The Role of Age of Acquisition in Bilingual Word Translation: Evidence from Spanish-English Bilinguals

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Abstract  The present research tested the hypothesis that the age at which one’s first language (L1) words are learned influences language processing in bilinguals. Prior research on bilingual language processing by Kroll and colleagues has suggested that memory links between L1 words and conceptual representations are stronger than memory links between one’s second language (L2) word and conceptual representations. We hypothesized that the strengths of memory links between L1 words and conceptual representations are stronger for words learned early in life than for words learned later in life. Support for the hypothesis was obtained in bilingual translation experiment with 36 Spanish–English bilinguals. Participants translated L1 words into L2 and L2 words into L1. Half of the L1 words were learned early in childhood (early AoA words), and half were learned later in life (late AoA words). The L2 words were translation equivalents of the L1 words tested; the average age at which L2 words were learned was age 7. Target words were presented either in random order or blocked by semantic category. Translation times were longer when trials were blocked by semantic category (i.e., categorical interference) occurred only when early AoA L1 words were translated into L2. Implications for current models of bilingual memory are discussed.

Keywords  Bilinguals · Word translation · Age of acquisition · Spanish · Bilingual memory
Numerous studies have shown that there is a processing advantage for words learned early in childhood (early AoA words) versus words learned later in life (late AoA words) (for reviews see Hernandez and Li 2007; Juhasz 2005). The processing advantage for early AoA words has been demonstrated in a variety of language processing tasks, including lexical decision (Gilhooly and Gilhooly 1979; Morrison and Ellis 1995, 2000; Stadthagen-Gonzalez et al. 2004), semantic categorization (Brysbaert et al. 2000; Ghyselinck et al. 2004), picture naming (Ellis and Morrison 1998; Morrison et al. 1992), word naming (Brown and Watson 1987; Morrison and Ellis 1995, 2000), silent word reading (Zevin and Seidenberg 2002), and fixation durations during sentence processing (Juhasz and Rayner 2003). A few studies have investigated acquisition effects in bilingual word processing (Hirsh et al. 2003; Izura and Ellis 2004; Murray 1986; for review see Hernandez and Li 2007). The present research investigated the strong possibility that the age at which L1 words are learned influences language processing in bilingual individuals.

There is no consensus regarding the organization of bilingual semantic memory. There are multiple models of bilingual memory. Some have focused on the extent to which phonological representations for two known languages are separate or shared (Dijkstra and Van Heuven 1998; Green 1998). Other models have focused on the extent to which semantic representations are separate or shared (De Groot 1992; Grosjean 1997; Kroll and Stewart 1994). In the present research, we focused on how semantic information related to translation equivalents is stored in memory. Our view of bilingual semantic memory was influenced by the revised hierarchical model (RHM) proposed by De Groot and Kroll (1997); Kroll and Curley (1988); Kroll and Stewart (1994), which has received a great deal of attention in the literature. In the model, bilingual memory is composed of three memory components: (a) a conceptual representation store; (b) lexical representation for words in one’s first language (L1); and c) lexical representation for words in one’s second language (L2). Kroll and Stewart (1994) proposed that the memory links between L1 words and the conceptual representation are stronger than the memory links between L2 words and conceptual representation. Further, they proposed that for the beginning bilingual, retrieving conceptual information for an L2 word requires processing of the L1 translation equivalent. As one’s proficiency increases, the memory links between L2 and conceptual representation become stronger. Figure 1 depicts the three components of the model with arrows representing memory links.

Empirical support for the RHM was obtained by Kroll and Stewart (1994). They conducted a series of experiments with Dutch-English bilinguals. Participants translated Dutch and English words into the opposite language as translation times were recorded. Words were either presented in random order or blocked by semantic category (e.g., weapons, vegetables, furniture, birds, clothing, fruits, animals, and vehicles). The results showed that participants took longer to translate Dutch words into English (i.e., L1–L2) than to translate English words into Dutch (i.e., L2–L1). Participants also took longer to translate Dutch words into English when they were blocked by semantic category than when they were presented in random order; no effect of order was observed when participants translated English words into Dutch. Kroll and Stewart (1994) suggested that viewing multiple words from the same semantic category caused activation of all members of that category. This increased activation led to difficulties in word retrieval, which resulted in slower translation times. They referred to longer response times in the blocked condition as categorical inference. Because memory links between the conceptual representation and L1 words are stronger than memory links between conceptual representation and L2 words, categorical interference occurred when participants translated from L1 to L2, but not when participants translated from L2 to L1. Since those studies, there have been many studies providing additional support for the RHM.