

A Tale of Two Fricatives: Consonantal Contrast in Heritage Speakers of Mandarin

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Though previous linguistic research has produced a wide range of scholarship on second language (L2) acquisition, the field has only begun to examine heritage language (HL) acquisition in its own right. A few studies have examined the phonological competence of HL speakers in different languages (cf. Au *et al.* 2002, Knightly *et al.* 2003 on Spanish; Oh *et al.* 2003 on Korean; Godson 2003 on Armenian), finding that childhood experience with a minority language, even if merely overhearing, provides a significant boost to a speaker's pronunciation of the language later in life in comparison to L2 learners with no prior experience. Curiously, though, only Godson (2003) examined the question of categorical neutralization. Though HL speakers may end up with better accents than L2 learners overall, do they actually make all the phonological distinctions that a native speaker would? Furthermore, do they realize these contrasts in the same way and to the same degree? Godson (2003) found that for HL speakers of Western Armenian, English had an influence on their pronunciation of Armenian vowels, but the influence was not necessarily neutralizing. What the present study addresses is whether consonantal contrasts can be affected in HL speakers in a similar way.

We investigated consonantal contrast in HL speakers of Mandarin Chinese. The specific Mandarin consonants examined were two voiceless post-alveolar sibilant fricatives – the retroflex /ʂ/ and alveolo-palatal /ç/ – in comparison to the English palato-alveolar /ʃ/. Eight speakers of Mandarin were recruited to participate: one native speaker, six HL speakers with a range of prior experience with Mandarin, and one advanced L2 learner. All subjects completed a detailed language background questionnaire as well as a production task in which they read 91 Mandarin and English stimuli, in random order and in separate sessions by language with four tokens collected for each item. Speakers were rank-ordered according to experience with Mandarin on the basis of their language background questionnaires (#1 = native, #2-7 = HL, #8 = L2), and their productions of critical stimuli (cf. Table 1) were measured on several acoustic dimensions along which these fricatives have been found to differ (Ladefoged 2005: 168): peak amplitude frequency and centroid (measured over a spectrum of the middle 100 ms of the fricative), and formant transitions into the following vowel (measured over the first 20 ms of periodicity).

The results of spectral analysis indicate that HL speakers are indeed maintaining a contrast between Mandarin /ʂ/ and /ç/, though one that is not as robust as the native contrast (cf. Figure 1). In both spectral measures taken, /ç/ is consistently differentiated from both /ʂ/ and /ʃ/, with all speakers setting apart /ç/ in peak amplitude frequency and most doing so in centroid as well (most p 's $< .001$). Analyses of vocalic transition show a similar pattern: /ç/ is consistently differentiated from both /ʂ/ and /ʃ/ by all speakers in at least one of F1, F2, and F3, with most speakers setting /ç/ apart on all three formant measures (most p 's $< .0001$). The effect of speaker rank on the magnitude of the measured differences is not significant (F 's < 5.5 , p 's $> .1$); however, it is clear that the native Mandarin speaker (Speaker 1) puts much more acoustic distance between the two Mandarin fricatives than nearly all of the HL and L2 speakers.

Though HL speakers keep /ʂ/ and /ç/ distinct, they show a tendency to merge /ʂ/ and /ʃ/, which is actually similar to the native inclination. Native speaker 1 does not reliably distinguish /ʂ/ and /ʃ/ in either peak amplitude frequency or centroid; these acoustic tendencies are reflected in nearly identical contact patterns for these two fricatives, which both differ from /ç/ significantly (cf. Figure 2). HL speakers 2, 4, 6, and 7 likewise do not reliably distinguish /ʂ/ and /ʃ/ in one or both of peak amplitude frequency and centroid. With respect to vowel transition characteristics, again /ʂ/ and /ʃ/ are merged in one or more of F1, F2, and F3 by all HL and L2 speakers.

These results thus extend those of Godson (2003) and suggest, first, that phonetic change in HL speakers is most likely to be sub-phonemic and, second, that there is language-independent perceptual similarity between retroflex and palato-alveolar fricatives. Finally, it appears that change in this very widely spoken HL parallels changes that have been reported in acutely endangered languages (e.g. Chang 2007).

Table 1. Critical stimuli in the production experiment

	MANDARIN		ENGLISH
	retroflex /ʂ/	alveolo-palatal /ç/	palato-alveolar /ʃ/
沙	/ʂ ⁵⁵ / 'sand'	瞎 /çʰ ⁵⁵ / 'shrimp'	shop /ʃ ⁵⁵ / 'shop'
啥	/ʂ ³⁵ / 'what'	轄 /çʰ ³⁵ / 'govern'	shot /ʃ ^{at} / 'shot'
傻	/ʂ ²¹⁴ / 'stupid'	下 /çʰ ⁵¹ / 'below'	
煞	/ʂ ⁵¹ / 'suddenly'		

Figure 1. Graphs of mean spectral measures for all speakers (#1 = native, #2-7 = HL, #8 = L2)

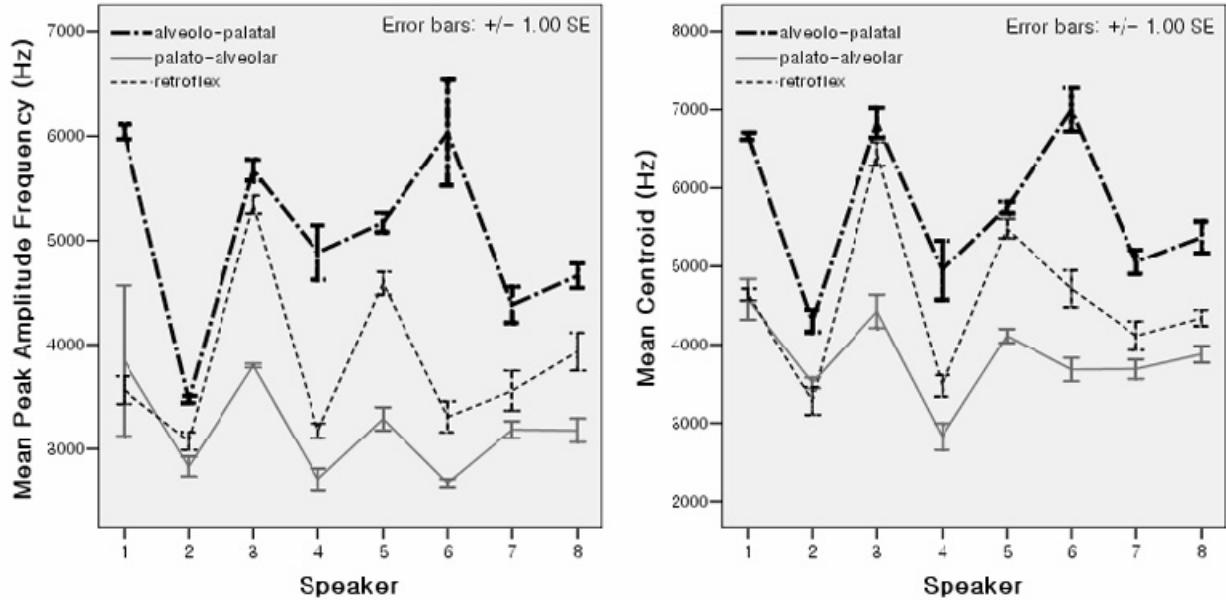


Figure 2. Palatograms of Speaker 1's fricatives (from L to R: /çʰ⁵¹/ 'below', /ʂ⁵¹/ 'suddenly', /ʃ⁵⁵/ 'shop')



References

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