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Relations among language exposure, phonological memory, and language development in Spanish–English bilingually developing 2-year-olds

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ABSTRACT

The relation of phonological memory to language experience and development was investigated in 41 Spanish–English bilingual first language learners. The children's relative exposure to English and Spanish and their phonological memory for English- and Spanish-like nonwords were assessed at 22 months of age, and their productive vocabulary and grammar in both languages were assessed at 25 months of age. Phonological memory for English-like nonwords was highly correlated with that for Spanish-like nonwords, and each was related to vocabulary and grammar in both languages, suggesting a language-general component to phonological memory skill. In addition, there was evidence of language-specific benefits of language exposure to phonological memory skill and of language-specific benefits of phonological memory skill to language development.

Introduction

A substantial body of evidence from the study of first and second language acquisition argues that phonological memory (i.e., the capacity to remember sequences of sounds) is a component of the human language acquisition capacity. Children and adults who have better phonological memory skills acquire language more rapidly than children and adults who are less able to remember novel auditory

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stimuli (Gathercole, 2006). Phonological memory skills appear to have both a general auditory memory component, which operates over all speech-like stimuli without drawing on information in long-term memory, and a component that makes use of knowledge based on prior language experience (Vallar, 2006). Evidence of the influence of language experience includes findings that children show better memory for sound sequences in real words than in nonwords (Chiat & Roy, 2007; Snowling, 1981), better memory for high-frequency sound sequences in nonwords than for low-frequency ones (Edwards, Beckman, & Munson, 2004; Munson, Kurtz, & Windsor, 2005), and better memory for sound sequences that conform to the phonology of their own language than for sound sequences drawn from a foreign language (Thorn & Gathercole, 1999).

The effect of language experience on phonological memory has implications for the process of phonological memory development and its role in bilingual development. The phonological memory skills of children exposed to two languages might include two different language-specific components, each drawing on knowledge of one of their languages. These two knowledge bases might develop at different rates if the children's exposure to one language is greater than their exposure to the other. Furthermore, to the degree that the value of phonological memory to subsequent language development depends on a language-specific capacity to store sound sequences, bilingually developing children's phonological memory skills in each language should have language-specific benefits. The current study was designed to test these hypotheses. In the following sections, we first review the literature that establishes the relation of phonological memory skill to vocabulary and grammar in monolingual development and in second language acquisition. We then outline the theoretical issues and evidence regarding the influence of language exposure and familiarity on phonological memory skill. Finally, we review the literature on bilingual development that is relevant to the hypothesis that bilingual children acquire language-specific phonological memory skills as a result of language exposure and that the value of those skills to subsequent language development is, in part, language specific.

Phonological memory and vocabulary

Phonological short-term memory has been demonstrated to be related to vocabulary knowledge and vocabulary development in first language learning even after considering the effects of age and nonverbal intelligence (Gathercole, Hitch, Service, & Martin 1997; Gathercole, Willis, Emslie, & Baddeley, 1992). Relations between phonological memory skill, measured as accuracy of nonword repetition, and vocabulary have been demonstrated in samples of children between 20 months and 8 years of age (Chiat & Roy, 2007; Gathercole & Adams, 1993; Gathercole et al., 1992; Hoff, Core, & Bridges, 2008).

Phonological memory is important to vocabulary learning in second language learning as well. Among adolescent foreign language learners, repetition accuracy for English-like stimuli has been found to be related to success at English vocabulary learning (Service & Kohonen, 1995). As with first language acquisition, phonological memory seems to play a role at the early stages of second language learning. For example, the relation between English nonword repetition and speed of learning English vocabulary was significant for Cantonese seventh graders (mean age = 12 years) learning English at school who had low English vocabulary skills, but not for those who had high English vocabulary skills (Cheung, 1996).

Phonological memory and grammar

Phonological short-term memory also has been associated with grammatical development in first and second language acquisition. Adams and Gathercole (1995) found that 3-year-olds with good nonword repetition skills differed from children poor at nonword repetition with respect to the variety of vocabulary, the length of the utterances, and the complexity of the syntax used in spontaneous speech. Adams and Gathercole (1996) also found that nonword repetition skills were associated with the length of sentences and the amount of detail in narrations produced by 4-year-olds after controlling for vocabulary knowledge, age, and nonverbal intelligence. Finally, Adams and Gathercole (2000) found that 4-year-olds with good nonword repetition skills produced longer utterances and more var-