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Brief Report

Do young readers have fast access to abstract lexical representations? Evidence from masked priming



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ABSTRACT

Although there is consensus that adult readers have fast access to abstract letter/word representations, the developmental trajectory of such access has not been mapped out yet. To examine whether developmental readers have rapid access to abstract representations during the early stages of word processing, we conducted a masked priming lexical decision experiment with two groups of young readers (third and fifth graders) and a group of young adults. We selected two types of words: (a) words composed of cross-case letters that are visually dissimilar (DIS words; e.g., arte/ARTE [Spanish for *art*]) and (b) words composed of cross-case letters that are visually similar (SIM words; e.g., vivo/VIVO [Spanish for *alive*]). For young adults and fifth graders, response times for DIS and SIM words were very similar in the matched- and mismatched-case identity priming conditions, which in turn produced shorter responses than the unrelated condition (i.e., ARTE–ARTE = arte–ARTE < edad–ARTE). This is consistent with the idea that there is fast access to abstract representations. In contrast, this process does not seem to be fully operative in third graders, as revealed by the pattern of data with DIS words (ARTE–ARTE < arte–ARTE = edad–ARTE). These findings have relevant implications for developmental models of visual word recognition and for the use of masked priming experiments with developmental readers.

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Introduction

While reading, the brain rapidly maps a visually dissimilar input (e.g., edge and EDGE) onto a common abstract lexical representation. The dominant accounts of printed word recognition in alphabetic orthographies assume that access to a visual word form in adult readers is attained via the activation of abstract letter units (ALUs) in the ventral areas of the brain (Dehaene, Cohen, Sigman, & Vinckier, 2005; Grainger, Rey, & Dufau, 2008; see Coltheart, 1981, for early evidence of the existence of ALUs). Compelling empirical evidence of the rapid activation of abstract representations during printed word recognition comes from masked priming experiments in adults. This paradigm taps the early stages of word processing via the presentation of a briefly presented masked prime (see Grainger, 2008, for a review). In a masked priming lexical decision experiment, Jacobs, Grainger, and Ferrand (1995) compared case-mismatched versus case-matched identity word pairs (YEUX-####-YEUX vs. yeux-####-YEUX; [eyes]) and found that, despite the greater visual similarity for the matched-case identity pairs, word identification times were virtually the same in the two conditions. Perea, Jiménez, and Gómez (2014) replicated Jacobs et al. (1995) pattern in words with high cross-case visual similarity (henceforth SIM words; e.g., city-####-CITY produced the same word identification times as CITY-####-CITY) and in words with low cross-case visual similarity (henceforth DIS words; e.g., edge-####-EDGE produced the same word identification times as EDGE-####-EDGE). Furthermore, similarly to Bowers, Vigliocco, and Haan (1998), Perea et al. (2014) found that the advantage of the identity priming condition relative to an unrelated condition was remarkably similar for SIM and DIS words (see Kinoshita & Kaplan, 2008, for a parallel finding with pairs of cross-case visually similar and visually dissimilar letters in masked priming).

The developmental trajectory of the access to abstract representations has not yet been mapped out. How does a developmental reader associate a common abstract representation with visually dissimilar stimuli such as edge and EDGE? Jackson and Coltheart (2001) hypothesized that ALUs are acquired when children are able to name the letters in uppercase and lowercase forms. ALUs would become available when children start to establish orthographic representations of words (e.g., as postulated by Ehri's (1999) model). Note, however, that Jackson and Coltheart (2001) acknowledged that these abstract representations might not be as efficiently accessed for developmental readers. An alternative view was proposed by Polk et al. (2009). They proposed that letters that have cross-case visual similarity (e.g., c/C) would form a context for the letters that have cross-case visual dissimilarity (e.g., r/R). Hence, when a printed word appears in some occasions in uppercase form and in other instances in lowercase form, the cognitive system creates ALUs for letters in different case because the visual contexts are similar. The current experiment was not designed to disentangle the Jackson and Coltheart versus Polk and colleagues hypotheses; rather, it was designed to examine, in a masked priming experiment, if and when young readers can rapidly activate abstract representations during the earliest stages of word processing. Indeed, in a review on how children acquire abstract letter units, Thompson (2009) concluded that "the acquisition of ALUs takes a developmentally long learning route" (p. 67).

For the current experiment, we selected two types of words: (a) words composed of cross-case letters that are visually dissimilar (DIS words; e.g., arte/ARTE [Spanish for *art*]) and (b) words composed of cross-case letters that are visually similar (SIM words; e.g., vivo/VIVO [Spanish for *alive*]). As in Jacobs et al. (1995) and Perea et al. (2014) experiments, the key comparison was between the matched-case and mismatched-case identity primes (i.e., ARTE-####-ARTE vs. arte-####-ARTE; VIVO-####-VIVO vs. vivo-####-VIVO). An unrelated priming condition was included for comparison purposes. If young readers have rapid access to abstract letter/word representations, word identification times should be similar for matched-case and mismatched-case identity pairs. (Note that this should be the case not only with SIM words [e.g., vivo-VIVO vs. VIVO-VIVO] but also with DIS words [e.g., arte-ARTE vs. ARTE-ARTE].) Alternatively, if young readers do not have rapid access to abstract letter/word representations, responses to DIS words should be faster when preceded by a matched-case identity prime than when preceded by a mismatched-case identity prime (i.e., ARTE-ARTE faster than arte-ARTE). Furthermore, under these circumstances, the advantage of the mismatched-case identity priming condition over the unrelated condition might be small or negligible.

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