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The development of the abilities to acquire novel detailed orthographic representations and maintain them in long-term memory

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ABSTRACT

Previous studies have clearly demonstrated that the development of orthographic representations relies on phonological recoding. However, substantial questions persist about the remaining unexplained variance in the acquisition of word-specific orthographic knowledge that is still underspecified. The main aim of this study was to explore whether two cognitive factors—sensitivity to orthographic regularities and short-term memory (STM) for serial order—make independent contributions to the acquisition of novel orthographic representations beyond that of the phonological core component and the level of preexisting word-specific orthographic knowledge. To this end, we had children from second to sixth grades learn novel written word forms using a repeated spelling practice paradigm. The speed at which children learned the word forms and their long-term retention (1 week and 1 month later) were assessed. Hierarchical regression analyses revealed that phonological recoding, preexisting word-specific orthographic knowledge, and order STM explained a portion of the variance in orthographic learning speed, whereas phonological recoding, preexisting word-specific orthographic knowledge, and orthographic sensitivity each explained a portion of variance in the long-term retention of the newly created orthographic representations. A secondary aim of the study was to determine the developmental trajectory of the abilities to acquire novel orthographic word forms over the course of primary schooling. As expected, results showed

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an effect of age on both learning speed and long-term retention. The specific roles of orthographic sensitivity and order STM as independent factors involved in different steps of orthographic learning are discussed.

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Introduction

It is generally acknowledged that phonological recoding skills are a *sine qua non* for the development of the orthographic lexicon (Ehri, 2005; Share, 1995). However, in opaque orthographies where one phoneme may be mapped to several graphemes, phonological skills are not sufficient for creating the detailed long-term orthographic representations required for the production of conventional spelling. In the current study, we investigated whether orthographic sensitivity and short-term memory for serial order may be predictors of orthographic learning over and above preexisting word-specific orthographic knowledge and phonological recoding in French, whose deep orthographic system contains many inconsistent sound-to-spelling mappings. We also examined the developmental course of orthographic learning abilities during primary schooling, which has been little studied in French. Actually, the way through which children progressively move from a serial phonological strategy to direct lexical retrieval and consequently become fluent readers and proficient spellers has received much interest these past decades. Nevertheless, the acquisition of the orthographic representations has been much more studied in the context of their use for visual word recognition than in relation to lexical spelling production. Yet spelling acquisition seems to pose an even greater challenge than reading given that partial cues in orthographic representations can be sufficient to read words, whereas the retrieval of fully specified lexical representations from memory is required to produce the correct spellings of words, especially in opaque orthographies where there are many phonologically plausible ways in which to spell a given word (Bosman & Van Orden, 1997; Ehri, 1997). Moreover, there has been considerably more research on the process of storing orthographic representations in long-term memory (i.e., orthographic learning) in English than in other alphabetic languages (e.g., Bowey & Muller, 2005; Cunningham, Perry, Stanovich, & Share, 2002; Kyte & Johnson, 2006; Nation, Angell, & Castles, 2007). In light of the resulting “anglocentric view” (Share, 2008a), orthographic learning in other languages must clearly be explored in order to avoid overgeneralization from English orthography, the deepest, to other less opaque orthographic systems (Seymour, Aro, & Erskine, 2003). In this study, we investigated orthographic learning in French, which is also a deep orthography but, in contrast to the English system that is highly inconsistent in reading and spelling directions, is more inconsistent in the direction of spelling (from sound to orthography) than in that of reading (from orthography to sound). According to Ziegler, Jacobs, and Stone (1996), 79.1% of French monosyllabic words are inconsistent in the sound-to-spelling direction, whereas only 12.4% are inconsistent in the spelling-to-sound direction. For instance, although the phoneme /u/ is always spelled “ou”, the sound /ɛ/ can be transcribed “in, ein, ain, ...” as in “vin” (*wine*), “rein” (*kidney*), or “main” (*hand*).

French spelling, given its sound-to-spelling inconsistency, requires the use of multiple types of knowledge. First of all, as in other alphabetic orthographies, young French-speaking children apply phoneme-to-grapheme mappings to produce spellings that are at least consistent with the phonological form of the words to be written (Sprenger-Charolles, Siegel, & Bonnet, 1998). At the same time, they develop word-specific knowledge allowing them to learn the conventional spellings of the many words whose phonology does not suffice to specify their orthography (Martinet, Valdois, & Fayol, 2004). Besides the fact that several alternative graphemes can be used to spell a given sound, many French words also include silent letters (e.g., “épinard” (*spinach*) is pronounced /epinar/). Nevertheless, in some cases, French-speaking children can use their morphological knowledge to support the spelling of letters without a phonological counterpart, either in words ended by a silent letter

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