The sociolinguistics of rhotacization in the Beijing speech community

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Chapter 6 Frequency of Rhotacization Types

6.1 Introduction

In Standard Chinese, rhotacization is a limited phenomenon, but in Beijing Mandarin, the phonetic basis of Standard Chinese, the extensive application of rhotacization on nouns, verbs, and adjectives is widely considered to be one of its typical features (B. Huang & Liao, 2017; Y.-H. Lin, 2007b). However, in previous sociolinguistic studies, the rhotacization frequency in the naturalistic speech of speakers is under-explored, as are the effects of social factors on the frequency, as mentioned in Section 1.2.1. Furthermore, hardly any studies could be found examining the rhotacization use of migrants who have different dialect backgrounds in the Beijing speech community. Therefore, in Chapter 5, we examined the rhotacization frequency of speakers in the Beijing speech community, and social variables were shown to have an effect on the rhotacization frequency. Meanwhile, we noticed that, although the rhotacization frequencies differ between native and non-native speakers, speakers tend to use rhotacized words multiple times in their speech, making the number of rhotacized words they produced quite large. So, this raises the question of whether the high frequency is simply due to the high occurrence rate of rhotacized tokens or whether high frequency rhotic speakers also use more diverse rhotacized words (types)[19] than the speakers with lower overall (token) frequencies. In addition, in relation to this, it would be also interesting to look at the number of rhotacization types being used by Beijing native speakers and in particular its change across different social groups, due to the growing influence of Standard Chinese.

This chapter is a further study on the rhotacization frequency, based on Chapter 5. The main concern of this chapter is to investigate the frequency of rhotacization types being used in spontaneous speech and the effects of the social variables on the frequency in the Beijing speech community. Therefore, based on the findings of existing studies and those presented in Chapter 5, the following questions will be addressed in this chapter. First, how many rhotacization types are actually used by the speakers in the different social groups? Second, how are they distributed across the different speaker groups? Third, what effects do the social variables, age, gender, and dialect background have on the frequency of rhotacization types? Fourth, do we see any changes with respect to rhotacization in the speech community?

Section 6.2 introduces the data source, the methods employed to judge and obtain the rhotacization types, and the statistical treatment. Section 6.3 presents the results of the overall distribution of the rhotacized words and the statistical results of the frequency differences between speakers in different

[19] For convenience and simplicity, we will use the terms "types" or "rhotacization types" in this study to address different rhotacized words. The criteria of judging rhotacized words as being the same type or different types are introduced in detail in the section *Judgment of repetition* in Section 6.3.

social groups. In the last section, we compare and discuss the results of Chapters 5 and 6 and draw conclusions.

6.2 Method

Data source and data type

This investigation is based on the frequency counts of the number of different rhotacized words per 1,000 words per person per social group. The outcome is defined as "the frequency of different rhotacization types." The total number of words observed is 76,000, and the total number of observed rhotacized tokens is 3,402, as presented in Chapter 5, based on which the number of rhotacization types will be obtained. The relevant detailed methods and information about data collection and data processing can be found in Sections 3.2 and 5.2.

Judgment of repetition

The aim of the judgment is to obtain the rhotacization types and their number of each speaker in each social group. Attention was paid not only to the phonological form, but also to meaning and grammatical status. Thus, even though the phonological form is the same, the instances of *menr* in the Table 6.1 are recognized as different types based on grammatical and lexical criteria.

Table 6.1 Examples of different rhotacized words.

	Rhotacization	*Meaning*	*Word category*	*Examples*
1	-边儿 -biānr	-side	Noun	上边儿 shàng bianr/above, 路边儿 lù biānr/roadside
2	-人儿 -rénr	people, person	Noun	老人儿 lǎo rénr/old people, 小人儿书 xiǎo rénr shū/picture-story book
3	-玩儿 -wánr	play	Verb	好玩儿 hǎo wánr/amusing
4	邪门儿 xiéménr	odd	Adjective	
5	专门儿 zhuānménr	specially	Adverb	
6	-门儿 -ménr	(city) gate	Proper noun	西便儿门 Xībiàn Ménr/Xibian Menr Gate
7	-门儿 -ménr	door	Noun	小门儿 xiǎo ménr/ small door
8	-门儿 -ménr	(for study subject)	Measure word	一门儿课 yì ménr kè/ one subject

On the other hand, all instances of the suffix *bianr* 'side' represent a single type, regardless of what precedes it. Similarly, the position of the rhotacized syllable in a word does not influence the judgment. For example, rhotacized *-renr* 'person' is the last syllable in *lao renr* 'old person' and in the middle position in the word *xiao renr shu* 'children's book', but all instances of *renr* 'person' count as one type.

Statistical treatment

Similar to Chapter 5, to compare the differences of the rhotacization types of frequency across different social groups statistically, both parametric and nonparametric statistical tests were used. We performed the normality tests with the combination of visual inspection and significance test in R (R Core Team, 2020). The ggpbur package (Kassambara, 2020) was used in R to do the visual inspection and Shapiro-Wilk's test to do the normality significance tests. The data sets of Beijing native speakers were normally distributed, according to the result of Shapiro-Wilk's test. For this reason, parametric statistical tests—*t*-tests and one-way ANOVA—were used for testing the differences among Beijing native speaker groups. The total data set was tested as well but not normally distributed. So, nonparametric statistics was also used. The Kruskal-Wallis test and Wilcoxon test were applied to deal with the nonparametric data set in this study.

In addition, distributions were also considered relevant, in addition to the average tendencies. Therefore, boxplots are used to present the distribution of the number of rhotacized words across the social variables, which could show the effects of the various social variables on rhotacization. The boxplots were made using the ggplot2 package (Wickham, 2016) in R, and the alpha value was shown on the boxplots as well.

6.3 Results

Overall rhotacization distribution

An overview of the number of participants and the sum of rhotacization types per social group and the average rhotacization frequency per participant per social group is shown in Table 6.2.

Table 6.2 Number of rhotacization types (*N*=1,452) per 1,000 words for various speaker groups (*N*=76).

	Age	*Beijing*			*Rhotic*			*Non-r*		
		p n	*r n*	*avg.*	*p n*	*r n*	*avg.*	*p n*	*r n*	*avg.*
Male	Young	8	235	29	4	53	14	4	12	3
	Middle	4	134	34	4	72	18	4	31	8
	Old	4	171	43	4	83	21	2	2	1
Female	Young	7	191	27	4	58	15	5	33	7
	Middle	4	160	40	4	74	19	3	15	5
	Old	4	155	39	2	39	20	5	10	2
	Total	31	1046	34	22	379	17	23	103	5

Note: p n refers to the number of participants; *r* refers to the total number of rhotacization types per 1,000 words by participants in each social group; *avg.* is the number of rhotacization types per 1,000 words per participant in each social group. *Beijing*, *Rhotic,* and *Non-rhotic* refer to the three dialect backgrounds of the participants.

As seen in Table 5.1 and Table 6.2, among the 3,402 rhotacized words, there are in total 1,528 types (non-repeated rhotacized words), accounting for 45% of the total. So, in general, more than half of the produced rhotacized words were repetitions.

Figure 6.1 shows the boxplots of the overall distribution of rhotacization types across social variables. The x-axis indicates Age–Gender social groups, and the y-axis indicates the number of rhotacization types produced by each group.

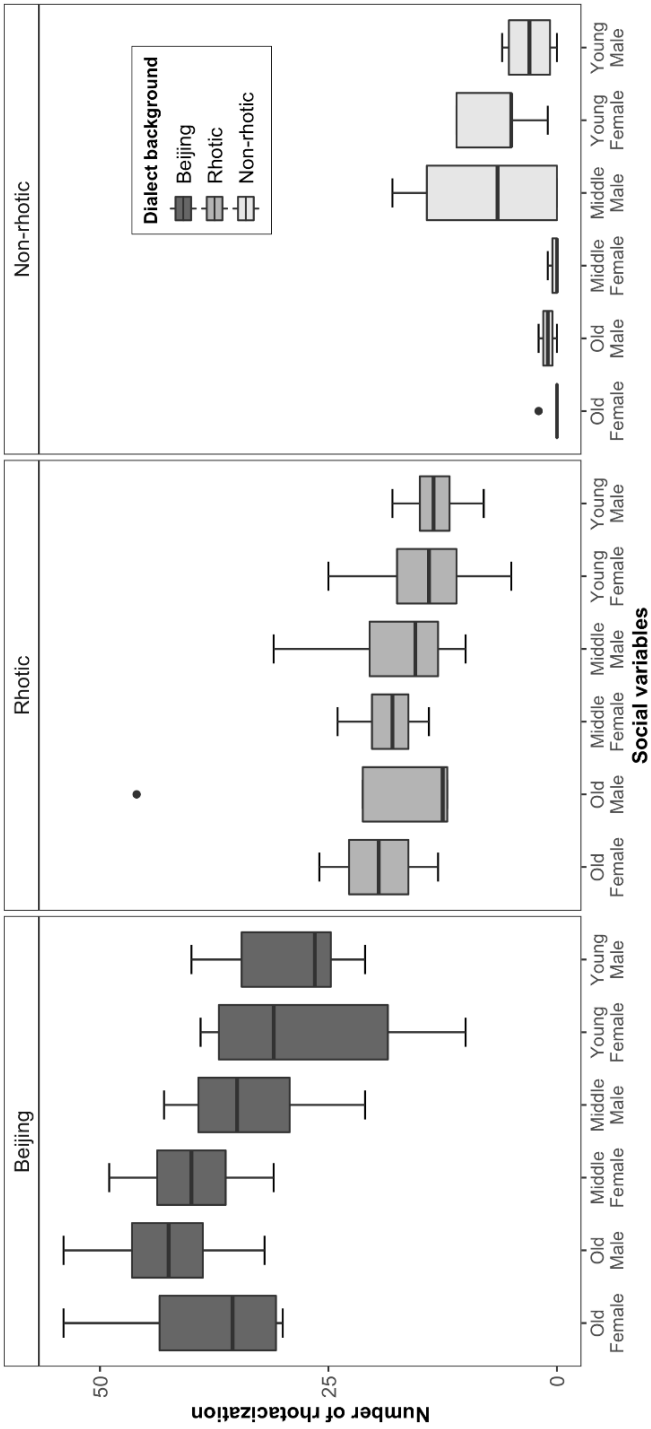

Figure 6.1 Distribution of the rhotacization types across the speaker groups (N=76).

As shown in Table 6.2 and Figure 6.1, the frequencies of average rhotacization types and the overall distribution of rhotacization types vary among speakers in different social groups. It seems that the three social variables have an effect on how many different rhotic words speakers produce in spontaneous speech. The specific effects are examined statistically next, and the subsequent figures show the results.

Gender[20]

An independent two-sample t-test was conducted to test whether the variable Gender is a factor among the Beijing native speakers. Figure 6.2 shows the boxplot of the number of different rhotacizations produced by the two gender groups and the alpha value.

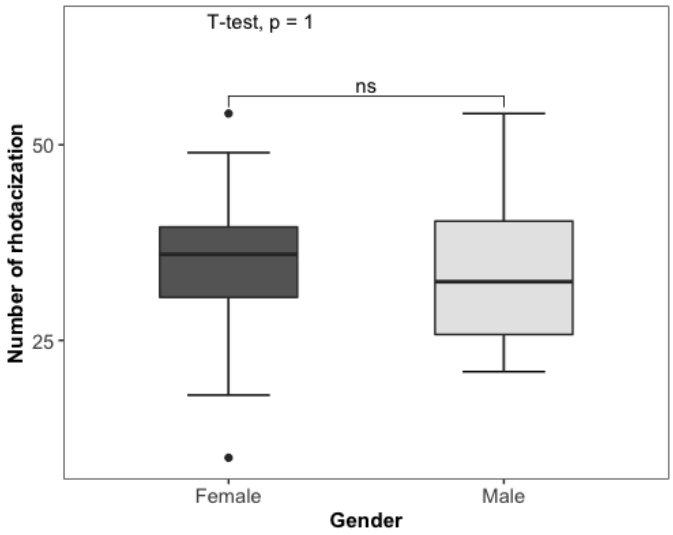

Figure 6.2 Number of rhotacization types (*N*= 991) of each gender (female, n= 15; male, n=16).

The statistical result shows that there was no significant difference in the number of rhotacization types for female (M = 33.67, SD = 11.3) and male Beijing native speakers (M = 33.38, SD = 9.24); $t(29) = 0.08$, $p = .94$. This suggests that the social variable Gender has no effect on the frequencies of the rhotacization

[20] For Gender, only the gender difference among the Beijing native speakers were studied. *Dialect* Background was not analyzed. The reasons can be found in Section 5.3.

types of Beijing native speakers. The detailed *t*-test results are summarized in Table 6.3.

Table 6.3 Summary of the independent *t*-test on the number of the rhotacization types of female and male Beijing native speakers.

Gender	*N*	*Mean*	*SD*	*Se*
Female	15	33.7	11.3	2.93
Male	16	33.4	9.24	2.31

We then conducted *t*-tests to test if the rhotacization frequencies of female and male Beijing speakers are different from each other in the same age group. Table 6.4 shows the results.

Table 6.4 *p*-values of pairwise comparisons of two genders of Beijing native speakers.

Young Beijing Male speakers	Middle Beijing Male speakers	Old Beijing Male speakers
.714	.352	.667
Young Beijing Female speakers	Middle Beijing Female speakers	Old Beijing Female speakers

The results show that the number of rhotacizations produced by both Male and Female Beijing speakers in the same age group is not significantly different from each other (p = .714, p = .352, p= .667).

In short, the social variable Gender is shown not to have any effect on rhotacization types produced by the Beijing native speakers.

Age

We conducted a one-way ANOVA test to measure the effect of Age on the number of rhotacization types. Figure 6.3 shows the boxplots of the number of rhotacization types produced by different age groups, as well as the alpha value.

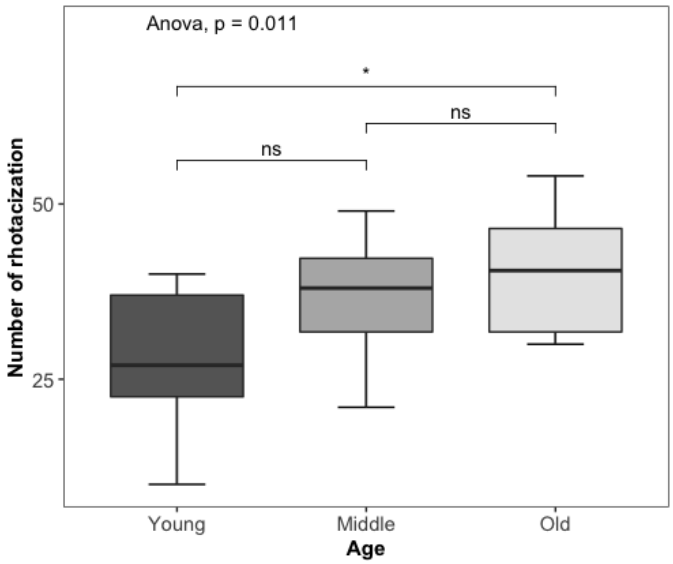

Figure 6.3 Number of the rhotacization types (*N*=333) of each Age group (*Young, n*=15*; Middle*, *n*=8; *Old*, *n*=8).

The results of the one-way ANOVA test show that Age had a significant effect on the number of rhotacizations at the $p < .05$ level for the three conditions [F (2, 28) = 6.243, $p = .001$]. Post hoc comparisons using the Tukey HSD test indicate that the Young Beijing native speakers (*M*=27.93, *SD=8.75*) produced significantly fewer rhotacizations than the *Old* (*M*=40.75, *SD*=8.83). However, there were no significant differences between the Young and Middle Beijing native speakers (*M*=36.75, *SD*=8.41) and between the Middle and Old Beijing native speakers (*M*=40.75, *SD*=8.83). Table 6.5 summarizes the results.

Table 6.5 Summary of the independent *t*-test on the number of rhotacization types produced by Young, Middle, and Old Beijing native speakers (*N*=31).

Age	*N*	*Mean*	*SD*	*Se*
Young	15	27.93	8.75	2.26
Middle	8	36.75	8.41	2.97
Old	8	40.75	8.83	3.12

An independent *t*-test was conducted to test the generational difference in each gender group. The results are presented in Table 6.6 (females) and Table 6.7 (males).

Table 6.6 *p*-values of pairwise comparisons of three age groups of female Beijing native speakers (*N*=15).

Young Beijing Female speakers	Middle Beijing Female speakers	Old Beijing Female speakers
Young Beijing Female speakers	.07	.111
	Middle Beijing Female speakers	.938
		Old Beijing Female speakers

As shown in Table 6.6, the Young and Middle Beijing Female speakers had significantly different rhotacization frequencies at the $p < .1$ level, $t(9) = 2.06$, $p = .07$. The difference of rhotacization frequencies between the Young and Old Beijing Female speakers is not significant, $t(9) = 1.77$, $p = .11$, and the same is true of that between Middle and Old Beijing Females $t(6) = 0.08$, $p = .94$.

Table 6.7 *p*-values of pairwise comparisons of three age groups of male Beijing native speakers (*N*=16).

Young Beijing Male speakers	Middle Beijing Male speakers	Old Beijing Male speakers
Young Beijing Male speakers	.318	.01
	Middle Beijing Male speakers	.232
		Old Beijing Male speakers

As shown in Table 6.7, the number of rhotacizations produced by the Young Beijing Male speakers was significantly different from that of the Old Beijing Male speakers. There were no significant differences between the Young and Middle Beijing Male speakers, $t(10)=1.05$, $p = .32$, and between the Middle and Old Beijing Male speakers, $t(6)=-1.33$, $p = .23$.

In sum, the social variable Age has an effect on the rhotacization frequencies by Beijing native speakers. The Young produced fewer different rhotacized words than the Old. However, female speakers in the same age group showed barely any differences.

Dialect background

We conducted two nonparametric tests, the Kruskal-Wallis test and the Mann-Whitney *U* test, to examine the effects of Dialect background, as the total data set of this study is not normally distributed, as mentioned above.

A Kruskal-Wallis test was conducted to test the effect of Dialect background on the number of rhotacizations. The results are shown in Figure 6.4.

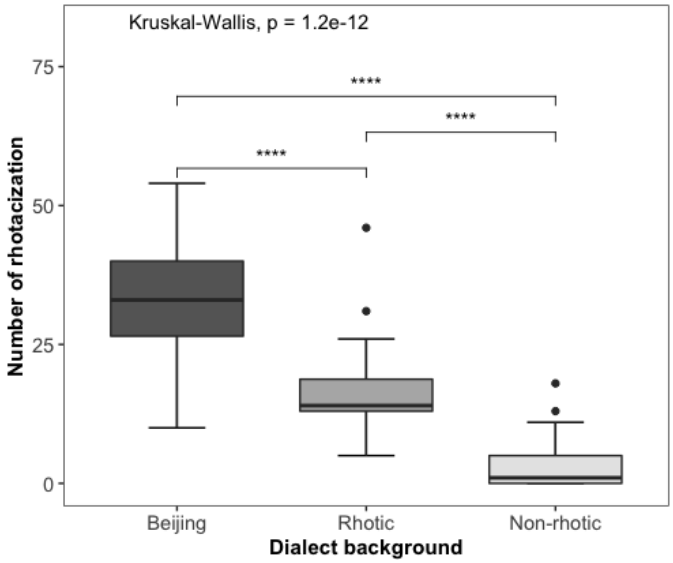

Figure 6.4 Number of rhotacization types (*N*=333) of each dialect background group (*N*=76).

The results reveal that Dialect Background has a significant effect on the number of rhotacization types (Kruskal-Wallis chi-squared = 54.85, df = 2, p = .000). Thus, *Dialect Background* is a crucial social variable.

The results also mean that there is a significant difference in at least one non-paired comparison. Mann-Whitney *U* tests were conducted to check which pair(s) of groups is (are) significantly different. Figure 6.4 (the horizontal lines with asterisks) shows that all pairs of groups are significantly different from each other. The number of rhotacizations is higher for Beijing native speakers (*Mdn* = 33) than for Rhotic speakers (*Mdn* = 14), U = 606, p = .000, and Non-rhotic speakers (*Mdn* = 2), U = 709, p = .000. Rhotic speakers (*Mdn* = 14) also produce significantly more rhotacization types than Non-rhotic *speakers* (*Mdn* = 2), U = 32, p = .000. Thus, speakers with a Beijing Mandarin dialect background produced the greatest number of rhotacization types in their natural speech, while the Non-rhotic speakers produced the least. Table 6.8 shows a summary of the Mann-Whitney *U* tests.

Table 6.8 Summary of the Mann-Whitney *U* tests on the number of the rhotacization types produced by speakers in three dialect groups.

Dialect groups	*N*	*Mean*	*Mdn*	*SD*	*Se*
Beijing	31	33.5	13.5	10.1	1.82
Rhotic	23	17.1	6.75	8.97	0.99
Non-rhotic	22	3.91	5.5	4.74	1.91

Mann-Whitney *U* tests were conducted to test the frequency differences of the Beijing and Rhotic speakers in the age group. The *p*-values are shown in Table 6.9.

Table 6.9 *p*-values of non-pairwise comparisons of Beijing native speakers (*N*=31) and Rhotic speakers (*N*=22) of three generations.

Young Rhotic speakers	Middle Rhotic speakers	Old Rhotic speakers
.002	.002	.024
Young Beijing speakers	Middle Beijing speakers	Old Beijing speakers

The results shown in Table 6.9 reveal that the number of rhotacizations in each comparison is significantly different from each other. The number of rhotacizations was greater for the Young Beijing speakers (*Mdn*=26) than for the Young Rhotic speakers (*Mdn*=13.5), *U*= 108, *p* = .002. The number of rhotacized words was greater for the Middle Beijing speakers (*Mdn*=38.5) than for the Middle Rhotic speakers (*Mdn*=17), *U*=62, *p*=.002. The Old Beijing speakers (*Mdn*=40) also significantly produced a greater number of rhotacized words than for the Old Rhotic speakers (*Mdn*=12.5), *U*=42, *p*=.002.

In short, Dialect background is an effective social variable. There are significant differences on the rhotacization frequency in all three comparisons. Beijing and Rhotic speakers in the same age group all have significant differences with each other.

6.4 Discussion and conclusion

The present study about the frequency of rhotacization types has three main findings. First, the social variable Gender showed no effect on the number of rhotacization types among Beijing native speakers. As the result in Chapter 5 showed, Gender also did not affect the rhotacization frequency among Beijing native speakers more generally. Previous studies (Q. Zhang, 2008; H. Zhao, 2017) have suggested that rhotacization in Beijing Mandarin is associated with masculinity, but this is not confirmed in our data as reported in this chapter and the previous one.

Second, the social variable Age was shown to be an effective factor among Beijing native speakers. There was a significant difference between the young

and the old native speakers, while there was no significant difference between the young and the middle, and the middle and the old speakers. However, as shown in Chapter 5, there were significant differences in the general rhotacization frequency in all three comparisons. Therefore, from the old to the young, the young generation produced fewer rhotacized words (tokens) than the middle and the old generation (as we saw in Chapter 5), and (as we saw in the current chapter) they produced fewer different rhotacized words (types). The middle generation produced fewer rhotacizations than the old generation, as presented in Chapter 5, but the number of rhotacization types they produced showed no significant difference with what we observed with the young and the old generation. We can, thus, conclude that a generational change in the rhotacization frequency can be observed, both in terms of tokens and in terms of types, among Beijing native speakers. The change in the former (tokens) can be seen across the three generations, while the change in the latter (types) was observed mainly in the young generation.

Third, Dialect background also proved to be a critical factor. The frequencies of the rhotacization types of speakers from the three different dialect backgrounds were significantly different from each other. We can make the following comments. First, as we saw here and in Chapter 5, Beijing native speakers produced more rhotacizations, both qua tokens and qua types, than speakers with other dialect backgrounds. Secondly, although speakers with a Non-rhotic dialect background appeared to adopt rhotacization, which was not natural to them, they produced a small number of rhotacizations, both in tokens and in types. Therefore, despite the social and language contact situation in the Beijing speech community, and the impact of Standard Chinese promotion, the influence on the rhotacized frequency and its variety was limited. Next, in this study, it is found that young Beijing native speakers used significantly more different rhotic words (non-repeated rhotacizations) than the young Rhotic speakers, while there was no significant difference between them on general rhotacization frequency (that is, with respect to the tokens, as presented in Chapter 5). This reveals that the young Beijing native speakers produced more diverse rhotacized words, whereas the large number of rhotacized words produced by the young Rhotic speakers was achieved by repeating the same type. Young Rhotic speakers used more rhotacization than the middle and the old Rhotic speakers. This suggests that the young Rhotic speakers were actually actively affected by Beijing Mandarin and rhotacization and tend to use more rhotacization. However, to accommodate themselves to the Beijing speech community, they tended to use more repeated rhotacization, because they did not have a wide rhotacized vocabulary. Finally, in Chapter 5, we found that the younger the Beijing native speakers were, the fewer the number of rhotacizations we found. The result of this chapter shows that the young generation also used fewer different rhotic words than the old generation. We can conclude that the rhotacization vocabulary of Beijing native speakers was undergoing a change; the older the Beijing native speakers were, the more they produced diverse rhotacization. Thus, as we mentioned in Chapter 5, a de-rhotacization process was actually ongoing among Beijing native speakers, not

only in terms of the number of tokens, but also in terms of the number of types. The number of rhotacized words in the Beijing vocabulary was diminishing.