

CROSS-LINGUISTIC INTERACTION BETWEEN TWO VOICED FRICATIVES IN MANDARIN-MIN SIMULTANEOUS BILINGUALS

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ABSTRACT

This study investigated cross-linguistic interaction in Mandarin-Min simultaneous bilinguals by examining how speech contexts and realizations of Min /z/, which is undergoing a /z/→[l] sound change, affected the realizations of Mandarin /z/. Twenty Mandarin-Min bilinguals produced /z/-words in different contexts and were grouped according to their realizations of Min /z/. Results showed speakers of Min /z/→[l] dialect had fewer retroflex variants of /z/. Read speech induced more retroflex variants of /z/ in males, but brought about a mixed effect among females. Females of Min /z/→[z] dialect had more [l], while those of the /z/→[l] dialect had more [z], implying that females used [±fricative] to differentiate different speech contexts. This study thus demonstrated a dynamic context-dependent relationship between the two languages in Mandarin-Min bilinguals.

Keywords: cross-linguistic, simultaneous bilingual, voiced fricative, Mandarin, Min

1. INTRODUCTION

One central issue in bilingualism is to understand how the two languages of bilinguals are organized and how they interact. Although various theoretical frameworks have been proposed, they are nonetheless largely focused on processes in late bilingual speakers, who are the majority. Another much rarer group of bilinguals is the simultaneous or early bilinguals, who are exposed to two languages from birth or at early ages. Since they are relatively free from the complication caused by differential ages of acquisition, and to a lesser extent, the imbalanced influence of language proficiency, it is easier for researchers to examine the potential interaction between two mature phonological systems by studying this group of bilingual speakers.

Previous studies on simultaneous bilinguals have demonstrated that the phonological representations of the two languages are kept largely distinct. For instance, Canadian English-French bilinguals tended to maintain separate realizations for their English and French coronals and high vowels rather than having merged representations in speech production [6, 7]. However, it was also observed that their Canadian-English vowels and

consonants were more French-like than those of monolingual English speakers. Similar patterns were found in Spanish-Catalan simultaneous and early bilinguals [2]. Both Spanish-first-acquired and Catalan-first-acquired Spanish-Catalan bilinguals maintained the Catalan /e/-/ɛ/ distinction, which is nonexistent in Spanish. However, Catalan-first bilinguals demonstrated more separate categories than their Spanish-first counterparts at the acoustic level, and were far less likely to commit realization errors at the lexical level. Based on these studies, one could conclude that the two phonological systems of simultaneous/early bilinguals are both autonomous and interdependent.

This study intends to further look into the nature of the interdependent relationship between the two linguistic systems of simultaneous bilinguals by studying Mandarin-Min simultaneous bilingual speakers in Taiwan. Mandarin is the official language of the country, while Min is the major substrate language, with about 70% of the population having at least some knowledge of Min [4]. Both languages incorporate a voiced fricative in their phonological inventories, with Mandarin having /z/ and Min having /z/, and both languages show variant realizations regarding their voiced fricative sounds. Four major realizations are reported for Mandarin /z/: [l], [z], [ʒ], and [n], with their frequencies of occurrence in that order [3]. [l] and [z] are traditionally attributed to Min influence, as Min has no retroflex in its inventory, and suffer a negative connotation [3, 5]. [z] and [ʒ] are sensitive to speech context, with the former being more commonly found in spontaneous speech, while the latter being more likely found in read speech. [l] and [n] are more impervious to style changes [3]. As for Min /z/, there are three variants identified: [z], [l], and [g], with the former two being major dialect- and age-dependent realizations, and the latter one being a minor dialect-dependent realization [1]. [l] and [g] variants of Min /z/ are considered to be motivated by ease of articulation, and are judged as less prestigious than [z].

2. SPECIFIC AIMS

There are two specific aims in this study. The first is to examine whether the realizations of Min /z/ in Mandarin-Min bilinguals would affect the realizations of their Mandarin /z/. Although this direction of influence is often assumed in previous

studies [3, 5], few have provided empirical evidence, and even fewer have taken into account the variable realizations of Min /z/. This study thus intends to include this factor and examine the potential influence of dialectal variations of Min /z/ on the realizations of Mandarin /z/. Specifically, one would expect speakers of the Min /z/→[z] dialect to demonstrate more Mandarin /z/→[z] realizations than both Min /z/→[l] and /z/→[g] dialect speakers. Similarly, speakers of Min /z/→[l] dialect should show more Mandarin [l] realizations of /z/ than both Min /z/→[z] and /z/→[g] dialect speakers.

The second aim of the study is to examine whether this potential influence of Min on Mandarin is modulated by speech context. Previous studies have shown that [z] and [ʒ] realizations of Mandarin /z/ are genre-sensitive, while [l] and [n] are not [3]. However, previous studies neglected the potential influence of Min dialectal difference, and thus it is unclear whether such differential patterning still holds when Min dialectal difference is taken into account. Therefore, this study intends to include different speech contexts to examine potential context effects, in addition to the interactions between Min influence and speech context.

3. METHOD

3.1. Participants

Ten male and ten female Mandarin-Min simultaneous bilinguals, aged from 18 to 25, were recruited. All spoke Mandarin and Min fluently.

3.2. Stimuli and procedure

Five Mandarin /z/-initial bisyllabic words were selected as stimuli, along with a number of other words functioning as fillers. Two speech conditions were created: question-answer (henceforth QA) and wordlist reading (henceforth WR).

All words appeared in both contexts. In the QA condition, the experimenter asked the participants prompt questions to elicit the response of the target words. As for the WR condition, all words were presented on the computer screen, and the participants were asked to read them out in a natural manner. Finally, in order to determine the participants' pronunciation of Min /z/, speakers were asked to read a short Min paragraph constructed to include seven /z/-initial syllables. Some of the /z/ syllables were repeated in the paragraph to test for consistency. Participants were asked to read the paragraph in Min once.

3.3. Data analyses

Each Mandarin /z/ and Min /z/ token was independently transcribed by the first and the second authors. Disagreed tokens were transcribed by the third author. All three authors/transcribers are

phonetically-trained native Mandarin-Min simultaneous bilinguals.

4. RESULTS

4.1. Min /z/ realizations

There were in total 234 tokens of Min /z/ production by all participants, and the overall distribution is shown in Table 1. There was a gender difference. Male speakers produced 55% of /z/ as [l], and 19% as [z], while females produced 82% of [l] and only 10% of [z]. However, regardless of gender, [l] was the most common realization for Min /z/, reflecting the predominance of /z/→[l], while /z/→[g] was a minor variant of the sound change [1]. Interestingly, a minor realization of retroflex approximant [ɻ] was also observed, which was not reported in previous literature, and was more frequently found in male than female speakers.

Table 1: Realizations of Min /z/.

	[l]	[z]	[ɻ]	[g]	Other	Total
♂	64	22	11	7	12	116
♀	97	12	1	4	4	118

Based on their realizations of Min /z/, participants were further divided into two groups, the Z-group and the L-group. The former refers to speakers with a /z/→[z] rule, while the latter refers to those with a /z/→[l] rule. However, since none of our participants produced only [z], contrary to what was indicated in the literature [1], the grouping criterion was adjusted so that participants were assigned to the Z-group as long as they realized at least one Min /z/ token as [z]. Half of the females were thus categorized into the Z-group while the other half were in the L-group. For males, four of them belonged to the Z-group, while the other six belonged to the L-group. As shown in Figure 1, the frequencies of occurrence of [l] and [z] in the two groups again showed a gender effect. Male speakers of the Z-group indeed demonstrated a dominant realization of [z] (48%), while female speakers of the Z-group still realized more [l] than [z] (73% vs. 20%). For the L-groups, female speakers also realized more [l] than their male counterparts (93% vs. 74%). This suggested that the /z/→[l] sound change in general progressed faster among females than males.

4.2. Mandarin /z/ realizations

Figure 2 presents the distribution of Mandarin /z/ variants for different speaker groups. There was a gender effect. Male speakers showed four major realizations, [z], [ʒ], [ɻ], and [l], while female speakers showed only three, [z], [ɻ], and [l]. No [z]

realization was found for female speakers. It is surprising that all speakers showed substantial [ɿ] realizations, an observation not documented in previous studies. At least 35% of male and 40% of female /z/ realizations were in this form. It is also interesting that the four major realizations could be differentiated by two features, [±retroflexion] and [±frication], with [ʐ] and [ɿ] being [+retroflexion], and [ʑ] and [z] being [+frication].

Figure 1: Distribution of [l] and [z] realizations of Min /z/ for Z-group and L-group speakers.

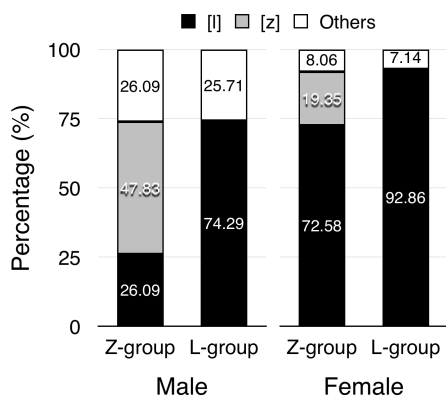
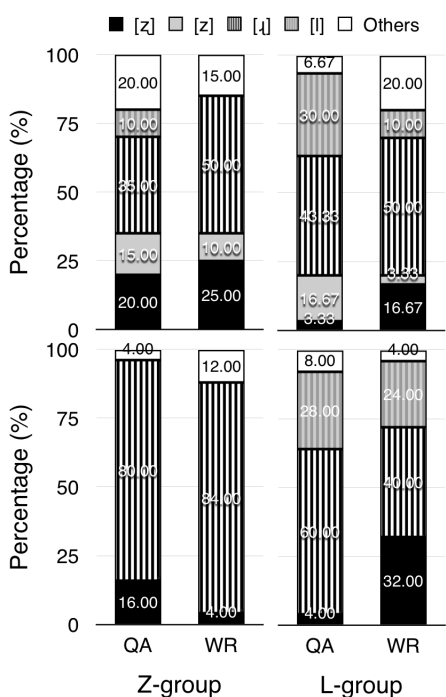


Figure 2: Distribution of Mandarin /z/ realizations in different contexts; upper: male, lower: female.



Comparing across the two Min dialect groups, one finds that the L-group had more [l] than the Z-group, regardless of gender. In fact, no [l] was found for female Z-group speakers. On the other hand, the Z-group speakers did not show more instances of [z]. Instead, male speakers had more [z], while female speakers had more [ɿ]. In other words, speakers' Min dialect group seemed to affect the

occurrence of [±retroflexion]. Separate logistic regressions were performed for the two genders, with GROUP entered as a predictor. Results showed that GROUP was significant in predicting the occurrence of retroflexion for female speakers. The probability for retroflexion to occur decreased by a factor of .14 when speakers switched from the Z-group to the L-group (Table 2b). No significant effect was found for male speakers.

Table 2: Summary of the logistic regression for (a) [±retroflexion] in males; (b) [±retroflexion] in females; (c) [±frication] in females. References: Z-group and QA. G × C: interaction of GROUP and CONTEXT. * $p < .05$, ** $p < .01$, *** $p < .001$.

Variable	B	SE	Wald χ^2	Exp(B)
(a)				
Constant	.00	.28	$\chi^2(1) = 0$	1.00
Context	1.05	.43	$\chi^2(1) = 5.95^*$	2.85
(b)				
Constant	2.75	.60	$\chi^2(1) = 21.35^{***}$	15.67
Group	-2.00	.67	$\chi^2(1) = 8.94^{**}$.14
(c)				
Constant	-1.87	.34	$\chi^2(1) = 30.37^{**}$.15
G × C	1.30	.54	$\chi^2(1) = 5.82^*$	3.66

With regard to the effect of speech context, there was a gender difference. Male speakers were fairly consistent. Regardless of their Min dialect groups, they tended to increase [z] and [ɿ] and decrease [ʐ] and [l] in read speech. In other words, [±retroflexion] was affected by speech context. A logistic regression with CONTEXT entered as a predictor showed that CONTEXT was significant in determining the occurrence of retroflexion. When speakers switched from QA to WR, their probability for retroflexion increased by a factor of 2.85, as shown in Table 2a.

On the other hand, female speakers showed a dialectal split with regards to speech context. Those belonging to the Z-group tended to increase [ɿ] and decrease [z] in read speech, while those belonging to the L-group tended to increase [z] and decrease the usages of [l] and [ɿ]. In other words, [±frication] was affected by Min dialect group and speech context. A logistic regression with GROUP × CONTEXT as a predictor showed that speakers switching from the QA context or the Z-group to WR in the L-group would increase the probability of frication by a factor of 3.66, as shown in Table 2c.

5. DISCUSSION

The present study investigated whether and how the two systems of a Mandarin-Min bilingual interact by focusing on the realizations of two voiced fricatives,

Mandarin /z/ and Min /z/. Specifically, one would like to closely examine how variability of Min /z/ affects the realizations of Mandarin /z/, a direction that was often assumed in previous studies [3, 5]. One found that both voiced fricatives had indeed variable realizations, which were surprisingly qualified by gender. Mandarin /z/ had [z], [ɹ], and [l], with an additional [z] being a male trait, while Min /z/ had [z], [l], and [g], with an additional [ɹ] being mainly a male trait. Across genders, [ɹ] was the major realization for Mandarin /z/, which was not observed in previous studies (cf. [3]), while [l] was the predominant realization for Min /z/, which was in accordance with [1].

When bilinguals were separated by their Min dialect groups, one found the expected significant influence of Min on Mandarin. L-group speakers realized more Mandarin /z/ as [-retroflex] [l]'s, while Z-group speakers showed more [+retroflex] [z] (for males) and [ɹ] (for females). While the realization of Mandarin /z/ as [l] in the L-group could be interpreted in a more straightforward manner as an outright transfer from Min to Mandarin, the pattern found in the Z-group speakers was not as easily explainable, as Min does not incorporate any retroflex in its inventory. One possibility might be the common attitude that the bilingual speakers hold towards the two languages. Even though there was a predominant /z/→[l] merger-in-progress in Min, speakers still regard [z] as the prestigious form [1]. Analogously, although [l] is a major variant for Mandarin /z/, [z] was still regarded more highly. Therefore, rather than a simple Min-to-Mandarin kind of influence, one might view the Z-group speakers as ones that hold a more conservative attitude towards language change. As a consequence, they chose to realize more [z] in Min, and more retroflex sounds in Mandarin. On the other hand, the L-group might be more open to such sound changes, and thus were more inclined to adopt the currently non-prestigious novel forms in both languages.

Although the contextual effect found in previous research was also observed in this study, the results were not a direct replicate. Instead, one found the effect to be qualified by gender. Male speakers seemed to value [+retroflexion] as an indicator for formal speech, and thus more [z] and [ɹ] were found in the WR context. On the other hand, female speakers tended to value [±frication] more. Z-group females preferred [ɹ] while L-group females preferred [z] in formal contexts. Given the predominant realization of [ɹ] in Z-group females, it is possible that they deemed [ɹ] as the orthodox realization for /z/, while the L-group still regarded [z] as the formal form.

Finally, it is rather surprising and interesting to find that [ɹ] was a variant for both Mandarin /z/ and

Min /z/. As retroflex is not part of the Min inventory, and substantially more instances were found in Mandarin than in Min, one suspects that the emergence of [ɹ] started in Mandarin, and gradually encroached on the Min system. In other words, the cross-linguistic interaction in Mandarin-Min bilinguals might be bidirectional rather than the previously-assumed unidirectional. The fact that females showed more [ɹ] in Mandarin than male speakers while males showed more [ɹ] in Min than female speakers is also intriguing. If the [ɹ] realization of Min /z/ is indeed due to Mandarin influence, then this implies that female bilinguals are more capable of maintaining separate phonological inventories than males. However, Mandarin-Min bilingual females demonstrated their cross-linguistic interaction by having little or no realization of [z] for Mandarin /z/, as their Min merger of /z/→[l] is almost complete.

In conclusion, this study presents a case of active phonological interaction between the two languages of simultaneous bilinguals. Variability in one language has a corresponding effect on the other language, and the influence is bi-directional. The results supported the interactive relationship between the phonological organizations of the two languages of simultaneous bilinguals, as suggested by previous literature. Such an influence is qualified both by gender roles and speech contexts, demonstrating the dynamism of such an interaction.

6. REFERENCES

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