DO MANDARIN-ENGLISH BILINGUALS HAVE AN ACCENT IN THEIR L1 VOWEL PRODUCTION?

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1. INTRODUCTION

It is claimed that the L1 phonetic categories established in childhood do no remain static; instead, they may undergo modification when similar L1 and L2 sounds interact in the process of L2 learning [2]. If the L1 sounds are influenced by the L2 sounds and deviate from the L1 norms, the L1 monolingual listeners should be able to detect it. With regard to L2 influence on L1, previous studies of the effect of L1 use [4, 5] have revealed mixed findings. This gives rise to the need to examine further whether the amount of L1 use is an important factor when examining L2 influence on an L1. The present study examines the Mandarin vowel production by a group of Mandarin-English bilinguals differing in the amount of L1 use and aims at answering the following questions: (a) Do the Mandarin-English bilinguals have an accent in their L1 vowel production? (b) If so, what acoustic properties contribute to this accent? (c) Are the Mandarin-English bilinguals of high L1 use and those of low L1 use equally judged as accented?

2. METHOD

2.1 Participants

Thirteen Mandarin monolinguals (MonoM) (mean age =24 years, SD=4), 33 Mandarin-English bilinguals and 12 English monolinguals (MonoE) (mean age =27 years, SD=5) were recruited to produce vowel tokens. Based on their self-reported amount of L1 use, the Mandarin-English bilinguals were further divided into a group of high L1 use (BiMH) (mean percentage of L1 use =65, SD=8; mean age =22 years, SD=2; mean age of arrival =11.6year, SD=1.2) and a group of low L1 use (BiML) (mean percentage of L1 use =30, SD=9; mean age =21 years, SD=2; mean age of arrival =10.9 years, SD=1.6). Mandarin monolinguals and Mandarin-English bilinguals produced Mandarin vowel tokens; English monolinguals produced English vowel tokens. Seventeen monolingual Mandarin listeners, all of whom reported normal hearing, participated in a perception test.

2.2 Stimuli

The target Mandarin vowels were /a/, /aj/, /au/, /e/, /i/, /ou/, /u/, and /y/. They were in Tone 4 open syllable words with initial /p/ whenever possible and were inserted in the sentence frame "Zhe ge zi shi ___. (This word is ___) to elicit production data. The target English vowels were /ɒ/, /aj/, /au/, /e/, /i/, /ou/ and /u/. To match the Mandarin words as closely as possible, they were also in open syllable words with an initial /p/ and were inserted in the sentence frame "Now I say ___".

In total, there were 104 Mandarin vowel tokens by Mandarin monolinguals (8 vowels ×13 subjects ×1 repetition), 264 Mandarin vowel tokens by Mandarin-English bilinguals (8 vowels ×33 subjects ×1 repetition) and

84 English vowel tokens by English monolinguals (7 vowels ×12 subjects ×1 repetition). To eliminate the effect of the initial consonants on perception of vowels, the initial consonants of the target words were manipulated to be homogeneous. The motivation to include English stimuli in the perception test was to examine the extent to which the Mandarin-English bilinguals' Mandarin vowel production resembled the English monolinguals' English vowel production.

2.3 Experiment procedure

Stimuli were divided into two blocks, counterbalanced and presented to Mandarin listeners for goodness rating via E-Prime 1.0 on a laptop computer. Mandarin listeners were instructed to rate the goodness of the word they heard on a 7-point scale, with "1" being the worst and "7" the best exemplar of the Mandarin target word.

2.4 Acoustical analysis procedure

The duration, F1, F1 movement (ΔF1), F2, F2 movement (ΔF2), F3 and F0 of each target vowel were measured using Praat script [8].

3. RESULTS

3.1 Inter-rater reliability

The Cronbach's α values for Mandarin listeners in the rating of the 8 Mandarin vowels were all above .70, a cut-off point of an acceptable reliability [6].

3.2 Group differences

The mean ratings for each vowel assigned by Mandarin listeners to each speaker group (pooled across listeners) is given in Figure 1. The general tendency is that MonoM received the highest ratings and MonoE the lowest ratings, with the two groups of Mandarin-English bilinguals receiving intermediate ratings. It is also observed that, in most cases, BiML's ratings were lower than those of BiMH. Despite the trend that the rating scores assigned to the Mandarin-English bilinguals were intermediate between MonoM and MonoE, a significant difference was observed between BiMH and MonoM [$Z = -2.42, p < .05$], BiML and MonoM [$t (28) =2.46, p < .05$] only in the rating scores of /y/.

3.3 Individual differences

Based on the accentedness criterion that speakers who obtained a mean rating falling two standard deviations below the mean rating assigned to native speakers were considered to have accented pronunciation [3], some individual Mandarin-English bilinguals had an accent in their L1 vowel production (see Table 1). As can be seen in

the numbers in the brackets, there is no evidence showing that BiML outnumbered BiMH in being judged as accented.
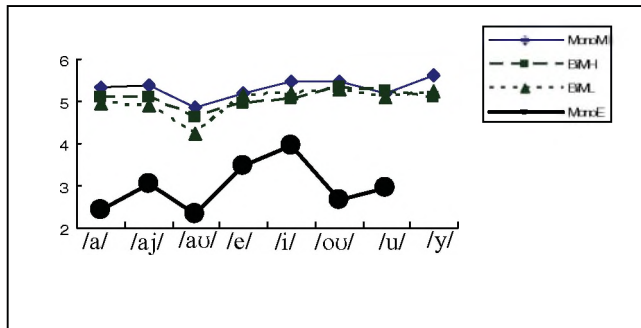

Fig. 1. Ratings assigned to MonoM, BiMH, BiML and MonoE by Mandarin listeners.

Table 1. Number of Mandarin-English bilinguals being judged as accented by Mandarin listeners.

Mandarin Vowel	Number of speakers judged as accented by Mandarin Listeners
/a/	4 (2 BiMH, 2 BiML)
/aj/	1
/aʊ/	1
/e/	2 (2 BiMH)
/i/	4 (2 BiMH, 2 BiML)
/oʊ/	5 (2 BiMH, 3 BiML)
/u/	1
/y/	13 (6 BiMH, 7 BiML)

3.3 Individual differences and acoustic data

As can be seen in Table 2, the acoustic dimensions that possibly contributed to the Mandarin-English bilinguals' accentedness in their L1 vowel production include lower F1(/y/), larger downward ΔF1(/u/), larger upward ΔF2(/aj/), duration(/e/, /oʊ/) and tone deviation(/a/, /aʊ/, /e/, /i/, /oʊ).

Table 2. Possible acoustic properties contributing to Mandarin-English bilinguals' accentedness.

Mandarin Vowel	Possible acoustic properties
/a/	tone deviation
/aj/	Larger upward ΔF2
/aʊ/	tone deviation
/e/	tone deviation, short duration
/i/	tone deviation
/oʊ/	tone deviation, exaggerated duration
/u/	Larger downward ΔF1
/y/	Lower F1

4. DISCUSSION

A clear pattern of accentedness was observed for the Mandarin-English bilinguals (n=13) in the production of /y/. This result is surprising, given the fact that Mandarin /y/ does not have an obvious English counterpart. It is hypothesized that the addition of the English /ɪ/ makes the high front portion of the vowel space more crowded and, as a result, the Mandarin-English bilinguals raised their /y/ to keep it perceptually distinct from its surrounding vowels. Another vowel showing the effect of L2 learning is Mandarin /aj/, in which the Mandarin-English bilinguals judged

as accented had larger upward ΔF2 that is a characteristic of English /aj/. Although some individual Mandarin-English bilinguals were judged as accented in /a/, /aʊ/, /e/, /i/, /oʊ/, and /u/, there is no evidence indicating that they have modified the categories of these vowels because the acoustic properties possibly contributing to their accent (e.g. tone deviation and duration) do not necessarily mean the reorganization of L1 vowel category. The Mandarin-English bilinguals' reorganization of /y/ suggests that an L1 sound that does not have an L2 counterpart and is therefore not "similar" to an L2 sound may also be adjusted to maintain perceptual contrast in the shared L1 and L2 vowel space. Therefore, such L1 segments should also be included in the predictions of speech learning theories.

With regard to the effect of L1 use, the Mandarin-English bilinguals sounded accented to Mandarin listeners, whether their amount of L1 use was high or low. It seems that a bilingual's L1 will be affected in one way or another as long as he or she uses and is exposed to L2 on a regular basis. Previous studies of L2 influence on L1 [e.g. 1, 7] provide supporting evidence for this claim.

The present study contributes to the less well-studied field of L2 influence on L1. In particular, it suggests the necessity to include dissimilar L1 segments in speech learning theories.

5. REFERENCES

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