There are three main reasons for this: many phonemes can be written differently (e.g., *o*, *au*, *eau* or *ot* for /o/); pairs of consonants seldom have phonological correspondences (e.g., *ule* as in *formule* and *ulle* as in *bulle* are pronounced the same); and silent letters are very frequent in French, especially at the ends of words (e.g., *bavard*, *foulard*, *filles*, *dansent*). This contrasts with English, in which silent letters can occur anywhere in a word (Jaffré, 2005). According to Sénéchal and Gingras (2014), 28% of French words end with silent letters, and they are a major cause of inconsistency (Peereman, Sprenger-Charolles, & Messaoud-Galus, 2013). A study conducted among French-speaking first, second and third graders by Sénéchal, Gingras, and L'Heureux (2016) confirmed that children have difficulty using silent-letter endings when spelling pseudowords, as the absence of phonological cues makes it harder to retrieve the silent forms from memory.

Learning and mastering spelling in an inconsistent language is complex and requires different types of knowledge and skills (Bosman, 2005; Frisson & Sandra, 2002; Kemps & Bryant, 2003; McCutchen & Stull, 2014; Nunes, Bryant, & Bindman, 1997; Sandra, Frisson, & Daems, 1999; Sénéchal et al., 2016; Seymour, Aro, & Erskine, 2003; for a review, see Treiman & Kessler, 2014). Even though phonology still mediates spelling and reading (Bosman & Van Orden, 1997), and alphabetical decoding represents an essential self-learning mechanism for processing new words (Ehri, 1992; Share, 1995, 1999), young children also need graphotactic knowledge, if they are to analyse the context in which a word segment appears and choose between alternative spellings (Treiman, 2017).

According to the classic step-by-step approach, the development of lexical spelling involves acquiring, implementing, and consolidating a strategy based on alphabetic calculation via the sublexical route (Ehri, 2000; Frith, 1980; Gentry, 1982). With the gradual automatization of reading during the learning process, combined with the inefficiency of phonological rules for irregular words, this alphabetic strategy is eventually supplemented by an orthographic memorisation strategy via the lexical route. According to the dual-route model developed by Rapp, Epstein, and Tainturier (2002), these two routes operate in an integrated way, rather than independently, both remaining active during word production.

This step-by-step concept of lexical spelling development, associated with the notion that symbolic representations of words are stored in a mental lexicon, is subject to some debate. Learning to spell can also take place through the early, continuous and inherent integration of the multiple phoneme-grapheme relations and graphic-orthographic regularities (Olson & Caramazza, 1994). According to this concept, based on a connectionist approach, lexical spelling development is the consequence of very basic learning mechanisms, rather than complex cognitive mechanisms. Indeed several computer applications using very simple principles of basic associative learning, where sublexical phonological units and sublexical orthographic units are connected by transitional units, have been used to simulate frequency and regularity effects, with performances similar to those of dyslexic individuals (see, for instance, Brown & Loosemore, 1994; Bullinaria, 1997; Houghton & Zorzi, 2003). According to Treiman (2017) the weakness of the step-by-step and phase accounts is that they disregard nonphonological knowledge, suggesting that it only emerges in the lattermost phase of development. By contrast, the connectivity approach allows for the concept of statistical learning, based on the very early integration of multiple sources of information, such as the phonological, graphotactic and morphological patterns inherent to words that young children are exposed to from early childhood (Treiman & Kessler, 2014).

Although the development of the lexical skills involved in reading

and writing follows a general pattern, there are individual differences, leading to the implementation of different strategies from one child to another, at any given point in development. In the early years of the last century, Chambers (1910) described the considerable heterogeneity of seventh and eighth graders' performances on tasks such as word spelling to dictation. More recently, Keuning and Verhoeven (2008) sought to identify the factors behind individual differences observed in the performances of Dutch students in Grades Two to Six (7–12 years), on a spelling test of 120 items. Their analysis of the contributions of sex, ethnicity and reading skills showed that variations in word reading skills were the sole cause of interindividual differences in spelling development during primary school.

For their part, when McGeown et al. (2013) studied the errors made by 6- to 8-year-old children during the reading and spelling of 40 irregular words, they found that differences in reading and spelling performances were predicted by variations in basic cognitive skills such as decoding (sustaining a phonological strategy) and orthographic processing (sustaining the orthographic strategy). In a recent study, Steacy et al. (2017) found that interindividual differences observed in English-speaking fifth graders during a 50 irregular word reading task were predicted both by child-related variations, such as nonword reading skills, orthographic coding skills and vocabulary extent, and by the features of the words being read which, depending on their frequency and grapheme-phoneme transparency, elicited different reading strategies. Individual differences emerge at a young age and characterize children's early literacy skills. When Norwalk et al. (2012) followed a group of preschool children for 6 months, they used latent profile analysis to demonstrate the stability of three profiles of children (from more disadvantaged households) who performed differently on expressive vocabulary, letter knowledge and phonological awareness at the beginning of the school year (see also Cabell, Justice, Konold, & McGinty, 2011).

Other individual differences in the development of lexical skills have been described, where there is a dissociation between reading and spelling performances. In almost all alphabetic languages, spelling is a more complex activity than reading - an asymmetry that can be explained by the fact that there are generally more possible spellings than possible readings for a given word (Bosman, 2005; Conrad, 2008; Martin-Chang, Ouellette, & Madden, 2014; Ouellette, 2010). Even if studies have shown that reading and spelling performances are closely correlated ($r = 0.77-0.86$; for a review, see Ehri, 1997), a more detailed analysis of the distribution of these performances reveals dissociated profiles across individuals. Studies with German-speaking children (Moll & Landerl, 2009; Wimmer & Mayringer, 2002) have reported the existence of both patterns, with *good readers/poor spellers* making up 3–7% of their samples, and *poor readers/good spellers* making up 4–6% of their samples. It should be noted that Moll and Landerl (2009) identified a higher percentage of these so-called *dissociation profiles* (good readers/poor spellers and vice versa) in Grade Two than in Grades Three or Four. For these authors, this reduction in dissociation with grade could be due to greater consistency in teachers' spelling interventions starting in Grade Three. In a study of a large population of French fifth graders (> 1500), Fayol, Zorman, and Lété (2009) found a close overall correlation between lexical reading and spelling, but also a double dissociation in a small proportion of individuals (about 8% of the sample) who were either good at reading and poor at spelling, or poor at reading and good at spelling. This result suggests that the lexical skills involved in reading and spelling may be closely related at the group level, but differ in a small number of people, once again indicating the presence of individual differences.

1.1.2. Grammatical spelling

Whereas lexical spelling relies on the general principle of correspondences between oral and written units in alphabetic languages, the grammatical rules determining syntax differ quite markedly from one language to another (for French, see Fayol, Largy, & Lemaire, 1994;

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