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Interaction between the native and second language phonetic subsystems

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Abstract

The underlying premise of this study was that the two phonetic subsystems of a bilingual interact. The study tested the hypothesis that the vowels a bilingual produces in a second language (L2) may differ from vowels produced by monolingual native speakers of the L2 as the result of either of two mechanisms: phonetic category assimilation or phonetic category dissimilation. Earlier work revealed that native speakers of Italian identify English /e/ tokens as instances of the Italian /e/ category even though English /e/ is produced with more tongue movement than Italian /e/ is. Acoustic analyses in the present study examined /e/s produced by four groups of Italian–English bilinguals who differed according to their age of arrival in Canada from Italy (early versus late) and frequency of continued Italian use (low-L1-use versus high-L1-use). Early bilinguals who seldom used Italian (Early-low) were found to produce English /e/ with significantly more movement than native English speakers. However, both groups of late bilinguals (Late-low, Late-high) tended to produce /e/ with *less* movement than NE speakers. The exaggerated movement in /e/s produced by the Early-low group participants was attributed to the dissimilation of a phonetic category they formed for English /e/ from Italian /e/. The undershoot of movement in /e/s produced by late bilinguals, on the other hand, was attributed to their failure to establish a new category for English /e/, which led to the merger of the phonetic properties of English /e/ and Italian /e/.

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1. Introduction

Many studies have shown that the age of first exposure to a second language (L2) exerts a strong and usually persistent influence on overall success in acquiring the L2. In some studies (including this

one) the age of first exposure to the L2 has been indexed by immigrants' age of arrival (AOA) in a predominantly L2-speaking country. Research has demonstrated better performance in the L2 by individuals who arrived in childhood ("early" bilinguals) than by individuals who arrived in late adolescence or early adulthood ("late" bilinguals). Age effects have been observed for the production of L2 consonants (e.g. Flege et al., 1995b; MacKay et al., 2001) and the perception of L2 consonants

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(Yamada, 1995; MacKay et al., 2001). Age effects have also been observed for the production of L2 vowels (Flege, 1992; Munro et al., 1996; Flege et al., 1999a; Piske et al., 2002), L2 vowel perception (Flege et al., 1999a), overall degree of foreign accent in L2 sentences (Flege et al., 1995a; Yeni-Komshian et al., 2000; Piske et al., 2001) and the recognition of L2 words presented in noise (Mayo et al., 1997; Meador et al., 2000).

The literature has offered three general types of explanation for age effects on L2 speech performance. One explanation is that as the age of first exposure to the L2 increases, the mechanisms used in L1 speech acquisition operate less effectively due to maturational constraints. For example, some researchers attribute the widespread presence of foreign accent in late bilinguals to the passing of a critical period for speech acquisition (Scovel, 1988; Patkowski, 1989; Mack, *In press*).¹

A second type of explanation offered for age effects is that late bilinguals receive less adequate L2 phonetic input than early bilinguals usually do. Grosjean (1982) observed that the contexts in which languages are learned and used influence a bilingual's performance in both the L1 and the L2. He observed that the L2 may become a bilingual's dominant language if it is used more than the L1 and is needed for a wider range of everyday activities, and that the dominant language is likely to develop to a greater extent than the non-dominant language does. Work by Jia and Aaronson (1999) provided cross-sectional and longitudinal evidence suggesting that child immigrants to the United States from China received more L2 input from native English speakers than adolescent immigrants did, and so were more likely to become English-dominant (see also Grenier, 1984). An ex-

amination of United States census data suggested to Stevens (1999) that age effects on immigrants' learning of English as an L2 in the United States might be attributed to "social and demographic considerations". For example, child immigrants are usually enrolled in a school where they interact frequently with native speakers of English, whereas adult immigrants often enter the workplace where they interact frequently with fellow native speakers of their L1. Early bilinguals are also more likely to marry L2 native speakers than late bilinguals are. Economic and social factors may well be linked to or even cause variation in motivation to learn the L2 well (Gardner and Lambert, 1972).

Speech research has suggested that the accuracy with which L2 phonetic segments are produced depends on how much native-speaker input as opposed to foreign-accented L2 input is received (compare Flege and Eefting, 1987, to Flege, 1991). For example, Flege and Liu (2001) examined the identification of word-final English consonants by groups of Chinese speakers who had lived in the United States for averages of 2 and 7 years. Half of the participants in the 2-year and 7-year residence groups were enrolled as full-time students at an American university, whereas the other half had occupations (e.g. laboratory technician) that were likely to reduce the frequency of interactions with native English (NE) speakers. The long-residence students obtained significantly higher identification scores than the short-residence students did, but there was no difference between two groups of non-students who differed in length of residence. The students and non-students did not differ in terms of self-reported percentage use of English (roughly 50% for both groups). This led to the inference that what differentiated the long-residence students and non-students was not how frequently they used English, but with whom.

A third type of explanation for age effects is language interaction. Were completely native-like performance in an L2 to be observed, it would imply that bilinguals can prevent their L1 and L2 sub-systems from influencing one another. However, most theorists have rejected the notion that the L1 and L2 phonetic subsystems of a bilingual can be separated completely (e.g. Lambert and Rawlings, 1969; Paradis, 1978; Grosjean, 1989,

¹ One might hypothesize that perceptual differences between L2 learners and monolingual native speakers of the L2 is due to the loss of ability to re-weight the features used in decoding phonetic segments following perceptual attunement to the L1 phonetic system (see Sebastián-Gallés and Soto-Faraco, 1999, p. 112). Or, one might hypothesize that as the L2 phonetic system develops, cross-language phonetic differences that are detectable auditorily in some task conditions tend to be filtered out by a kind of cross-language "categorical perception" (see Hallé et al., 1999, p. 302).

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