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Bilingual non-selective lexical access in sentence contexts: A meta-analytic review

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ABSTRACT

Research on bilingual sentence processing demonstrates effects of cross-language activation during lexical access. However, there are mixed findings regarding the ability of semantically-constraining sentences to eliminate non-selective effects. In a quantitative meta-analysis the magnitude of cognate facilitation was examined as a function of sentence constraint, task and language of the sentence [native language (L1) versus second (L2)] as moderator variables. Twenty-six studies met criteria for measuring cognate facilitation in low-constraint sentence contexts and 18 experiments for high-constraint sentence contexts. The weighted average effect size for both contexts was significant, but significantly smaller for high-constraint contexts. This provides evidence that semantic information from a sentence constrains cross-language lexical activation. Effect sizes were moderated by task and language of the sentence. Findings are discussed in terms of models of bilingual lexical access and a new framework for understanding the mechanism of sentence context effects is proposed.

Introduction

Psycholinguistic research has clearly demonstrated that visual word recognition involves parallel activation of multiple lexical candidates within the lexicon. However, early research focused exclusively on monolingual readers. In the 1990s there was a sudden surge of studies examining whether parallel activation extends across languages for bilinguals. To address this question, investigators capitalized on the existence of words that share lexical form across languages. For example, interlingual homographs are words across languages that have the same orthography but mean completely different things, such as *pie* in English and Spanish (meaning "foot" in Spanish). Similarly, interlingual homophones share a high degree of phonological similarity but have completely unrelated meanings, such as *soul*/*sol* (meaning "sun" in Spanish). In both of these cases the cross-language overlap is only in word form and not meaning. However, there are also words across languages that share both lexical form and meaning; these are referred to as cognates. For example, words like *piano*/*piano*, *lion*/*león*, and *emotion*/*emoción* are all cognates across English and Spanish. If lexical representations across languages are activated simultaneously, then word recognition performance for items like cognates and homographs should differ relative to matched controls.

Indeed, numerous studies have revealed differences in word recognition performance for words that share lexical overlap across languages relative to control words. For example, facilitated performance in recognizing cognates has been observed across a wide variety of paradigms and language pairs (e.g., Cristoffanini, Kirsner, & Milech, 1986; de Groot & Nas, 1991; Dijkstra, Grainger, & van Heuven, 1999; Dijkstra, van Jaarsveld, & ten Brinke, 1998; Lalor & Kirsner, 2001; Lemhöfer, Dijkstra, & Michel,

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2004; Schwartz, Kroll, & Diaz, 2007; Sánchez-Casas, García-Albea, & Davis, 1992), including languages that do not share orthographic scripts (e.g., Gollan, Forster, & Frost, 1997; Hoshino & Kroll, 2008). The benefits of cognate status are even observed when the task is performed in the L1 (van Assche, Duyck, Hartsuiker, & Diependaele, 2009; van Hell & Dijkstra, 2002). While cognate effects are quite robust, the overall magnitude of their effects is moderated by differences in form overlap. In general, the facilitation effect decreases with decreasing form overlap (e.g., Duyck, van Assche, Drieghe, & Hartsuiker, 2007; van Assche, Drieghe, Duyck, Welvaert, & Hartsuiker, 2011) and can be eliminated or even reversed to inhibition (Schwartz et al., 2007).

Findings for interlingual homographs have been more mixed. In some studies inhibitory effects of homograph status have been observed (Dijkstra et al., 1998; Jared & Szucs, 2002; Von Studnitz & Green, 2002), while others have failed to find any effects (Dijkstra et al., 1998; Gerard & Scarborough, 1989). Furthermore, the specific nature of homograph effects, whether they are inhibitory or facilitative in nature, varies across different task demands and stimulus properties (Dijkstra, De Bruijn, Schriefers, & Brinke, 2000; Dijkstra, Timmermans, & Schriefers, 2000; Dijkstra et al., 1998). This suggests that activation of lexical representations from the non-target language is much stronger when there is overlap in semantics rather than only in lexical form.

The most widely-accepted theoretical model of the bilingual lexicon is the *Bilingual Interactive Activation* (BIA) model (van Heuven, Dijkstra, & Grainger, 1998) and its more recent updated version, the BIA+ model (Dijkstra & van Heuven, 2002) (see Figs. 1 and 2). Both versions of the model share the fundamental assumption that lexical representations across languages exist in a single, integrated lexicon. Second, the models assume that bottom-up

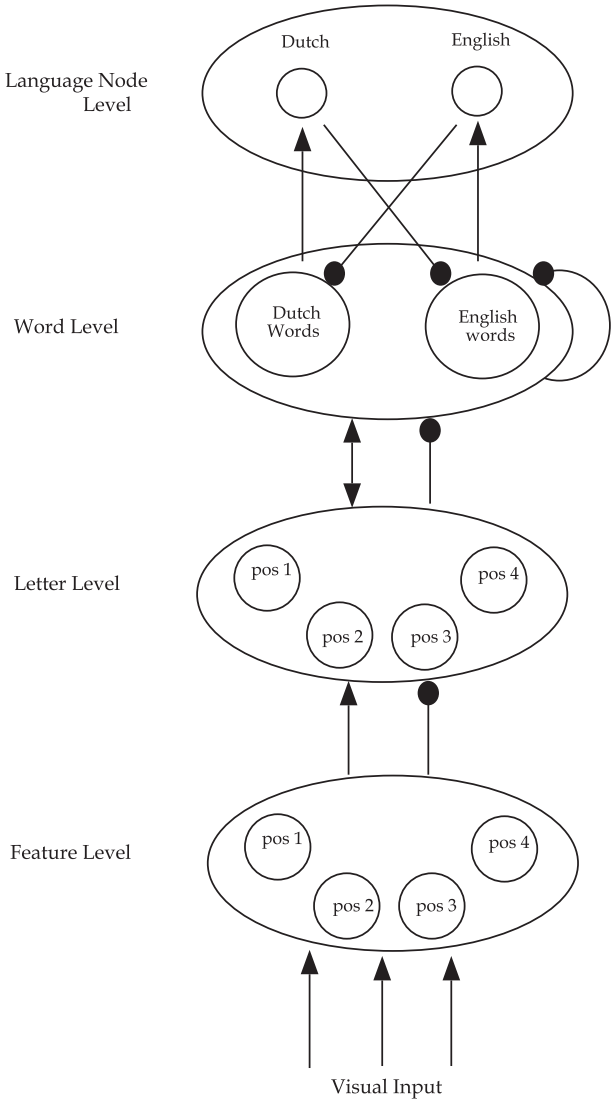

Fig. 1. The bilingual interactive activation model (van Heuven, Dijkstra, & Grainger, 1998).