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The moderating effect of orthographic consistency on oral vocabulary learning in monolingual and bilingual children



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ABSTRACT

Two studies were conducted to assess whether (a) the incidental presence of print facilitates the acquisition of oral vocabulary, (b) the facilitative effect of print is moderated by phoneme-to-grapheme consistency, and (c) the findings obtained with monolingual children generalize to bilingual children. In total, 71 monolingual French-speaking children ($M_{\text{age}} = 9$ years 2 months) in Study 1 and 64 bilingual children ($M_{\text{age}} = 9$ years 3 months) in Study 2 participated in one of three conditions: consistent print, inconsistent print, or no print. Children were to learn novel labels for unfamiliar objects in a paired-associate paradigm. In both studies, print facilitated the acquisition and recall of expressive vocabulary. The effect of print consistency, however, varied across studies. As expected, monolingual children exposed to consistent print learned more novel labels than children exposed to inconsistent print. In contrast, bilingual children exposed to inconsistent print learned and recalled more labels than children exposed to consistent print. These intriguing findings might be due to differences in attention allocation during training.

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Introduction

Vocabulary knowledge has been positively and robustly linked to the amount of reading elementary school children do (e.g., [Sénéchal, 2006](#)), and yet we are only beginning to investigate how

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reading might support oral vocabulary acquisition. Central to the current research was the notion that written representations can facilitate oral word learning for those who can read. Considering the complementary nature of spoken and written language, orthography may provide an additional source of analogous information to support oral word learning. For children and adults, hearing novel words in context can result in the creation of phonological representations in memory that are linked to semantic referents. Similarly, reading novel words in context also provides opportunities to acquire orthographic representations and link those representations to semantic referents (Share, 1999). When phonological and orthographic representations co-occur, they may become bonded in the mental lexicon and, therefore, increase the quality of word form representations as well as the availability of their contents (Ehri, 1978; Perfetti & Hart, 2002). Of primary importance for learning, orthographic information might facilitate the encoding of more precise phonological information for literate individuals (Rosenthal & Ehri, 2008). The facilitative effect of print on learning vocabulary might be especially valuable for bilingual learners, whose vocabulary tends to lag behind that of monolingual learners (Bialystok, 2008).

The current research was conducted to test whether written information, presented incidentally, would facilitate oral vocabulary learning and retention in literate monolingual and bilingual children. Although an *orthographic facilitation effect* on oral vocabulary acquisition has been documented with first- and second-language adult learners (e.g., Zarei, 2009), there are few studies testing the effect in children. An early set of studies by Ehri and Wilce (1979) demonstrated that Grade 1 and Grade 2 children learned more spoken labels when paired with spelling than when paired with symbols or single letters. Recently, Rosenthal and Ehri (2008) examined whether an orthographic facilitation effect would be present when print was presented incidentally. In separate studies, Grade 2 and Grade 5 children who could read were taught paired associations between spoken words and their meanings. The children heard spoken rare nouns paired with simplified oral definitions that drew on familiar knowledge as well as picture representations. The presence of print during training was manipulated; half of the pictured items included the word in print and half did not. Importantly, no attention was drawn to the print. Results from both studies were similar in that the *incidental* presence of print enhanced children's acquisition of expressive vocabulary across trials and increased recall of pronunciation and spelling accuracy 1 day later. Moreover, the facilitative effect of print on oral vocabulary learning has been replicated with samples of Chinese Grade 3 children learning English as a second language (Hu, 2008), typically developing children and literate children with Down syndrome (Mengoni, Nash, & Hulme, 2013), and literate children with autistic spectrum disorder (Lucas & Norbury, 2013). In three studies, the researchers also showed that the print facilitation effect was due to the print itself rather than a cueing effect (i.e., a condition in which the print was substituted with abstract symbols) (Ehri & Wilce, 1979; Hu, 2008; Mengoni et al., 2013). In sum, there is a growing body of evidence showing that print provides a congruent and complementary support to oral vocabulary learning.

The words used in the above studies, with the exception of the science words in Lucas and Norbury (2013), were consistent and regular. English, however, is an opaque orthography characterized by multiple mappings between phonemes and graphemes (Katz & Frost, 1992). The less transparent the mapping, the more difficult it might be for literate individuals to exploit correspondences between print and speech. Therefore, it is possible that the orthographic facilitation of oral word learning might be influenced by the degree to which speech-to-spelling mappings are consistent. We found one published study that examined this issue. In addition to manipulating the presence of orthography during oral word learning, Ricketts, Bishop, and Nation (2009) manipulated phoneme-to-grapheme consistency (i.e., whether phonemes map onto one or more graphemes). Children were asked to learn three types of novel spoken labels: labels with consistent spelling, labels with inconsistent vowel spelling, and labels with inconsistent consonant spelling. Although Ricketts and colleagues' findings seemed to show that inconsistent spelling affected oral vocabulary during the learning phase, the researchers did not find a statistically significant orthography-by-consistency interaction for production trials or for recognition reaction times at posttest. Hence, no strong conclusion could be made. It is possible, however, that the lack of a clear orthography-by-consistency effect might be due to the research design used. The design included only two items in each of the orthography-present conditions and only three learning trials that resulted in children producing less than 50% of items at the end of training. Moreover, posttesting occurred immediately following the learning session and was limited to

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