Automatic phonological activation during visual word recognition in bilingual children: A cross-language masked priming study in grades 3 and 5

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ABSTRACT

Previous masked priming research has shown automatic phonological activation during visual word recognition in monolingual skilled adult readers. Activation also occurs across languages in bilingual adult readers, suggesting that the activation of phonological representations is not language specific. Less is known about developing readers. First, it is unclear whether there is automatic phonological activation during visual word recognition among children in general. Second, no empirical data exist on whether the activation of phonological representations is language specific or not in bilingual children. The current study investigated these issues in bilingual third and fifth graders using cross-language phonological masked priming in a lexical decision task. Targets were French words, and primes were English pseudowords of three types: (a) phonological primes, which share phonological information with the target beginning (e.g., dee-DIMANCHE [Sunday], pronounced /di:/-/dimãʃ/); (b) orthographic control primes, which control for letters shared by the phonological prime and target (e.g., *d*) and their position (e.g., doo-DIMANCHE, pronounced /du:/-/dimãʃ/); and (c) unrelated primes, which share no phonological or orthographic information with the target beginning (e.g., pow-DIMANCHE, pronounced /paʊ/-/dimãʃ/). Significant

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phonological priming was observed, suggesting that (a) phonological representations are rapidly and automatically activated by print during visual word recognition from Grade 3 onward and that (b) the activation of phonological representations is not language specific in bilingual children.

Introduction

Although effects of both monolingual and bilingual phonological activation are well established in adults, little is known about how early these effects appear in young readers. In particular, it is still unclear whether phonological representations are automatically activated during visual word recognition (i.e., when written words are known and no longer require phonological recoding). In addition, there is no evidence whether or not the activation of phonological representations is language specific among bilingual children. These issues are important because they could show the obligatory involvement of phonological representations in visual word recognition and the importance of the setting up of strong links between orthography and phonology in both languages during learning to read. The current study aimed to address (a) whether phonological representations are automatically activated during visual word recognition in bilingual children, (b) whether this phonological involvement increases with reading experience, and (c) whether or not this activation is language specific. To answer this question, the current cross-sectional study was carried out at two points in the reading development of bilingual readers (third grade vs. fifth grade).

Studies using the masked priming paradigm (Forster & Davis, 1984) provide a large body of evidence indicating that phonological representations are automatically activated during the early stages of visual word recognition by skilled adult readers (in French: Carreiras, Ferrand, Grainger, & Perea, 2005; Ferrand & Grainger, 1993; Grainger & Ferrand, 1994, 1996; Ziegler, Ferrand, Jacobs, Rey, & Grainger, 2000; in Hebrew: Frost, Ahissar, Gotesman, & Tayeb, 2003; in English: Lukatela, Eaton, Lee, & Turvey, 2001; Lukatela, Frost, & Turvey, 1998; Perfetti, Bell, & Delaney, 1988; for a review, see Rastle & Brysbaert, 2006). These phonological effects are thought to reflect a rapid, automatic, and nonstrategic activation of phonological representations from orthographic information. In this paradigm, a letter string (the prime) is briefly presented, followed by a target for which participants need to perform a lexical decision. The prime duration is very short (typically between 30 and 60 ms), ensuring that participants are unaware of its existence (Forster, Mohan, & Hector, 2003). The prime's influence is measured through the speed and/or accuracy of target recognition. Phonological priming is demonstrated when a target word, following a phonological prime (word or pseudoword sharing phonological information with the target, e.g., bloo–BLUE in English), is recognized faster and/or more accurately than when preceded by an orthographic control prime (word or pseudoword in which the only information in common with the target is the orthographic information that is already shared between the phonological prime and the target, e.g., blar–BLUE). The comparison between phonological and orthographic control conditions enables measurement of the benefit in word recognition due to the phonological information shared only between the phonological prime and the target. The phonological effect indicates that the phonological prime (e.g., bloo) activates its phonological code (e.g., /blu:/), which in turn is used during the process of target word recognition (e.g., BLUE). Such masked phonological priming has been found with full phonological overlap between prime and target (e.g., klan–CLAN [clan] vs. slan–CLAN, pronounced /klã/–/klã/ vs. /slã/–/klã/ in French; Ferrand & Grainger, 1993) and with partial phonological overlap between prime and target (e.g., fomie–FAUCON [falcon] vs. fémie–FAUCON, pronounced /fomi/–/fokɔ̃/ vs. /femi/–/fokɔ̃/ in French; Carreiras et al., 2005). Masked phonological priming effects have been found in monolingual readers (e.g., Carreiras et al., 2005; Ferrand & Grainger, 1993; Grainger & Ferrand, 1994, 1996; Lukatela et al., 1998, 2001; Perfetti et al., 1988; Ziegler et al., 2000; for a review, see Rastle & Brysbaert, 2006) and also in bilingual readers in both their first and second languages (in Dutch–French bilinguals: