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Density and length in the neighborhood: Explaining cross-linguistic differences in learning to read in English and Dutch

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ABSTRACT

Two experiments examined underlying cognitive processes that may explain why it is harder to learn to read in English than in more transparent orthographies such as German and Dutch. Participants were English and Dutch readers from Grades 3 and 4. Experiment 1 probed the transition from serial to more parallel processing, as measured by the word length effect for words and pseudowords. English children took longer to make the transition to more parallel reading strategies for words than Dutch children. In contrast, Dutch children continued to use more serial reading strategies for pseudowords. Experiment 2 investigated children's sensitivity to the orthographic overlap between words, as measured by the size of orthographic neighborhood effects for words and pseudowords. Children reading Dutch showed greater sensitivity to the overlap between both words and pseudowords than English children. Cross-linguistic differences in the transition from serial to parallel reading strategies are discussed within the framework offered by the self-teaching hypothesis and the orthographic depth hypothesis. Finally, it is argued that differences between the two languages in the effect of orthographic neighborhood size are a result of cross-linguistic differences in orthographic density and not cross-linguistic differences in orthographic transparency.

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Introduction

Cross-linguistic studies have consistently demonstrated that it is harder for children to learn to read in English than in other European languages (Landerl, Wimmer, & Frith, 1997; Patel, Snowling, & de Jong, 2004; Seymour, Aro, & Erskine, 2003). This finding has mainly been attributed to the fact that letter–sound correspondences in English are much less transparent than in other alphabetic languages, making it harder to decode and recognize words (e.g., Ziegler & Goswami, 2005). The aim of the current study was to go beyond the well-established finding that reading acquisition in English takes more time. Instead, we focused on how cross-linguistic differences in the reliability of letter–sound mappings affect the development of two processes thought to underlie the development of skilled word recognition, namely the transition from serial to parallel processing and sensitivity to overlap between words. To do this, we compared the naming speed of English and Dutch children as they read words and pseudowords that varied in length and neighborhood size.

The majority of relevant cross-linguistic experiments in the literature have compared children learning to read in English and German (Goswami, Ziegler, Dalton, & Schneider, 2003; Landerl et al., 1997). This is an interesting comparison; although the two languages differ in orthographic depth, both are Germanic languages and highly comparable in terms of syllable complexity (Ziegler, Perry, Ma-Wyatt, Ladner, & Schulte-Körne, 2003). For instance, they boast numerous different complex consonant clusters in both the onset and coda positions of words. The same holds for English versus Dutch. In addition, Dutch is even more similar to English with regard to the complexity of letter–phoneme alignment (van den Bosch, Content, Daelemans, & de Gelder, 1994) and the frequency of vowel digraphs. However, the languages differ markedly in the transparency of their letter-to-sound mappings (van den Bosch et al., 1994). In sum, although the English and Dutch orthographies are very similar, especially in comparison with very shallow orthographies with a simple syllable structure such as pointed Hebrew, Italian, and Finnish (Share, 2004), they differ on an important aspect of orthographic depth, namely the transparency of letter-to-sound mappings.

Given that English and Dutch vary in spelling–sound transparency, how might this influence the developmental time course of visual word recognition? Two contrasting perspectives can be gleaned from the literature. According to the self-teaching hypothesis (Share, 1995), successful phonological decoding facilitates the development of orthographic representations. Due to the greater transparency of Dutch, children learning to read Dutch are able to decode sooner and with greater ease than children learning to read English (Patel et al., 2004; Seymour et al., 2003). Thus, we would expect Dutch readers to make a more rapid transition to a more skillful mode of word recognition than those learning to read in English. An alternative view stems from the orthographic depth hypothesis (Frost, Katz, & Bentin, 1987; Share, 2004). This proposes that whereas readers of transparent languages continue to use nonlexical reading strategies (i.e., serial decoding), those reading in deep scripts are pressured to recruit lexical strategies given the less transparent spelling–sound mappings (Ziegler, Perry, Jacobs, & Braun, 2001). In line with this, Share (2004) found that children learning to read in pointed Hebrew—a very transparent script—remained insensitive to word-specific details for a relatively long time. On this view, we would expect English children to make a faster transition to direct word recognition than those learning to read Dutch.

To investigate and compare the development of visual word recognition in English and Dutch, we examined cross-linguistic differences in two experiments. In Experiment 1, we focused on the transition from serial to more parallel reading strategies, as indexed via the length effect, based on the assumption that the difference in naming times between longer and shorter words is a marker of serial processing (Marinus & de Jong, 2010b; Spinelli et al., 2005; Zoccolotti et al., 2005). In Experiment 2, we investigated children's sensitivity to the overlap between words, as indexed by the effect of neighborhood size on reading speed.

Length effects

To consider length effects first, if Dutch children make a faster transition from serial to parallel processing, as predicted by the self-teaching hypothesis, word length effects should be smaller in children