



Influence of Hangzhou Dialect on Mandarin Speaking: Using *Erhua* as an Example

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Abstract. One of the phonetic differences between Mandarin and the Hangzhou dialect is the pronunciation of Mandarin *erhua*. According to the phonetic realizations, Chinese *er*-suffix can be produced as *erwei* and *erhua*: the *er*-suffix remains its independent syllable and tone in *erwei* but loses its independent syllable and tone while merging with the preceding rhyme as the concomitant action of retroflexion in *erhua*. This study found that Hangzhou natives performed worse than the standard speaker in speaking Mandarin *erhua* with the influence of the popularity of *erwei* and the lack of retroflex/rhotic in the Hangzhou dialect; however, younger participants showed improvement in producing Mandarin *erhua* compared to middle-aged participants.

Keywords: *Erhua* · *Erwei* · Rhotic · Mandarin · Hangzhou dialect

1 Introduction

In 1956, the State Council of China established the official status of Mandarin and announced Standard Mandarin, i.e., Putonghua, as the unique standard language in China [1]. However, it is common to see Mandarin and regional dialects co-exist in Chinese linguistic communities [2]. Accordingly, Mandarin can be categorized into 1) the narrow sense, i.e., Standard Mandarin theoretically, and 2) the broad sense, i.e., Mandarin with different dialectal accents practically [2]. Strictly speaking, Mandarin in the narrow sense only exists in official books, and no one can speak Standard Mandarin [2]. However, some professionals who are regarded as standard Mandarin speakers should be capable of speaking Mandarin that is closest to Standard Mandarin [2].

This article terms Mandarin used by natives in Hangzhou, a southern city in China, as Hangzhou Mandarin. The current study aims to facilitate collaborative work between Mandarin *erhua* words in order to support the influence of the Hangzhou dialect on Mandarin speaking in Hangzhou from both perceptual and acoustic perspectives.

2 Background

2.1 Language Proficiencies

In recent decades, the urbanization of Hangzhou has increased the importance of Mandarin learning and speaking yet weakened the practicality of the Hangzhou dialect particularly among the younger generation [3]. For instance, in a survey conducted by Fan

(2015), teenagers (93.9%) were rated as more proficient in using Mandarin than their parents (75.8%) and grandparents (16.7%); on the contrary, the young generation group (51.5%) was less proficient in using the Hangzhou dialect than the middle-aged group (90.9%) and the elders' group (93.9%) [4].

2.2 *Erhua* and *Erwei*

Pronounced as /əʒ35/ in Mandarin and /əɭ213/ in the Hangzhou dialect, the Chinese one-character content word, which is written as *ér* in Pinyin, originally means “son, little boy” and can be used as a diminutive suffix to show speakers' emotions in both languages [5–6]. When the Chinese character functions as an *er*-suffix, it can be categorized as *erwei* and *erhua* following its phonetic realizations [7].

The *er*-suffix remains its independent syllable and tone in *erwei* [7]. Whilst *erwei* words widely exist in Mandarin, as in (a), and the Hangzhou dialect, as in (b). Moreover, the *er*-suffix loses its independent syllable and tone while merging with the preceding rhyme as the concomitant action of retroflexion in *erhua* [8]. *Erhua* words broadly appear in Mandarin, as in (c), but never emerge in the Hangzhou dialect [9].

Erwei and *erhua* correspond to two stages of Chinese *er*-suffixation: *erwei* represents a morphological process, while *erhua*, which is developed from *erwei*, represents a morphophonological process [8–11].

In sum, the Hangzhou dialect only includes *erwei* as the phonetic realization of *er*-suffix. However, Mandarin includes *erwei* and *erhua* words, as well as other *er*-suffixation words whose phonetic realizations depend on the context [5, 7, 9]. Most Mandarin *er*-suffix words are realized as *erhua* [7]. In this experiment, only *erhua* words whose pronunciations are definite and should not be read as *erwei* words have been selected as the word-list stimuli. This study hypothesized that with the influence of the Hangzhou dialect, Hangzhou participants might not be accustomed to reading the target *erhua* words and may misread some of them as *erwei* words.

2.3 Rhoticity of *Erhua*

The vowels in the *erhua* rhymes should be rhotacized due to the retroflexion in the *erhua* process. However, compared with Mandarin which includes rich retroflex/rhotic consonants and vowels, the Hangzhou dialect does not contain any retroflex/rhotic sounds [8–14]. Therefore, it is predicted that, with the influence of the Hangzhou dialect, Hangzhou participants might not be accustomed to rhotacizing vowels in *erhua* rhymes. Even if they produced rhotacized vowels, they might not produce strong rhoticity compared to standard Mandarin speakers.

2.4 Independent Variables

Type of initial consonants: Due to the lack of retroflex sounds in the use of the Hangzhou dialect, this article presents a study on the influence of retroflex consonants on reading vowels in *erhua* rhymes. Yu (2019) found that foreign Chinese learners produced less rhoticity while reading Mandarin r-colored vowels with retroflex initial consonants than non-retroflex initial consonants [15].

Age: Since previous studies disclosed better proficiency in Mandarin speaking than using Hangzhou dialect by the younger generation compared to the elders, age differences are considered in this study as a significant factor influencing participants in reading Mandarin *erhua* words.

3 Methods

3.1 Participants

Two groups of Hangzhou natives were invited to the study, including four young female participants aged 20 to 23 years old and four middle-aged female participants aged 44 to 49 years old. They were born and grew up in the city of Hangzhou at least until 18 and have been living in Hangzhou as residents.

3.2 Materials

Except for Chinese characters pronounced as /e/ or /ə/, all vowels can be rhotacized to *erhua* rhymes in Mandarin [8]. The pronunciation rules of *erhua* rhymes can be categorized into five types [8]. In line with the List of Erhua Words for Putonghua Proficiency Test [16], twelve monophthong *erhua* words were randomly chosen, as shown in Table 2. Due to the *erhua* rhymes under the fifth rule containing two vowels, this paper excludes the rhymes categorized in the fifth rule. However, writings in Pinyin might indicate that the target words are *erhua* words. Therefore, I only showed participants the Chinese orthography of the target three-character words in the experiment (Table 1, 3 and 4).

Each participant recorded once for each target word; thus, 12 items were obtained. Additionally, participants were asked to answer the following two questions:

- 1) What are your first and second languages?
- 2) Are you proficient in Mandarin or the Hangzhou dialect?

Furthermore, recordings of the 12 tokens read by a female standard speaker on the CD matched with the official book were included in the experiment [16].

Table 1. Examples of *erwei* and *erhua* [Table Credit: Original]

	Pinyin	IPA	Phonetic realization	Meaning
a.	niǎo ér	niǎu214 ə35	<i>erwei</i>	bird
b.	niǎo ér	liǎ53 ə131	<i>erwei</i>	bird
c.	niǎor	niǎo- u- 214	<i>erhua</i>	bird

Table 2. Tested *erhua* words in each pronunciation rule [Table Credit: Original]

	Regularity	Pinyin / IPA (Non-retroflex initial consonant)	Pinyin / IPA (Retroflex initial consonant)
1.	Rhymes that end in /a/, /o/, /ɤ/, /u/, or /e/: the vowel should be rhotacized.		
	a → a·	<i>bǎn cār</i> /pan214 ts ^h a· 55/	<i>zhǎo chār</i> /tɕ au214 tɕ ^h a· 35/
	u → u·	<i>sui bùr</i> /suei51 pu· 51/	<i>lèi zhūr</i> /lei51 tɕ ^h u· 55/
2.	Rhymes that end in [i] or [n] and include at least a vowel before [i] or [n] (except for [in] and [yn]): /i/ or /n/ should be lost and the vowel should be rhotacized.		
	an → a·	<i>liǎn dānr</i> /liɛn214 ta· 51/	N/A
	ən → ə·	<i>huā pénr</i> /xua55 p ^h ə· 35/	N/A
3.	Rhymes that include [ɿ] or [ʅ]: the vowel should be changed into the rhotacized [ə].		
	ɿ → ə·	<i>méi cír</i> /mei35 ts ^h ə· 35/	N/A
	ʅ → ə·	N/A	<i>jì shìr</i> /tái51 ʂə· 51/
4.	Rhymes that end in [ɨ]: [ɨ] should be lost, and the vowel should be nasalized and rhotacized; if the vowel is [i], a nasalized and rhotacized [ə] should be added after it, and the [i] remains unchanged.		
	uɨ → ũ·	<i>guǒ dòngr</i> /kuo214 tũ· 51/	<i>jiǔ zhōngr</i> /tɕiou214 tɕ ^h ũ· 55/
	ɤɨ → ẽ·	<i>gāng bèngr</i> /kaŋ55 p ^h ẽ· 51/	<i>tí chénggr</i> /t ^h i35 tɕ ^h ẽ· 35/
5.	Rhymes [i], [y], [in] or [yn]: the [ɨ] should be lost, and a rhotacized [ə] should be added after the vowel.		

Table 3. Rbrul analysis of the factor groups conditioning *erhua* words with *erwei* words among the participants [Table Credit: Original]

Centered input probability				0.75
Overall proportion				0.656
Df				2
Total N				96
Factors	Logodds	Tokens	<i>Erhua / erhua + erwei</i>	Factor weight
Age				
Young	1.609	48	0.938	0.833
Middle	-1.609	48	0.375	0.167

3.3 Measurement

The measurement of the type of word is based on auditory perception. The main difference between *erwei* and *erhua* lies in the syllable and tone. Since the 12 stimuli are three-character words, if the experimenter heard a word including three syllables and

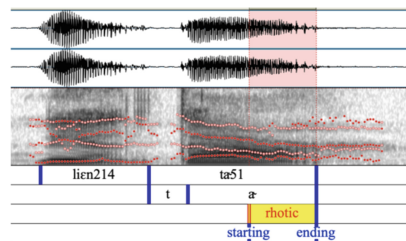
Table 4. Rbrul analysis of the factor groups conditioning rhotic *erhua* rhymes with non-rhotic *erhua* rhymes among the participants [Table Credit: Original]

Centered input probability				0.63
Overall proportion				0.651
Df				3
Total N				63
Factors	Logodds	Tokens	Rhotic / rhotic+ non-rhotic <i>erhua</i>	Factor weight
Age				
Middle	0.045	18	0.722	0.511
Young	-0.045	45	0.622	0.489
Consonant				
Non-retroflex	0.837	39	0.795	0.698
retroflex	-0.837	24	0.417	0.302

three tones, it should be categorized as an *erwei* word, however, if she heard two syllables and two tones, the word should be classified as an *erhua* word.

The measurement of the rhoticity of *erhua* rhymes is based on acoustic analyses from PRAAT software [17]. Specifically, the lowering of the third formant (F3) is known as the most robust acoustic characteristic of the rhotacized vowels [18–20]. Moreover, lower F3 indicates more rhotic *erhua* rhyme [11].

Accordingly, this study measured the values of F3 at the start and the end of the lowering F3 in the rhotic part of the rhotacized vowel, i.e., the *erhua* rhyme. After that, it is calculated the lowering of F3 (see Fig. 1). The formant was set to 5,5 kHz for female speakers considering acoustic practice [21].

**Fig. 1.** Speaking of *liǎn dàn* /lien214 ta˥51/ from a 20-year-old participant [Figure Credit: Original]

4 Results and Discussion

4.1 Language Proficiencies

The results indicated that three of ($N = 4$) and all of ($N = 4$) young participants considered Mandarin as their first language and dominant language respectively, but none of ($N = 4$) and two of ($N = 4$) middle-aged participants considered Mandarin as their first language and dominant language respectively. Furthermore, two of ($N = 4$) and none of ($N = 4$) young participants recognized the Hangzhou dialect as their first language and dominant language respectively, but all of ($N = 4$) and two of ($N = 4$) middle-aged participants recognized the Hangzhou dialect as their first language and dominant language respectively. Therefore, the findings disclose that the young generations were more influenced by Mandarin and less affected by the dialect than the middle-aged group.

4.2 *Erhua* and *Erwei*

To study the age factor on the produced type of word, one-level logistic regression analysis in Rbrul demonstrated a statistically significant effect of age ($p < .001$).

Align with the prediction, young participants, who were more influenced by Mandarin and less influenced by the Hangzhou dialect, were more likely to produce *erhua* words than the middle-aged participants.

4.3 Rhotic and Non-rhotic *Erhua*

Furthermore, it was surprising that all participants from the younger group ($N = 4$) and one from middle-aged participants ($N = 4$) produced 22 non-rhotic *erhua* rhymes. Strictly speaking, the vowel in an *erhua* rhyme must be rhotacized, and an *erhua* rhyme must be rhotic. Nevertheless, the researcher of this study classified words with two syllables and two tones as *erhua* words and categorized *erhua* rhymes with no noticeable F3 lowering as non-rhotic *erhua* rhymes. In fact, it is the participants who internalized those non-rhotic *erhua* rhymes as *erhua* rhymes. For instance, they misread *huā pénr* /xua55 p^hə̌ 35/ as /xua55 p^hə̌35/, *méi cǐr* /mei35 ts^hə̌ 35/ as /mei35 ts^hə̌35/ and *jì shìr* /tɕi51 ʂə̌ 51/ as /tɕi51 ʂə̌51/. It is clear that they followed partial rules for producing *erhua* rhymes, such as losing the [n] in rhymes that end in [n] and changing the vowel [ɿ] or [ʮ] to [ə̌] (see Figs. 2 and 3).

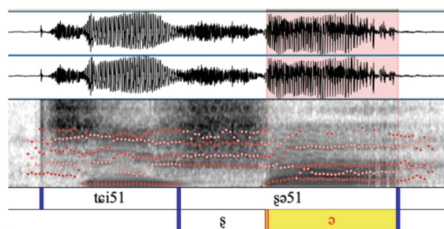


Fig. 2. Speaking of *jì shìr* /tɕi51 ʂə̌51/ from a 20-year-old participant [Figure Credit: Original]

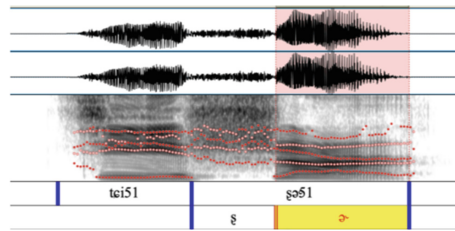


Fig. 3. Speaking of *ji shir* /tei51 ʂ ə 51/ from a standard speaker [Figure Credit: Original]

To study the age factor and type of consonant on the produced type of *erhua* rhymes, one-level logistic regression analysis in Rbrul demonstrated a statistically significant effect of the type of consonant ($p < .005$) and a non-significant effect of age ($p = .892$).

Align with the prediction, the participants were more likely to produce rhoticity with non-retroflex consonants than retroflex consonants. This may be due to a lack of retroflex/rhotic sounds in the Hangzhou dialect.

Furthermore, the degree of rhoticity of the rhotic *erhua* rhymes produced by participants and the standard speaker was analyzed in the one-tailed independent *T*-Test. The findings showed no significant effect for the type of speaker, i.e., Hangzhou participants or the standard speaker, $t(51) = -0.08$, $p = .47$. Whilst the degree of rhoticity of the rhotic *erhua* rhymes produced by the young group and middle-aged group was analyzed in another one-tailed independent *T*-Test. The 28 *erhua* words spoken by young participants ($M = 830.38$, $SD = 383.70$) compared to the 13 *erhua* words spoken by middle-aged participants ($M = 585.68$, $SD = 236.92$) demonstrated significantly higher F3 lowering scores, $t(39) = 2.11$, $p < .05$ ($p = .02$).

In line with the prediction, the young group tended to produce a higher degree of rhoticity of the rhotacized vowel than the middle-aged group, which might be associated with young participants being more exposed to Mandarin and less exposed to the Hangzhou dialect.

5 Conclusion

This study discussed the influence of the Hangzhou dialect on the Hangzhou Mandarin speaking. Findings were generated through investigating participants reading *erhua* words using their Hangzhou Mandarin. Findings disclosed that participants tended to misread some *erhua* words as *erwei* words, with the middle-aged group being more likely to produce *erwei* words than the young group. The study also found that participants tended to produce (non-standard) non-rhotic *erhua* rhymes, particularly with retroflex consonants in the same syllable. Moreover, the younger participants, who were less influenced by the Hangzhou dialect and more exposed to Mandarin, tended to produce stronger rhoticity in rhotic *erhua* rhymes than the middle-aged participants. Finally, limitations remain in this study, and further studies can investigate male participants to fill the gender gap and elder participants to fill the age gap.

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