

SOUNDS OF CHINESE KOREAN: A VARIATIONIST APPROACH

by

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Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT ARLINGTON

May 2008

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To my mother, Genzhu Wu, and my father, Guangzhu Jin
with love.

ACKNOWLEDGEMENTS

I would like to thank all the people who have encouraged and supported me in making this possible. First of all, I am indebted to Dr. David J. Silva, my supervising professor, for ushering me into the world of Korean linguistics, inspiring me with his insightful questions, and guiding me through this dissertation journey. I want to extend my thanks to the members of the committee, Dr. Donald A. Burquest, Dr. Jinny Choi, Dr. Jerold A. Edmondson, and Dr. Laurel Smith Stvan for their constructive comments and time.

I want to thank the Shenyang Municipal Committee of Ethnic Affairs, Shenyang Korean Ethnic Normal College, Shenyang Korean Association of Senior Citizens, Shenyang Korean Christian Church and my fellow Korean Chinese in Shenyang, China for their support and participation in this study. I also want to thank Kai Yang, Hua Yang, and Yongwei Liu for their assistance in the data collection during the field work.

I am grateful to AAUW and the graduate school and Dean's office at UTA for the financial support for the study.

Finally, I would like to thank my family, my mom and dad for their unconditional love and support, my sister and brother for taking over my share of responsibility in taking care of my parents, and my husband and daughter for their patience, love, and unfailing support.

April 5, 2008

ABSTRACT

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This study approaches the understudied Chinese Korean from a variationist perspective, with an aim to capture the variations and potential changes in the speech patterns of Chinese Korean. More specifically, three variables were examined: the voice onset time (VOT) of stop consonants and front rounded vowels /y/ and /ø/.

To discern any variation and change in these variables, 35 native speakers of Chinese Korean were interviewed and digitally recorded in the Korean community of Shenyang, China. Results of the analysis reveal the existence of a diachronic VOT shift and the “incrementation” of VOT change in the transmission process within this speech community. /ø/ has completely undergone diphthongization into [we], while /y/ presents a more complicated picture with four different variants: [y], [yi], [i] and [u]. It is suggested that instead of undergoing diphthongization as in Seoul Korean, /y/ in

Chinese Korean will remain as an underlying monophthong. Variable rule analysis on the four variants of /y/ reveals that [y] occurrence is more favored by word-initial-syllable position; [yi] as a prestigious form is more favored by female and upper class subjects; [i] is basically a sentence reading style indicator; and [u] as a stigmatized form is more common among lower class subjects and in casual style. The [u] variant is also more likely to occur when the preceding segment is [+back].

While the patterns observed above are explicable as reflexes of language-internal variability, one must also consider the possibility of a role played by language and dialect contact. The “transmission” (Labov 2007) within Chinese Korean as a branch of the Korean family tree justifies the continuity of “Chinese Korean” on its own; the “diffusion” across Korean dialects as in the wave model, however, helps foster its similarity to its sister.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	iv
ABSTRACT	v
LIST OF ILLUSTRATIONS.....	xi
LIST OF TABLES.....	xvii
CHAPTER	Page
1. INTRODUCTION AND BACKGROUND	1
1.1 Introduction.....	1
1.2 The Korean Chinese People.....	5
1.2.1 Population and Distribution	5
1.2.2 Korean Chinese Origin	7
1.2.3 The Current Situation of Korean Chinese.....	10
1.3 The Chinese Korean Language.....	14
1.3.1 Korean Varieties in China.....	14
1.3.2 The Current Situation of Chinese Korean.....	17
1.3.3 The Korean Sound System.....	20
1.4 The Korean Chinese Community in Shenyang City.....	21
2. LITERATURE REVIEW	25
2.1 Models of Language Change and Diffusion.....	25
2.2 The Labovian Quantitative Paradigm.....	30
2.3 Variation and Change in Korean	34

3.	METHODOLOGY	42
3.1	Introduction.....	42
3.2	Research Questions.....	42
3.3	Theoretical Framework.....	44
3.4	Social and Linguistic Factors.....	46
3.4.1	Social Factors Considered in Current Study	46
3.4.2	Linguistic Factors Considered in Current Study.....	50
3.5	Subjects.....	51
3.6	Data Collection	54
3.6.1	The Fieldwork.....	54
3.6.2	Data Collection Procedure	55
3.7	Acoustic Measurements and Transcription	59
3.7.1	The VOT Variable	59
3.7.2	The Front Rounded Vowels	68
3.8	Statistical Methods.....	71
4.	VOT OF CHINESE KOREAN STOPS.....	75
4.1	Introduction.....	75
4.2	Patterns of VOT Variation.....	77
4.2.1	VOT Patterns in Word Initial Position	77
4.2.2	VOT Patterns in Word Internal Position.....	85
4.3	Patterns of Other Acoustic Cues.....	98
4.3.1	Patterns of Other Acoustic Cues in Word Initial Position	98
4.3.2	Patterns of Other Acoustic Cues in Word Internal Position	103
4.4	Discussion.....	106

4.5 Conclusion	116
5. FRONT ROUNDED VOWELS OF CHINESE KOREAN.....	119
5.1 Introduction.....	119
5.2 Diphthongization of /ø/.....	121
5.3 Variation in the Realization of /y/	130
5.3.1 Variants of /y/	130
5.3.2 Distribution of the Four Variants	142
5.3.2.1 Overall Distribution of the Four Variants	142
5.3.2.3 Distribution of Each Variant by Two Dimensions of External Factors	148
5.3.3 Variable Rule Analysis of /y/.....	162
5.3.3.1 Introduction	162
5.3.3.2 Factor Groups Considered in the Study	164
5.3.3.3 VARBRUL Analysis: [yi].....	167
5.3.3.4 VARBRUL Analysis: [y].....	179
5.3.3.5 VARBRUL Analysis: [i].....	186
5.3.3.6 VARBRUL Analysis: [u].....	193
5.3.4 Discussion	201
5.4 Conclusion	205
6. CONCLUSION.....	208
6.1 Summary.....	208
6.2 Implications	215
6.2.1 For the Study of Korean Language Change and Development	215
6.2.2 For the Study of Language Variation and Change in General	223

Appendix

A. QUESTIONNAIRE.....	226
B. TOPICS FOR CASUAL CONVERSATION.....	228
C. MATCHING GAME.....	230
D. SENTENCE READING.....	232
E. WORDLIST READING.....	234
F. SELF-EVALUATION TEST	236
REFERENCES	238
BIOGRAPHICAL INFORMATION.....	249

LIST OF ILLUSTRATIONS

Figure	Page
1.1 Map of the Northeastern Part of China	6
1.2 The Major Dialect Areas of Korea.....	15
2.1 Simple form of the wave model.....	27
2.2 Simple scheme of the competing waves	28
2.3 The gravity model of linguistic diffusion	28
2.4 VOT Values for the Chinese Korean stops.....	40
3.1 Illustration of VOT measurement for [p] of [pa]	62
3.2 Illustration of F0 onset measurement for [a] of [pa]	63
3.3 Illustration of F0 offset measurement for [a] of [pa]	63
3.4 Illustration of intensity rise time measurement for [a] of [pa]	65
3.5 Illustration of vowel length measurement for [a] of [pa].....	66
3.6 Illustration for the closure period measurement for [k ^h] of [k ^h a].....	67
3.7 Spectrogram of [sa.y] without formant trajectory.....	70
3.8 Spectrogram of [sa.y] with automatic formant trajectory	70
4.1 Distributions of Mean VOT Values for Different Places of Articulation (ms)	78

4.2	Range of VOT Values for Different Phonation Types (ms)	80
4.3	Mean VOT Values for Different Phonation Type (ms)	81
4.4	Distribution of Δ VOT (ms).....	83
4.5	Mean VOT Values for Older and Younger Groups.....	84
4.6	Sample voiceless tense stop /t/ as in /pottari/ ‘parcel’	87
4.7	Sample voiceless aspirated stop /t ^h / as in /ɛt ^h ata/ ‘anxious’	87
4.8	Sample lax stop /k/ with unbroken voicing in /tʃ ^h okatʃip/ ‘thatched house’	88
4.9	Sample lax stop /t/ with partial voicing in /motaku/ ‘nail’	89
4.10	Sample lax stop /t/ realized as voiceless [t] in /motaku/ ‘nail’	90
4.11	Sample lax stop /t/ realized as voiced fricative variant in /motaku/ ‘nail’	91
4.12	Sample lax stop /k/ realized as an approximant in /tʃ ^h okatʃip/ ‘thatched house’	92
4.13	Mean VOT values for three different phonation types in word internal position.....	95
4.14	Mean VOT values for different phonation types in different places of articulation in word internal position.....	96
4.15	Word internal Mean VOT values for different phonation types for younger ad older groups	97
4.16	F0 onset and offset for the vowel immediately following a stop of different phonation type in	

word initial position for Younger and Older Groups.....	99
4.17 Length of the vowel immediately following a stop of different phonation type in Younger and Older Groups.....	100
4.18 F0 onset and offset for the vowel immediately following a stop of different phonation type in word internal position	104
4.19 Word internal closure duration for stops of different phonation types	105
4.20 VOT Patterns Observed in Young Speakers from Three different Places	114
5.1 Simple vowels in Chinese Korean (adapted from Xuan et al. 1991).....	119
5.2 Current Seoul Korean simple vowel system.....	120
5.3 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of an old subject in Wordlist Reading style.....	122
5.4 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of an old subject in Matching Game style	124
5.5 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of an old subject in Sentence Reading style	125
5.6 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of a middle aged subject in Wordlist Reading style.....	125
5.7 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of a middle aged subject in Matching Game style	126
5.8 Spectrogram and intensity contour of /øsamɿson/ ‘uncle’ of a middle aged subject in Sentence Reading style.....	126

5.9 Spectrogram and intensity contour of /øsamɥɔn/ ‘uncle’ of a young subject in Wordlist Reading style	127
5.10 Spectrogram and intensity contour of /øsamɥɔn/ ‘uncle’ of a young subject in Matching Game style	127
5.11 Spectrogram and intensity contour of /øsamɥɔn/ ‘uncle’ of a young subject in Sentence Reading style	128
5.12 Spectrogram of /y/ ‘stomach’ realized as [y]	133
5.13 Spectrogram of /y/ ‘stomach’ realized as prototypical [yi] with onset vowel, glide and offset vowel	134
5.14 Spectrogram of /y/ ‘stomach’ realized as non- prototypical [yi] with only onset vowel and glide	135
5.15 Spectrogram of /y/ ‘stomach’ realized as non- prototypical [yi] with only glide and offset vowel	137
5.16 Spectrogram of /y/ ‘stomach’ realized as non- prototypical [yi] with only the glide	138
5.17 Spectrogram of /y/ in /taramɥy/ ‘squirrel’ realized as [i]	140
5.18 Spectrogram of /y/ in /kkamaky/ ‘crow’ realized as [u]	141
5.19 Overall distribution of [y], [yi], [i] and [u]	142
5.20 Variation in distribution of [y], [yi], [i] and [u] by Age	144
5.21 Variation in distribution of [y], [yi], [i] and [u] by Gender	145
5.22 Variation in distribution of [y], [yi], [i] and [u] by Socioeconomic Status	146

5.23 Variation in distribution of [y], [yi], [i] and [u] by Style	147
5.24 Distribution of [y] by Age*Style	149
5.25 Distribution of [yi] by Age*Style	150
5.26 Distribution of [i] by Age*Style	150
5.27 Distribution of [u] by Age*Style	151
5.28 Distribution of [y] by Age*Gender.....	152
5.29 Distribution of [yi] by Age*Gender	153
5.30 Distribution of [i] by Age*Gender	153
5.31 Distribution of [u] by Age*Gender.....	154
5.32 Distribution of [u] by Style*Class	155
5.33 Distribution of [y] by Style*Class	156
5.34 Distribution of [yi] by Style*Class	156
5.35 Distribution of [y] by Style*Gender	157
5.36 Distribution of [yi] by Style*Gender	158
5.37 Distribution of [y] by Class*Gender.....	159
5.38 Distribution of [yi] by Class*Gender	159
5.39 Structured levels for multinomial variable /y/	162
5.40 Parallel models for multinomial variable /y/	163
5.41 Effect of Age+Syllable Context on the realization of [yi]	172
5.42 Effect of Age+Syllable Onset on the realization of [yi]	174
5.43 Realization of /y/ as [yi] ‘stomach’	175

5.44	Effect of Gender+Socioeconomic Status on the realization of [yi].....	176
5.45	Effect of Age+Socioeconomic Status on the realization of [yi].....	177
5.46	Effect of Target Syllable Position on the realization of [y].....	183
5.47	Effect of Age+Gender on the realization of [y]	184
5.48	Effect of Style on the realization of [y]	185
5.49	Effect of Style on the realization of [i]	190
5.50	Effect of Age on the realization of [i].....	191
5.51	Effect of Syllable Context on the realization of [i].....	192
5.52	Effect of Socioeconomic Status on the realization of [u].....	196
5.53	Effect of Age on the realization of [u]	197
5.54	Effect of Style on the realization of [u]	198
5.55	Effect of Modified Linguistic Context on the realization of [u].....	199
5.56	Wave model of diffusion between Korean varieties	203
6.1	Simple vowel system of current Chinese Korean	221
6.2	Simple vowel system of current Seoul Standard Korean.....	221

LIST OF TABLES

Table	Page
1.1 Frequencies of articles returned by key word searches	3
1.2 Distribution of the Korean Chinese population	6
1.3 Modern Seoul Korean consonant inventory	20
1.4 Modern Korean vowel inventory	21
2.1 Modern Korean vowel inventory	35
3.1 Subject distribution in this study (total 29).....	52
4.1 Mean VOT values for stops of different phonation types in different places of articulation (ms)	79
4.2 Mean VOT values of stops in word initial and word internal positions (ms)	93
4.3 One-way ANOVA analysis on Mean VOT values of Tense stops in word internal position (ms).....	94
4.4 One-way ANOVA analysis on Mean VOT values of Lax stops in word internal position (ms)	94
4.5 Post Hoc Tests of intensity build-up after stops of different phonation types for older group	101
4.6 Post Hoc Tests of intensity build-up after stops of different phonation types for younger group	102
5.1 Percentage of each variant by subject's age	143
5.2 Percentage of each variant by subject's gender	145

5.3 Percentage of each variant by subject's socioeconomic status	146
5.4 Percentage of each variant by style.....	147
5.5 Factor groups and factors considered in model A4	170
5.6 Goldvarb probabilities for significant factor groups in model A4.....	171
5.7 Factor groups and factors considered in Model B3	181
5.8 Goldvarb probabilities for significant factor groups in Model B3	182
5.9 Factor groups and factors considered in Model C4	189
5.10 Goldvarb probabilities for significant factor groups in Model C4	189
5.11 Factors in the modified linguistic context factor group	194
5.12 Factor groups and factors considered in Model D2.....	195
5.13 Goldvarb probabilities for significant factor groups in Model D2	196

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 Introduction

The Korean people living as citizens in today's People's Republic of China are the immigrants and descendants of the immigrants from the Korean Peninsula whose history can be traced back to centuries ago (Piao 1995). As they settled in China, often people from the same original hometown in the Peninsula speaking the same dialect lived together in their new settlement, forming villages of different dialects. Thus, features of their original Korean varieties have been maintained in China (Xuan 1996).

However, given the overall differences in the political and socio-cultural environment between China and the Korean Peninsula, it is expected that after centuries of acculturation with the China's mainstream Han culture, the Korean spoken by Korean people in China may manifest independent patterns of variation and change. This phenomenon has been reported in studies on other languages. For example, Guy's (1981) study on Brazilian Portuguese reveals that the language has acquired many unique characteristics so that today it is quite different from European Portuguese in many aspects such as the use of pronouns, verbal clitics, patterns of number agreement, reduction and deletion of final consonants, intonations patterns, lexicon, etc.

Indeed, some available studies on the Korean spoken in China indicate that despite the similarity in syntax between the Korean spoken in China and its counterparts in North Korea and South Korea, many linguistic differences are observable, especially in terms of lexicon and pronunciation/intonation. The Korean spoken in China not only maintains some archaic forms no longer present in other varieties, but also manifests some unique features best understood in terms of language contact (Cui and Quan 1993, Zheng and Li 2005, Silva and Jin 2006). Thus the Korean spoken in China deserves a term in its own right: Chinese Korean¹.

A note regarding the term Chinese Korean is in order. It is not a homogeneous variety. On the contrary, there are several sub-varieties under this general term (Zhao 1982). For this study, one sub-variety of Chinese Korean, i.e. the Phyengan variety, has been chosen as the focus of research. The term Chinese Korean is still used here to form contrast with the Peninsula counterparts.

This historically, politically, socio-culturally, and linguistically rich variety of Korean language, however, has not received much attention in the linguistic literature. In terms of linguistic research on Chinese Korean, two points come in order: one is the dearth of research ever conducted on Chinese Korean and the other is the lack of balance in research areas.

The majority of extant linguistic studies on Korean are about the southern varieties², i.e. the Korean spoken in South Korea, and the available research on Chinese

¹ Hereafter, “Korean Chinese” refers to the Korean people living as citizens in China, while “Chinese Korean” refers to the Korean language they speak.

² Research conducted within North Korea is not easily accessible due to political reasons.

Korean is scant and often theoretically underdeveloped (Silva and Jin 2006). What is more, since the limited amount of research on Chinese Korean is mainly conducted within China by Korean Chinese scholars, the output is usually either in Modern Standard Chinese (MSC) or in Korean, making it inaccessible to most scholars in the rest of the world who are not familiar with either of these languages. Thus, what has not been studied is a mystery, and what has been studied remains unknown to most part of the world.

The other point is that while the available linguistic research on Chinese Korean often addresses areas of bilingualism, lexicon, morphology and dialectology (e.g. Lee 1984, Jin 1990, Xuan, Zhao and Jin 1991, Guan 2001, etc.), systematic variationist studies on the sound system of Chinese Korean remain extremely underdeveloped. This imbalance in research areas is not limited to the study of Chinese Korean; a similar phenomenon is observable in Korean studies in general, as indicated in the following table as a result of key word searching in two important databases:

Table 1.1 Frequencies of articles returned by key word searches

Keyword pairings- “Korean” and:	Linguistics and Language Behavior Abstracts	MLA International Bibliography
“acquisition”	494	80
“dialect”	87	54
“phonetics”	181	93
“phonology”	426	263
“semantics”	331	205
“sociolinguistics”	119	23
“syntax”	730	637
“variation”	98	25

(Source: Silva and Jin 2006)

The current situation of Chinese Korean and Korean study in general constitute a motivating factor for undertaking this study.

In addition, the existing variation studies on Korean varieties other than Chinese Korean reveal changes and variations in the Korean vowel and consonant system (e.g. Hong 1991, Kang 1997, Kim-Renaud 1986, Silva 2006, etc.). Thus it is believed that studies on the sound system of contemporary Chinese Korean may contribute to a better and more comprehensive understanding of the change and development of Korean language provides further motivation to this current study.

A third motivating factor involves variationist study in general. Generalizations about variation and change are often based on studies conducted in western societies, thus they may not capture the patterns that occur in Eastern societies whose social organizations are substantially different from the West (Guy 2003). Thus, studies in eastern settings may shed new light on the understanding of language variation and change in general.

Given the current situation of Korean research and variation study in general, this study approaches the understudied Chinese Korean from a variationist perspective, with an aim to capture the variation patterns and potential changes in the sounds of Chinese Korean to better understand Korean language change and development. More specifically, this study has three goals: the first is to discern patterns of variation and change in the three variables of Voice Onset Time (VOT) of stops, high front rounded vowel /y/, and mid front rounded vowel /ø/ based on quantitative data and statistical

modeling; the second is to explain the observed patterns in terms of Labovian sociolinguistic paradigm; the third is to integrate the Chinese Korean case into the larger picture of Korean language development and variationist study in general.

In the remaining part of this chapter I present relevant background information: section 1.2 describes the history and current situation of the Korean Chinese people; section 1.3 explains the Chinese Korean language that they speak; section 1.4 introduces the target Chinese Korean speech community in this study.

1.2 The Korean Chinese People

1.2.1 Population and Distribution

Korean people live all over the world today. The 73,020,000 Korean people are distributed in 144 different countries and regions, among which 44,850,000 are in the Republic of Korea (South Korea), 22,970,000 in the Democratic People's Republic of Korea (North Korea). Of the remaining over five million Korean people, about two million are in China, forming the 13th largest among the 55 minority groups living in China. This group has been considered as the one that has best maintained the Korean language, culture, customs and traditions outside the Korean Peninsula (Jin 2003).

The majority of the Korean Chinese people live in the three northeastern provinces in China: Heilongjiang, Jilin and Liaoning (see Figure 1.1), with the rest living in Inner Mongolia and large cities such as Beijing, Tianjin, Guangzhou, Shanghai, Qingdao.

Table 1.2 shows the distribution of the Korean Chinese as enumerated by the national census in the year of 2000.



Figure 1.1 Map of the Northeastern Part of China

Table 1.2 Distribution of the Korean Chinese population

Province	Population	Percentage
Heilongjiang	388,458	20.19
Jilin	1,145,688	59.55
Liaoning	241,051	12.53
Other areas	148,645	7.73
Total	1,923,842	100.00

(Source: Cui 2004)

From this table we can see that over 90% of Korean Chinese live in the three northeastern provinces, among which about 60% live in Jilin province. This

distributional pattern reflects the migration pattern of their ancestors from the Korean Peninsula to China many centuries ago.

1.2.2 Korean Chinese Origin

Korean Chinese have been commonly considered as the descendants of the immigrants from the Korean Peninsula, and their places of origin are found to be scattered all over the Korean Peninsula by a national investigation on Korean Chinese conducted in 1982 (Shen 1985). As to the beginning date of their immigration, however, different views have been proposed in studies on Korean Chinese history with no consensus being reached to the present day (Jin 1996).

One view is that the beginning point of Korean Chinese history should be considered to be the Chinese Tang Dynasty in the eighth~ninth Century. This view is based on the fact that during this period, an aggregated Korean living area was formed along the Tang's coastal areas of Shandong, Jiangsu, etc., and thereafter there was continuous Korean immigration into China in the dynasties following Tang (Pan 1989).

A second view holds that the beginning point should be around the Yuan (1279-1368) and Ming dynasties (1368-1644) (Gao 1986). The argument is that it was in the Ming dynasty that China and Korea delimited the natural border along the Yalu River and the Tumen River, and only after the border was clearly defined could the border-crossing Koreans be called Korean Chinese.

A third view traces the Korean Chinese history back to the end of the Ming dynasty (1368-1644) and beginning of the Qing dynasty (1644-1911) (Huang 1993, Piao 1995). The major supporting piece of evidence for this understanding is the

existence of three groups of Piao people (their family name is Piao) in China. It has been proven that over 380 Piao people in Qinglong County (Hebei province), over 270 Piao people in Gai County (Liaoning province), and 1,234 Piao people in Benxi County (Liaoning province); all are the descendants of Koreans who immigrated to China some 350 years ago during the early Qing Dynasty and were registered ethnically as Manchu. During the Japanese colonization period, they were registered either as Manchu or as Han. They were not able to claim their real ethnicity until 1982 when the Chinese government reinstated their status as Korean per their own request. But for one generation after another, they have been farming in these areas to the present day.

The fourth (and most common) view holds that Korean Chinese have a history of about 150 years, starting from the mid 19th century when the large bulk of Korean people immigrated to China. Their direct descendants form the majority of today's Korean Chinese (Jin 1989, Zhu 2001, Jin 2003). A major argument put forward by this group is that the Koreans who immigrated to China earlier than the mid 19th century are not directly related to today's Korean Chinese in that they either later returned to Korean Peninsula or, if they stayed, they often mixed with other ethnic groups such as Manchu or Han so that gradually they had completely assimilated into the host cultures, losing their original ethnicity. This is even true with the documented Piao people. Although it is true that they are descents of an ancient Korean people from the Peninsula, they have completely lost their Korean language and their customs and traditions have been assimilated with those of Manchu and Han; thus, it is believed that they should not be considered part of today's Korean Chinese minority (Jin 1996). For

this fourth view, the continuity and maintenance of Korean language and culture from the immigrant ancestors to the descendants is then a necessity for the claim of Korean Chinese to be true.

As different as they are, these views all share one common understanding: Korean Chinese are descendants of Korean immigrants from the Korean Peninsula. However, there is one group of scholars (e.g. Gao 1990, Yan 1994) who have suggested that Korean Chinese are aboriginal inhabitants of China whose ancestors had built the kingdom of Koguryo (37BC-668AD) and after that the Kingdom of Balhae (698AD-926AD) in early Korean history in what is now the Yanbian area in China. This view has encountered wide rejection on the belief that after the kingdoms were toppled, the majority of their people who lived in what is now known as Yanbian area fled to the Korean Peninsula, and the remaining small part were forced by the Chinese government to move to the inner areas in China (Piao 1995). They were then completely assimilated with other ethnic groups, leaving no Korean descendants in China.

As heated as the debate is, one common understanding that has been reached by all the schools is that the majority of Korean Chinese in today's China are descendants of Korean people who immigrated into China between the mid 19th century and the end of the Second World War in 1945. They basically followed three different routes in this process (Jin 1993): to cross the Tumen River from the northeastern part of Korea into the Yanbian area in China; to cross the Yalu River from the northwestern part of Korea into the Dongbiandao area; to first enter the Russian coastal area, and then from there enter China's Heilongjiang area.

Korean immigration into China stopped when Korea regained its independence in August 1945 from Japanese colonization and about 600,000 Koreans in China returned to Korea. Those who remained in China lived in aggregation and maintained their language, tradition, culture and their strong sense of Korean ethnicity, forming the ethnic group of what we call today Korean Chinese. By the time “the new China” was established in 1949, the Korean Chinese population had reached 1,110,657 (Jin 1993).

1.2.3 The Current Situation of Korean Chinese

Among the ethnic Korean groups living outside the Korean Peninsula, Korean Chinese are believed to have best maintained Korean language and culture (Jin 2003). This has to do with Chinese government policy and the attitude of Korean Chinese themselves towards their culture.

Since the establishment of the People’s Republic of China, the Chinese government has advocated and legislated the concept of equality among the 56 ethnic groups in China, regardless of their differences in population, area, level of economic development, language, religion, customs and tradition (Huang 2001). The Constitution also stipulates that in places where the minorities live in aggregation, different levels of ethnic autonomous regions should be established, depending on the size of the population and area. In these autonomous regions, the ethnic language is used as the official language together with Mandarin Chinese, and the minorities enjoy their right to decide on their own interior affairs. It also stipulates that minorities have the right to use and develop their own languages and the freedom to maintain and change their ethnic

customs, traditions and religious belief, and that the central government should help the minorities in the development of their politics, economy, culture and education.

Under these guidelines, the Chinese government has been taking a series of practical measures to implement the policies. For example, among the 55 minorities, 40 have established 159 autonomous regions where 70% of the 1.6 billion minority people now live; since 1990, the government has been allocating special funds for minority education; and minority people are allowed to have two children while the general birth control policy permits one child per family (Huang 2001, Jin 2001).

Of the 55 minorities, Korean Chinese are among the most advanced in many areas including education, culture, and economy. Up to now, they have established the Yanbian Autonomous Prefecture, Changbai Autonomous County, and hundreds of autonomous Xiang³ (Cui 2004). They have established a complete ethnic educational system from kindergarten to graduate school, and their illiteracy rate is the lowest and college attendance rate is the highest among the 56 nationalities in China (Choi 2001). They also have five ethnic Korean publishing companies, six Korean newspapers, sixteen Korean magazines, and four Korean TV stations (Huang 2001). In economy, the Korean Chinese have been experiencing a new period of boom since the establishment of foreign diplomatic relationship between China and South Korea in 1992. Take Yanbian Autonomous Prefecture as an example: its international trade with South Korea reached 1.03 billion Yuan in 2002, and annual income from tourism was 2.8 billion Yuan (Cui 2004).

³ Xiang in China is a government administrative level lower than county.

Thus, Korean Chinese have cherished a pride in their ethnic identity and maintained a strong sense of Korean ethnicity by using their own language, attending ethnic schools, observing their ethnic customs and traditions, etc. In the field work for this study, all the Korean Chinese I encountered believed that because they are ethnic Korean, they should learn and use Korean, and they do. In addition, none of their family members have married someone from other ethnic groups. These practices have been a Korean tradition since ancient times, as a means of preserving the Korean language and culture, and the purity and continuity of this ethnic group.

However, under the influence of the mainstream Chinese culture and the socio-economic development in China, Korean Chinese have come to realize the necessity to be fluent in Chinese as well. Over 80% of Korean Chinese are bilingual in Korean and Chinese, though they differ in their proficiency levels (Guan 2001). This bilingualism has been fostered by the education system in the Korean ethnic schools, where Korean is used to teach all the content courses, while Mandarin Chinese is taught as a foreign language from the first grade. The number of hours allocated to Chinese courses increases each year until it equals (or higher than) that of Korean language courses in middle and high schools. Outside the classroom, ethnic Korean students have easy access to authentic Chinese materials and native Chinese speakers; thus most Korean Chinese have become bilingual and also developed a dual identity: Korean ethnicity and Chinese nationality (Choi 2001).

Today's Korean Chinese, however, are faced with some problems bearing on the maintenance and continuity of their ethnic group. One issue is that the population

growth rate of Korean Chinese is the lowest among the 56 nationalities in China; in some areas, the population growth rate is even negative. In Yanbian Autonomous Prefecture, for example, the growth rate in 1996 was -1.07%. In some major cities where Korean Chinese represent a substantial percentage of the population, such as Longjing, Helong and Tumen, the growth rate for the Korean Chinese went down to as low as -2.09%, -2.06% and -3.94% respectively (Quan and Zhang 2000). Among several possible contributing factors to this, two things deserve special attention. First, most Korean Chinese have adopted the concept of one child per family, and are not willing to raise a second one even if they are allowed to. Second, more and more Korean Chinese women are leaving the country through marriage with men from South Korea. In 2002, for example, about 70,000 Korean Chinese women were married into South Korean families (Cui 2004).

The second issue is not unrelated to the first one: the Korean ethnic education system in the countryside--which is believed to be the base of the Korean culture in China--has been deteriorating, as many schools are forced to close due to low enrollments. For example, the Taidong Elementary School in Chaoyangchuan Town, Longjing City had over 400 students in 1998, but five years later only about 50 students remained (Zhang 2003). The total number of elementary schools in Yanbian Autonomous Prefecture had decreased from 228 in 1990 to 92 in 2000 (Cai 2004). This has been caused by two things: self-imposed “one child” practices and emigration to large coastal cities within China and also to foreign countries, especially to South Korea. Those schools that have managed to survive are often considered inferior to the regular

Han schools. So, some Korean Chinese families are sending their children to the Han schools. It was estimated that in 1998 about 4.88% of ethnic Korean children went to Han schools, which rose to about 15% in 2003 (Cai 2004). Despite the fact that Korean is becoming popular in China after the establishment of foreign relationship with South Korea, the number of Chinese Korean speakers is still shrinking. It was reported that about ten percent of Korean Chinese cannot speak the Korean language at all and the proportion of Korean Chinese who have given up using Korean among Korean youth in major cities such as Beijing, Harbin, Shenyang and Changchun is over 60 percent (Zheng 1996).

Given the current situation in China, if no substantial changes are made both by the government and the Korean Chinese people themselves, Korean Chinese will encounter a serious problem in maintaining itself as a continuously developing ethnic group. The good news is this prospect has been raised to the people and the government.

1.3 The Chinese Korean Language

1.3.1 Korean Varieties in China

Traditionally, the Korean language is considered to have six different varieties⁴ (Lee and Ramsey 2000):

1. The Northwestern (Phyongan) dialects
2. The Northeastern (Hamgyong) dialects
3. The Central dialects
4. The Southwestern (Chonlla) dialects
5. The Southeastern (Kyongsang) dialects
6. Cheju dialect

⁴ The Korean names in parenthesis are in Yale Romanization.

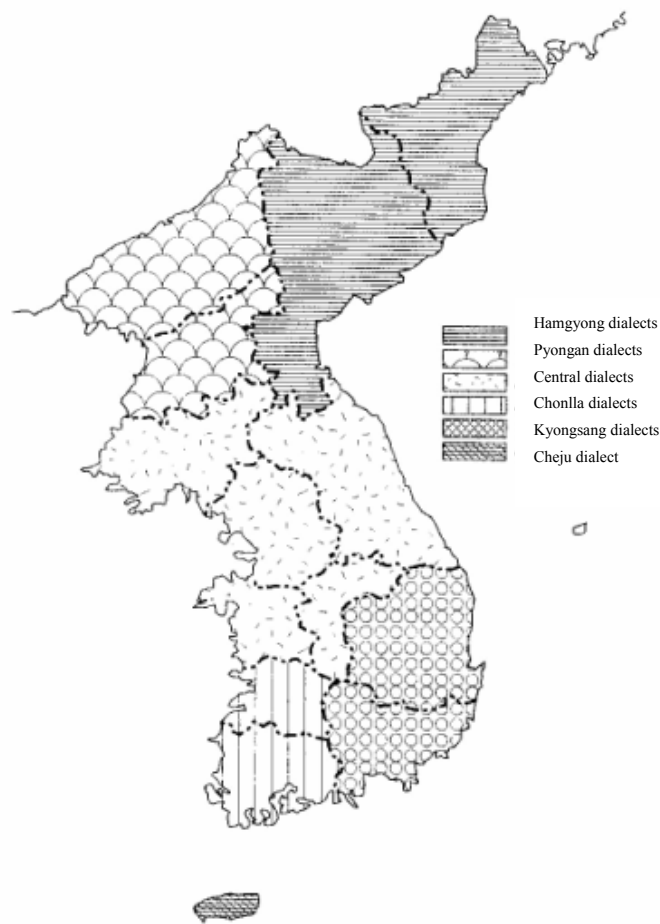


Figure 1.2 The Major Dialect Areas of Korea
(Source: Lee and Ramsey 2000)

The terms above in parentheses are the alternative names of the dialects that originated from the provincial divisions in North Korea and South Korea. However, terms in the form of “northeastern” or “northwestern” are considered to be more objective, especially when the administrative units are readjusted (Lee and Ramsey 2000). Except for the sixth variety which is spoken in the southernmost island of Cheju, all the rest are in plural forms; they each consist of sub-varieties, the north and the

south. For example, the Northwestern (Phyengan) dialect includes North Phyengan dialect and South Phyengan dialect.

This six-way distinction of the dialects in Korean language together with the exact names of the dialects are well adopted among Korean Chinese, and especially, the terms following administrative units are more widely used among Korean Chinese. Zhao and Xuan (1986), however, suggested that while this dialect division is basically valid, minor adjustment is needed for the Northeastern dialects: the variety spoken in the ancient Liuzhen area manifests substantial differences from the rest of the Northeastern dialects, thus deserving the status of a separate variety, i.e. a seventh dialect. They suggested that this Liuzhen variety is a true Northeastern dialect, while the rest of the former Northeastern varieties are North-Central dialects. Lee and Ramsey (2000) also pointed out the unique characteristics of the development of the vowel system of this variety spoken in ancient “Yukchin” (Liuzhen) area and suggested that labeling this variety as a separate dialect is more meaningful than dividing the Hamgyeng dialects into north and south varieties. Thus, while the six-way division is widely accepted, the field of Korean dialectology is progressing toward a delineation of increasingly smaller subdivisions of dialect areas.

Regardless of the distinction between the dialects, all of them have been carried over into China by the Korean immigrants from the Korean Peninsula, and when they arrived in China, they formed different *Chun* (village) according to their different hometown *Gwon* (county) on the Peninsula (Zhao and Xuan 1986). Thus, all the

dialects together with their original features were preserved in the relatively stable homogeneous villages in China.

1.3.2 The Current Situation of Chinese Korean

The current situation of Chinese Korean is more complicated due to the combined effect of various social-political factors. First, being implanted into the land of Chinese culture, from day one Chinese Korean has been influenced by the Chinese language, culture, politics, economy, etc. In the lexicon of Chinese Korean, for example, many new Chinese loan words have been added which were not adopted by other Korean varieties (e.g. *몐뽕* meynppo ‘bread’, *좡자* cwancya ‘expert’). Textbooks for Korean ethnic schools are written in Korean, but the contents and background materials are mainly Chinese, reflecting Chinese ideology and culture (Tai 2004). Also, as the ethnic Koreans started to become bilingual in Korean and Chinese, it is possible that the two different systems may have mutually influenced each other in the language performance of Korean Chinese. In fact, Silva and Jin (2006) did find, for example, a unique feature among Chinese Korean speakers in Beijing, China, who retroflex their Korean [l], explainable in terms of the popular retroflexing in Beijing Chinese that they also speak.

Secondly, there has been an influence from North Korea, especially before 1980s due to the political relationship between China and North Korea. After World War II, Korea was split into two countries with two different political systems. South Korea established the Seoul variety as their standard Korean, while North Korea chose Pyongyang Korean as their standard language. As North Korea shares the same

communist system with China, Pyongyang Korean became the official model for Chinese Korean, though in people's daily practical communication the historical standard Korean, i.e. Seoul Korean, has still been considered the standard (Zheng 1987). North Korea eliminated Chinese characters from their Korean in 1952, and Chinese Korean followed this practice in 1953. In general, before 1977 language standardization in Chinese Korean followed North Korea in terms of pronunciation, orthography, hyphenation, punctuation, etc. (Quan 2001). For example, in Pyongyang Korean, word initial [lj] and [nj] clusters are permitted, but in Seoul Korean they are simplified to [j]. Chinese Korean followed the North Korean norm:

Pyongyang Korean	Chinese Korean	Seoul Korean	
[ljəkˈssa]	[ljəkˈssa]	[jəkˈssa]	‘history’
[njədʒa]	[njədʒa]	[jədʒa]	‘female’

After 1977, China set up a committee to work on the standardization of Chinese Korean and established a series of norms which take the actual Chinese situation into account, while making reference to the Pyongyang standard (Tai 2004). Thus, North Korean influence was substantial during the early stages of Chinese Korean standardization process.

Thirdly, since the establishment of diplomatic ties between China and South Korea in 1992, there has also been an influence from South Korea, a strong ‘Korean Wind’ sweeping through Korean communities in China. Since 1992, China and South Korea started bilateral foreign exchange, encompassing areas of politics, economy,

culture, etc. As Korean Chinese originated from the Korean Peninsula, they often have relatives and even siblings in Korea. In Heilongjiang Province, for example, 70% of the Korean Chinese have relatives in Korea (Guan 2001). With the door being opened, the mutual visits between the relatives from the two countries become increasingly frequent in recent years. In addition, there are also large scale political-cultural exchanges and an international business boom between the two countries. Only two years after the establishment of the foreign relationship, for example, the Korean government invested in 1543 projects in China, amounting to a total of 1.308 billion Yuan (Guan 2001). All these channeled the Korean impact into China, its language, fashion, products, entertainment, etc. A simple example could be the above mentioned word initial [l]/[n] pronunciation. There is anecdotal evidence that nowadays, more and more Korean Chinese tend to drop the initial [l] and [n] in speech.

Fourthly, with the development of modern transportation and economy in China, especially since China's reform and opening-up, the former relatively stable Korean Chinese population configuration has been disrupted due to ever increasing labor mobility (Kim 1996). Korean Chinese from various dialect areas thronged to large coastal cities of China such as Tianjin, Qingdao, Dalian, and Shenzhen. for new job opportunities. Thus often in these newly formed Korean Chinese concentrated area, we see a mixture of different Korean dialects rather than the village-by-village, internally homogeneous pattern found in the earliest immigration into China.

At the language level then, there has been a long time contact between Chinese and Korean, and at the dialect level, there is the more recent contact between different

varieties of Korean, be it inter-national or intra-national. Thus, today's Chinese Korean preserves some original Korean features (Zhao and Xuan 1986), manifesting meanwhile some innovations that may be explainable in terms of internal variation or the various levels of contact (Silva and Jin 2006).

As this study specifically addresses variation and change in Korean speech patterns, in the following subsection I briefly introduce the consonant and vowel system of modern Korean.

1.3.3 The Korean Sound System

As we can see in Table 1.3, Modern Seoul Korean has nineteen consonants and a typologically unique three-way distinction for stops and affricates: unaspirated (also called plain or lax), aspirated, and reinforced.

Table 1.3 Modern Seoul Korean consonant inventory
(Adapted from Lee& Ramsey 2000)

	labial	alveolar	Alveo- palatal	velar	glottal
Stop					
lax	p	t		k	
aspirated	p ^h	t ^h		k ^h	
reinforced	pp	tt		kk	
Affricate					
lax			tʃ		
aspirated			tʃ ^h		
reinforced			tʃʃ		
Fricative					
lax		s			h
reinforced		ss			
Nasal	m	n		ŋ	
Liquid		l			

The vowel system of Modern Seoul Korean includes ten simple vowels and eleven diphthongs as listed in Table 1.4.

Table 1.4 Modern Korean vowel inventory

Simple vowels			w diphthongs		j diphthongs		isolated diphthong
i y	i	u					ju ii
eø	o		we		je	jo	
ε	ə		wε wə		jε jə		
	a		wa		ja		

(Adapted from Lee and Ramsey 2000)

Modern Standard Chinese Korean has the same consonant and vowel system as the Modern Seoul Korean (Shen et. al 1985). The Modern Seoul Korean sound system has been reported to be undergoing constant changes (e.g. Kim-Renaud 1986, Hong 1991, Kang 1997, and Silva 2006). To what extent this system remains stable in Chinese Korean is still a pending issue, and determining that is one task of this study. In the following section, I briefly introduce the target speech community of this study.

1.4 The Korean Chinese Community in Shenyang City

Shenyang is the capital city of Liaoning province, one of the three major provinces where Korean Chinese are concentrated. According to the fourth national census, Shenyang has 83,329 Korean Chinese, taking up 36% of the total Korean Chinese population in Liaoning province. The Korean Chinese community along the urban Xita area has become the third largest Korean Chinese concentrated area,

following the Yanbian Autonomous Prefecture and Changbai Autonomous County in Jilin province (<http://www.cnta.gov.cn/>).

The Korean Chinese community in Shenyang has been well known for its maintenance of Korean ethnicity. The community has established a complete Korean ethnic educational system, from kindergarten through higher education; has built up its cultural center where various kinds of exhibition, performance, and activities have been organized; circulates its ethnic newspaper 辽宁朝鲜文报 (Liaoning Korean Newspaper); owns a Korean publishing house and book store; practices their religious belief in Korean ethnic churches; runs an ethnic hospital; and has built up a business street nationally famous for its Korean flavors and features.

Since the establishment of a foreign relationship between China and South Korea, with more and more capital infusions from South Korea, the Chinese Korean community in Shenyang has now become an internationally famous business center hosting 105 enterprises, 9 banks, and two large Korean shopping centers (<http://www.cnta.gov.cn>). The billboards along the street are in both Chinese and Korean, or just Korean; what you hear in the stores and what you eat in the restaurants is all Korean. There is also one of the largest Korean markets, where you can buy all kinds of things that are Korean, from food to utensils.

Since 2001, Shenyang city started to hold a “Week of Korea” event in the Chinese Korean community every year, when a whole summer week is devoted to the exchange between China and Korea in the areas of politics, business, and culture. Take the fifth “Week of Korea” as an example (the one I happened to experience in person

during field work): it attracted 215 political VIPs, 485 delegations, a total of over 20,000 people from South Korea to the event. During the event, a total of 117 contracts were signed between the two countries, reaching a total investment of \$3.045 billion. There were also 14 different cultural exchange events between the delegations from the two sides (<http://www.shenyang.gov.cn/>). Now various kinds of products, fashions, entertainment, etc. from South Korea have filled the stores of the community. Shenyang city is now even called “Little Seoul in the North.”

Under such a strong impact from South Korea, will Chinese Korean evolve to be more similar to the South Korea standard, or will it continue its journey of independent evolution? Studies on contemporary Chinese Korean will shed new light on the understanding of Korean language development, and also on the understanding of language variation and change in general.

The rest of this dissertation is arranged in the following manner: Chapter two reviews the relevant literature on language variation and change in general and also on Korean related studies. Chapter three describes the methodology of this study, including research questions of this study, the theoretical framework adopted, social and linguistic factors considered, subject recruitment, data collection, statistical methods used, and acoustic measurements and transcription. Chapter four focuses on variation in the voice onset time (VOT) of the stop consonants. Chapter five addresses the two front rounded vowels of /y/ and /ø/: the diphthongization of /ø/, variation in the realization of /y/ and variable rule analysis on /y/. Chapter six summarizes the study and concludes that a

valid account of variation and change of Chinese Korean has to integrate the ‘family tree model’ and ‘wave model’ in the analysis.

CHAPTER 2

LITERATURE REVIEW

2.1 Models of Language Change and Diffusion

“Not all variability and heterogeneity in language structure involves change, but all change involves variability and heterogeneity” (Weinreich, Labov and Herzog 1968:188). People do not go to bed with one linguistic form and wake up the next morning speaking categorically another. This is a postulate on which scholars of language variation and change have come to agree. However, different understandings on the mechanism of language change and diffusion have coexisted throughout the history of linguistics. Based on empirical studies, scholars from different disciplines of linguistics such as historical linguistics, dialectology, and sociolinguistics have proposed different models of language change and diffusion, including the traditional family tree model, wave model, the gravity model, social network model, and the Labovian paradigm.

The family tree model is a traditional model of language diversification often associated with August Schleicher, the German historical linguist. A family tree diagram shows how a single language develops dialects that in time become distinct languages through the accumulation of changes and how these daughter languages can split up into daughters of their own. It assumes the existence of clear-cut boundaries

between languages/dialects, and that linguistic innovations occurring in one language variety after the split will be confined to this variety only, leaving other varieties unaffected even if they are in geographic vicinity. Although the family tree model has been the principal guide for the comparative method in historical linguistics, explanation of language evolution along the family tree model has often been considered inadequate (e.g. Campbell 2000), as linguistic reality is far messier, often due to the contact between the adjacent language varieties.

An alternative model that has long been considered to have “an uneasy relationship” with the family tree model (Labov 2007) is the wave model initiated by Johannes Schmidt, developed further by Bailey (1973), in the explanation of language variation and change. Different from the family tree model, the wave model not only accounts for the transition of change within a speech variety, but also registers the mutual influence of terminal branches of a family tree due to their contact with each other.

First, in this model, changes are typically started by a group of speakers in a particular locale at a given point in time, spreading from that locale outward in successive stages as do waves in a pond when a stone is thrown into it. See figure 2.1.

In this figure, the letters represent successfully later or lighter-weighted environments in which the rule operates (Bailey 1973). At time i, the change is only present in environment “a” in the origin; at time ii, the change in environment “a” may have spread to an outlying area while at the origin it further applies to environment “b”; at time iii, the change further applies to environment “c” in the origin while that in both

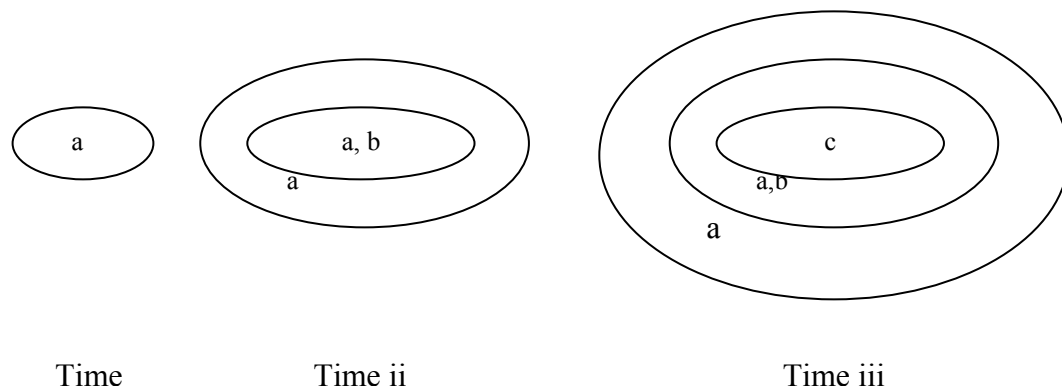


Figure 2.1 Simple form of the wave model
(adapted from Bailey 1973 and Wolfram and Schilling-Estes 2003)

environments “a” and “b” may have spread to further outlying areas. Thus, the change in a later environment implies the presence of the same change in earlier environments, and the process goes on until the change becomes categorical in all environments.

The second rationale of the wave model is that there are no clear-cut boundaries between different varieties of languages and the outward-spreading waves of a change initiated in one language variety may cross or intersect with those from another language variety, leading to the overlap between competing waves, as illustrated in the following figure 2.2.

The two different changes A and B from separate origins form their own dispersion waves A, A₁, A₂ and B, B₁, B₂. While A₁ and B₁ each possess just one change, the two wave system overlap along the edges of A₂ and B₂, producing a transitional area between them where the two changes compete with each other.

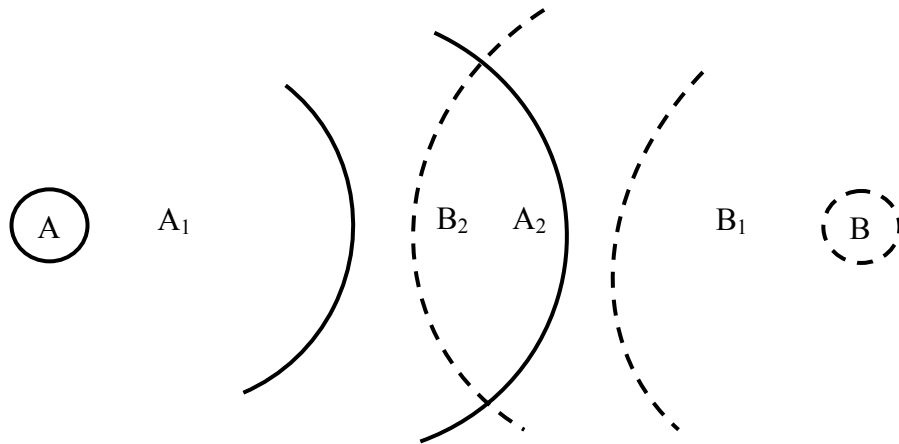


Figure 2.2 Simple scheme of the competing waves
(adapted from Bailey 1973)

While the explanatory power of the wave model has been acknowledged to be a necessary compensation for the family tree model (Campbell 2000, Labov 2007), some empirical studies have indicated inadequacies in the wave model, too (Trudgill 1974, Labov 1991, Wolfram and Schilling-Estes 2003), hence the emergence of the gravity model (Trudgill 1974).

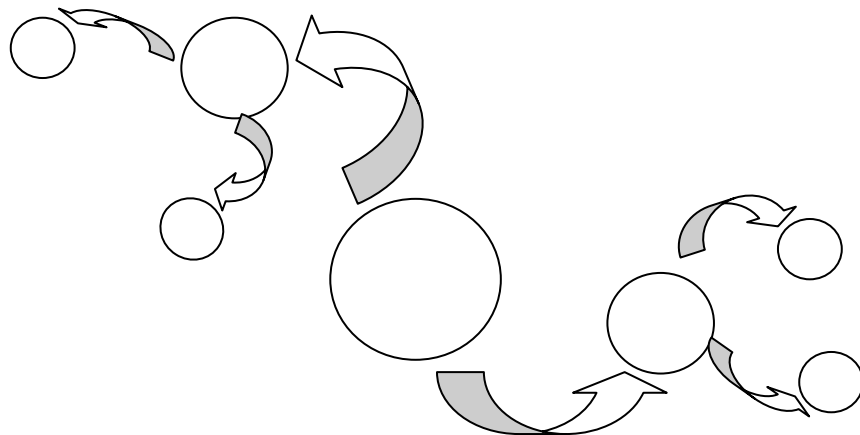


Figure 2.3 The gravity model of linguistic diffusion
(Source: Wolfram and Schilling-Estes 2003)

Different from the wave model where the diffusion of change is considered a function of mere distance from the origin to outward areas, the gravity model suggests that the population density is also important. As illustrated above, changes often skip a smaller sparsely populated area even if it is closer to the origin and spread first to larger densely populated urban areas. The theory admits that in some cases the distance is all that matters, but in other cases the manner of diffusion is a result of a combined effect of distance and population density. In this sense, we could say the gravity model is an expansion of the wave model.

A fourth model of linguistic change, proposed by Milroy and Milroy (1985), is the social network model. It looks not just at the population density, but at the nature of the relationship and contact, i.e. the social network, that people of a certain area have established as the explanation for language change and diffusion. A general principle of social network analysis on language change is that networks constituted chiefly of strong ties support localized linguistic norms, while those constituted of weak ties are more susceptible to language change. As Milroy and Milroy (1985) put it:

Linguistic change is slow to the extent that the relevant populations are well established and bound by strong ties, whereas it is rapid to the extent that weak ties exist in populations (Milroy and Milroy 1985: 375).

The weak-tie analysis proposes conditions that are necessary for linguistic change to take place, but in itself is not sufficient to provide a full explanation of linguistic change (Milroy 1993). The framework put forward by Labov et al. (1968),

however, provides an approach that attempts to present a fuller account of social and linguistic embeddings of language change.

2.2 The Labovian Quantitative Paradigm

At the core of this Labovian approach (Labov 1963, 1966, 1968, 1972, 1981, 1982, 1994) are several key assumptions and understandings. First, linguistic variation is characterized by structured heterogeneity and the ability of human beings to accept, preserve and interpret this structured heterogeneity is part of their linguistic competence rather than mere issue of performance.

Secondly, speakers' choice of one linguistic variant over another is systematically determined by multiple social and linguistic factors. This is what Bayley (2002) called the principle of "multiple causes", meaning the variability observed in natural language data needs to be explained with multiple contextual factors, both internal and external. Thus a sound analysis of variation and change of a linguistic variable should take both internal and external factors into consideration. While internal factors are determined, case by case, by the specific linguistic context where the target variable occurs, common external factors examined in variation studies include factors such as subjects' age, gender, socioeconomic status, language attitude, style, etc.

Thirdly, claims about language change can be made by quantifying the language variation which is the prerequisite for language change---the principle of "quantitative modeling" in Bayley's term. The frequency of the occurrence of one variant over others are examined along different linguistic environment and social factors, enabling the researcher to extract regularities and tendencies from the data, and determine how

selection of a linguistic structure is influenced by specific configurations of factors that characterize the environment. In this way, it is possible to ascertain which social or linguistic factors favor or disfavor the occurrence of a variant, and also how strongly. For example, in one of the most frequently used method for language variation studies, VARBRUL analysis, factors with weight over 0.5 are considered to favor the variable rule application, while those with weight lower than 0.5, disfavor the rule application, enabling the researcher to make claims about the nature of the variation, linguistic changes in progress and contact between linguistic systems based on the quantitative evidence.

Fourthly, synchronic variation is often a reflection of diachronic change. The innovative methodology that Labov developed in his study of Martha's Vineyard and New York City in 1960s allows the scholars to track the progress of changes as they take place, establishing thus a synchronic approach to the study of language change. Although the existence of age-grading phenomenon has been a potential problem for the apparent time construct, the apparent time study as a surrogate of real time study has been widely proven to be valid (e.g. Labov 1963, Guy et al. 1986, Bailey et al. 1991, Labov 1994). As Bailey (2002: 312) put it, "the synchronic approach to the study of language change, the study of change in progress, forms one of the cornerstones of research in language variation and change".

In this robust Labovian quantitative paradigm, large-scale studies in the past few decades have come to many generalizations about the patterns of language variation and change in the urban settings in the west (Chambers 2002). Speakers' preferences for

certain linguistic forms have been found to be linguistically and socially conditioned. While the linguistic factors may differ depending on the linguistic variable under study, social factors that interact with linguistic factors often involve age, gender, socioeconomic class, style, etc.

Age: When language variation indicates change, the primary social correlate is age. In his classic study on Martha's Vineyard (1963), Labov found that the younger the age group, the more frequently the group uses the centralized variants, i.e. the innovative forms (with the exception of the youngest group). This general age distribution pattern of the innovation form is also found in Holmes (1992). She concludes that when a linguistic change is spreading through a community, there will usually be a regular increase or decrease in the use of the linguistic form over the time: for an innovative form, there will be a low use by older people and a higher use among younger people, while for a disappearing form, opposite pattern will occur.

However, many later studies show that the pattern may not be a simple straight line along the age dimension. Instead, it shows up as an "s-shaped curve" (Hibiya 1996, Croft 2000, Guy 2003, Denison 2003). What this means is that the use of an innovative form regularly increases with each successive age group from old to young, but the youngest members of a speech community would manifest a downward trend due to a possible conservative influence from the parental speech. Indeed, this same "s-shape" curve, which Labov did not mention in his Martha's Vineyard study, did manifest itself in his age distribution data with the youngest members showing the downward perturbation of the general trend (Guy 2003).

Socio-economic class: Another social factor that has been proven to be closely related to variation and change is socio-economic status of the speaker. Kroch (1978) suggested a “linear model,” indicating that the spread of innovation predicts the social class distribution of an innovative form to be linear, with highest use in the lowest class group and progressively lower use in higher class groups. In contrast to this, Labov (1966, 1972, 1980, 1990) and Trudgill (1974) believed that innovation is often from an interior group, especially the upper working class or lower middle class, rather than from the lower class as suggest by Kroch, or from the upper class as suggested by the traditional concept of “the flight of the elite”; thus their model is called “the curvilinear pattern.” In the stable variation, linguistic variables are found to be markers of group membership with higher classes often being associated with higher frequency use of overt prestigious forms and more restricted use of particular variants in constrained circumstances, while lower classes with lower frequency use of prestigious forms but higher frequency use of stigmatized variants.

Gender: A third factor often correlated to linguistic variation and change is gender. Women are often reported as more status-conscious than men because their insecure and subordinate position makes it necessary for them to secure their social status linguistically. In addition, their social role as models for children also encourages (or requires) them to use more standard language. Thus women tend to use more overt prestigious forms but fewer stigmatized variants than men, and men may use more covertly prestigious form as a signal of masculinity and group solidarity. When prestigious innovative forms are introduced, women are reported to often lead such

linguistic changes. They accept and help to propagate the linguistic changes earlier than men do (Fischer 1958, Labov 1972, Trudgill 1972, Eckert 1989, Holmes 1992, Labov 1994, Trudgill 1998).

Style: Style is also found to be a conditioning factor for language variation. In examining the effect of five different styles -- casual, careful, reading passage, reading words and reading minimal pairs -- Labov (1966) found that standard variant is more frequently used as the style shifts progressively from casual to more formal settings. Although some later studies made relevant adjustment along the dimension of style in the research design, the patterns observed are generally consistent with Labov's original finding (e.g. Trudgill 1974).

As mentioned previously, the common thread of patterns of language variation and change observed have been based on the extant studies in the western context. With different social structure and organization, language variation and change in eastern context may exhibit different patterns.

2.3 Variation and Change in Korean

Following the Labovian paradigm, several Korean linguists (e.g. Ahn 1987, Chae 1995, Hong 1991, Kang 1996, and Silva 2004) started in recent years to apply the theory of variation and change to the analysis of the Korean language in South Korea, especially of the sound system of Seoul variety.

Below is the Modern Korean vowel inventory from chapter one reproduced here for the convenience of the readers. Note that five segments are put in parentheses here and *wi* was not there originally.

Table 2.1 Modern Korean vowel inventory

Simple vowels			w diphthongs	j diphthongs	isolated diphthong
i (y)	i	u	wi		ju ii
e(ø)	o		we	je	jo
(ɛ)	ə		(wɛ) wə	(jɛ) jə	
	a		wa	ja	

(Adapted from Lee and Ramsey 2000)

Available studies reveal that Seoul Korean has undergone and is undergoing substantial variation and change. The front two vowels /e/ and /ɛ/ are reported to have merged (Lee 1971, Hong 1991); /y/ and /ø/ have become diphthongized into [wi] and [we] respectively (Kim-Renaud 1974, Kang 1997); the isolated diphthong /ii/ has been monophthongized in all the environments except for word initial position (Kang 1997); and /wɛ/, /jɛ/ have disappeared due to the front vowel merger. Thus, the five segments in parentheses have disappeared from the current vowel system of Seoul Korean, resulting in a much simpler vowel inventory, especially with the monophthong system (note though an extra diphthong [wi] has been added).

Variation and change have also been reported in the consonant system of Seoul Korean. Voice onset time (VOT) has long been regarded as the single most important phonetic basis for the distinction between the three different phonemic categories of Korean stop consonants (Lisker and Abramson 1964). The landmark work of Lisker and Abramson (1964), however, did reveal the existence of an overlap in VOT between

tense and lax Korean stops, though they both can be distinguished from that of aspirated stops. This finding was confirmed in further studies by C-W Kim (1965), Han and Weitzman (1965), Han and Weitzman (1970), Abramson and Lisker (1971). Subsequent studies in the 90s by Silva (1992), Cho (1996), and Han (1996), however, showed that the observed overlap has been replaced with a clear distinction in VOT with the lax stops being more aspirated and standing between the other two categories in VOT value, confirming the major role of VOT in marking the phonological distinction of the three types of stops. Most recent studies by Silva (2004, 2006) on Seoul Korean speakers living in the Korean community of Dallas area in US revealed that speakers born after 1965 neutralize the VOT differences between lax and aspirated stops, suggesting a diachronic shift in VOT values and a change in the primary phonological role played by VOT.

In an effort to detect the acoustic dimensions that may cue the phonological distinction of the three types of stops, several studies have examined the fundamental frequency (F0), vowel length, intensity build-up, stop closure period, etc. that are related to the target stops. Han and Weitzman (1970) found that the onset value of F0 following an aspirated or tense stop is higher than that following a lax stop, though the difference between the former is not systematic, suggesting that F0 serves to distinguish lax stops from aspirated and reinforced stops. The same pattern has been observed in later studies (e.g. Cho 1996, Han 1996, Choi 2002, Silva 2006), which suggests that despite the diachronic shift in VOT value of the stops, the F0 pattern immediately following the different types of stops remains constant, justifying the reliability of F0 as

a valid acoustic cue to separate at least lax stops from aspirated and tense stops in Korean.

Another valid cue that has been reported for signaling the stop distinction is intensity build-up. Han and Weitzman (1965, 1970) found that the intensity build-up following a lax stop takes the longest time with no sharp slope; that following a tense stop takes the shortest time with a sharp slope; and that following an aspirated stop stands in the middle. Cho (1996) agreed with them on the part that intensity build-up is relatively sharp for vowels associated with aspirated and tense stops, and slow for those associated with lax stops, but he also pointed out exceptional cases where this regular pattern was disrupted, suggesting thereby the secondary role that intensity build-up may play in the stop distinction.

A third acoustic dimension that has been reported to tend to pattern with the three phonation types of stops is vowel length. To determine whether vowel length is influenced by the phonation type of the preceding stop, Cho (1996) measured the length after different types of stops between the voice onset and the point where the amplitude of the waveform falls to near zero and found that in general the vowel is longest after tense stops and shortest after aspirated stops, and is intermediate after lax stops. He also pointed out that the vowel length difference between after aspirated and after the other two categories tend to be more salient than the difference between after lax and after tense stops. However, given some cases where the difference is not statistically significant, he suggested that the observed pattern be viewed better as a tendency.

Finally, the duration of stop closure has also been reported as valid acoustic cue distinguishing the stop categories. Silva (1992) found that stop closure is consistently longest for tense stops, intermediate for aspirated stops, and shortest for lax stops and that the difference in the closure duration between tense and lax stops in word-initial position is much smaller than that in intervocalic position, though the difference in word-initial position is still statistically significant. Cho (1996) and Han (1996) confirmed Silva's finding, but Han also reported that closure duration is not a perceptual cue to distinguish tense from lax stops in word-initial position, though in intervocalic position it does serve as a primary perceptual cue to distinguish lax and tense stops by being significantly longer for tense than for lax stops.

Despite the abundant studies on Seoul Korean, Korean varieties spoken outside the Korean Peninsula, which constitute part of the whole Korean language family, have attracted little attention from the linguistic circle, especially in the west.

Among the non-peninsular Korean varieties, Soviet Korean, spoken in the Russian Far East and former-Soviet Central Asia, has gained at least some attention from some Korean and American scholars in recent years (Kim and King 1993, Kho 1987, King 1987, 1992, Vincent 1994). This variety is found to preserve some archaic features that are no longer maintained in other varieties, rendering itself as a more accurate reflector of what North Hamkyeng used to be like than does the variety spoken in the northern tip of Korea today. Meanwhile, this variety has undergone some variation and change, too, which is most obviously reflected in its vocabulary due to the influence from the language of the host country, Russia. In this sense, the situation of

Chinese Korean might be similar to the Soviet Korean, only this time it is a different dominant language, i.e. Chinese.

Indeed, available studies on Chinese Korean confirm that, like Soviet Korean, Chinese Korean has preserved some archaic features that are lost in the current peninsular varieties (Shen et al. 1985, Zhao and Xuan 1986). For example, ‘dog’ is still pronounced as [kai] rather than the monophthongized form [kɛ] and ‘crab’ still as [kɔi], not the monophthongized form [kɛ]. Meanwhile, Chinese Korean also developed some regional features, especially in its lexicon. It contains a lot of unique loan words not found in other varieties. E.g. words like 멘뽀 meynppo ‘bread’ and 완자 cwancya ‘expert’ are direct translations from Chinese. In terms of its sound system, Silva and Jin’s (2006) investigation of Korean Chinese living in Beijing indicates that unlike the situation in Seoul Korean, young Korean Chinese maintains very clear distinction between /e/ and /ɛ/ and there is no VOT shift of the stops, i.e. the three way contrast is still well maintained. However, available Chinese Korean data and findings by Chinese scholars may not suggest the same conclusion.

The data set documented in Shen et. al (1985) indicates very complicated variation of /e/ and /ɛ/. For example:

/toŋne/ → [toŋnɛ] ‘neighborhood’

/ssəre/ → [ssəɾɛ] ‘farming tool’

/angɛ/ → [angɛ] ‘fog’

/pɛm/ → [pɛm] ‘snake’

/peda/ → [pida] ‘cut’

/tʃogɛ/ → [tʃogɛ] ‘clam’

/posuregi/ → [posuregi] ‘crumb’

/pegɛ/ → [pegɛ] ‘pillow’

/kɛ/ → [kai] ‘dog’

/əkkɐ/→[əkki] ‘shoulder’

/sɐ/→[sai] ‘bird’

/kɐ/→[kəi] ‘crab’

/ses/→[səi] ‘three’

As we could see from this list, in some cases, /e/ and /ɛ/ are not distinguished, in some other cases they are clearly distinguished, in still other cases they are realized as [i], and in a fourth case, the archaic forms [ai] and [əi] are maintained. In addition, these data are back in the 1980s, and the current situation in Chinese Korean communities is still a mystery to all. The intriguing variation phenomenon warrants further systematic study.

As to the VOT in Chinese Korean stops, Zheng and Li’s (2005) investigation on six 21-year-old Korean Chinese college students in Yanbian area indicates the tendency of a merging in VOT between the plain and reinforced stops (see figure 2.4).

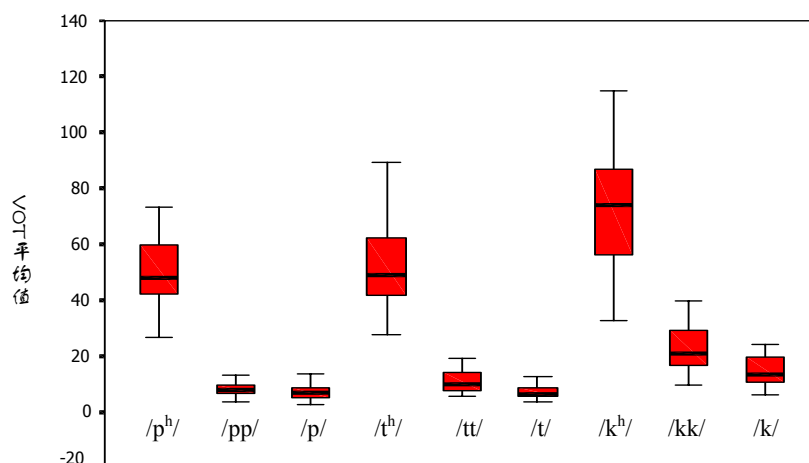


Figure 2.4 VOT Values for the Chinese Korean stops of Yanbian.
(Source: Zheng and Li 2005)

As indicated in Figure 2.4, the aspirated stops remain distinct from the lax and tense ones, but the lax and tense stops tend to merge in VOT. Statistical analysis shows that there is no significant difference between the VOT values of these two sets in bilabial and alveolar positions. If this is true, then the three-way distinction in Chinese Korean is becoming a two-way distinction as in Seoul Korean, though the merging is in different direction: for the former, it is in VOT between the tense and lax stops and for the latter it is in VOT between aspirated and lax stops. Whether or not this VOT shift also occurs in other generations among different social group members and in other varieties of Chinese Korean remains to be examined in further systematic study.

Research on variation and change of Chinese Korean is still in its infancy, and any future systematic study on this topic, and other topics as well, would contribute tremendously to its growth, thereby contributing to the understanding of overall picture of Korean language change and development. It is in this spirit that the current research has been undertaken.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter describes the design and methods of the current study. Section 3.2 presents the research questions, section 3.3 explains the theoretical framework, section 3.4 discusses social and linguistic factors considered, section 3.5 describes the subject distribution, section 3.6 explains the data set and data collection procedures in the field, section 3.7 explains acoustic measurements taken, and section 3.8 discusses statistical methods employed in the current study.

3.2 Research Questions

In his discussion about what kind of linguistic variable to choose as the focus for the study of a speech community, Labov mentioned three most useful properties: frequency, structural integration and stratification. He writes:

First, we want an item that is frequent, which occurs so often in the course of undirected natural conversation that its behavior can be charted from unstructured contexts and brief interviews. Secondly, it should be structural: the more the item is integrated into a larger system of functioning units, the greater will be the intrinsic linguistic interest of our study. Third, the distribution of the feature should be highly stratified: that is, our preliminary explorations should suggest an asymmetric distribution over a wide range of age levels or other ordered strata of society (Labov 1972:8).

Based on this guideline, available data in the literature and my own language experience, originally several variables were proposed as potential candidates for the variation study of this Korean Chinese community, including (y), (ø), (VOT), (e), (ɛ), (j), (w), (l), etc. After I came back from the field work, I decided on three variables as the targets of the current study: VOT of stops and the two front rounded vowels (y) and (ø). For one thing, it is impossible to address all the variables in this work. For another thing, preliminary observation in the field reveals that these three variables manifest more interesting variation patterns than the rest, which I believe are linguistically and socially meaningful, especially when we take into consideration the existing literature on Southern Korean studies where a VOT shift and the diphthongization of the two front rounded vowels were reported. In addition, these three variables are frequent in daily use and are structurally very important: VOT has long been believed to play a major phonological role in the distinction of three types of phonation of Korean stops; (y) and (ø) are the only two front rounded vowels in Korean, and any change in their status may affect the whole vowel system. Thus, this current study addresses the following questions:

1. Is there any variation in the VOT of Chinese Korean stops?
2. Are the front rounded vowels of /y/ and /ø/ of Chinese Korean undergoing (or have they undergone) any change? Is there diphthongization as in Seoul Korean?
3. If there are variations, what patterns do they manifest? Is there any evidence of

sound change?

4. To what extent are the patterns of variation and change similar to /different from those documented in Seoul Korean? How could this be integrated into the larger picture of Korean language development?

Thus, the main goal of this study is to investigate patterns of variation and change in a potentially unstable sound system of Chinese Korean, enabling us to get a more comprehensive understanding of the variation, change and development of the Korean language.

3.3 Theoretical Framework

The theoretical framework adopted in this study is the Labovian quantitative paradigm (Labov 1969, Sankoff 1972). This approach assumes that variability is an integral part of linguistic competence. As Labov (1972:226) puts it: “the ability of human beings to accept, preserve, and interpret rules with variable constraints is clearly an important aspect of the linguistic competence or *langue*.” The model of language fundamental to this approach is that proposed by Weinreich, Labov and Herzog (1968: 185). Language is presented as an orderly heterogeneous structure which has “intrinsic variables defined by covariation with linguistic and extralinguistic elements.” Language changes are believed to be constant, and “all change involve variability and heterogeneity,” though “not all variability and heterogeneity in language structure involves change.” Because “no change occurs in social vacuum,” a sound study of variation and change of a linguistic variable must take both the linguistic and the social factors into consideration. This is what Labov (1973) called the “embedding” problem.

These interpretations diverge from the traditional generative linguistic understanding proposed by Chomsky (1965:3):

Linguistic theory is concerned with an ideal speaker-listener, in a completely homogeneous speech community, who knows its language perfectly and is unaffected by such grammatically irrelevant conditions as memory limitations, distractions, shifts of attention and interest, and errors (random or characteristic) in applying his knowledge of the language in actual performance.

Thus, in Labovian quantitative paradigm, the language faculty comprises far more than what Chomsky includes as competence and a large portion of the details of Chomsky's "performance" are treated as part of "competence" in the form of variable rules.

In this quantitative approach, different ways of producing the same underlying form are recognized as variants of a single linguistic variable. The frequency of the occurrence of one variant over others is examined along different linguistic environments and social factors such as age, gender, class, style, etc., enabling the researcher to extract regularities and tendencies from the data, and to determine how selection of a linguistic structure is influenced by specific configurations of factors that characterize the environment in which it occurs. In this way, it is possible to ascertain which social or linguistic factors favor or disfavor the occurrence of a variant, and also how strongly, enabling the researcher to use quantitative evidence to make claims about the nature of the variation, linguistic changes in progress, and contact between linguistic systems.

The variable rule model was introduced by Labov (1969) in a classic analysis of the Vernacular Black English. The most thoroughly examined variable phenomenon in linguistics, however, may be the deletion of a final [t] or [d] in English. Based on this

model, Cedergren and Sankoff (1974) developed VARBRUL, a software program which computes the probabilistic weight of different coded conditions for the variable patterns. This program, together with commercial statistical packages such as SPSS has been widely used in the study of language variation and change (Guy 1980, Kang 1997, Sankoff 1988, Silva 1991, 1997 etc.), successfully overcoming many of the analytical difficulties associated with intuitive judgments and anecdotal reporting used in other paradigms.

3.4 Social and Linguistic Factors

All languages are inherently variable. As mentioned in chapter 2, speakers' choice of one linguistic form over another is governed by both linguistic and social factors. "Linguistic factors" refer to the grammatical, i.e. phonological, syntactic, morphological, etc., features that characterize the environment in which the variable occurs. "Social factors" refer to external non-linguistic elements that shape the context where the variable is set, such as a speaker's age, gender, class, etc. Linguistic and social factors are closely interrelated in the development of language change. As Weinreich et al. (1968:188) mentioned, "explanations that are confined to one or the other aspect, not matter how well constructed, will fail to account for the rich body of regularities that can be observed in empirical studies of language behavior."

3.4.1 Social Factors Considered in Current Study

The social factors considered in this study include speakers' age, gender, socioeconomic class (SEC) and style (Labov, 1966).

Age: Along the age dimension, the subjects have been divided into three groups:

Young group: 18 ~ 25

Middle group: 26 ~ 55

Old group: over 55 (55+)

This grouping of age is motivated by a number of facts in the target speech community. First, 18 is the legal beginning age of adult life in China. Also, it is generally believed that at this age, we are linguistically well set in our first language. 25 is the age at which people graduate from college and universities and start their careers. 55 is the common age for people to retire in China, thus people over 55 are usually considered to belong to the senior end of the age continuum. In following the lead of many sociolinguistic researchers who have studied the effects of age (Labov 1966, Trudgill 1974, Holmes 1992, etc.), the assumption here is that linguistically, speakers of one age cohort may behave differently from speakers of other age cohorts as a result of different extents of exposure to and involvement with the society.

Gender: Two groups are formed based on biological difference: female and male. The assumption here is that women and men often exhibit different patterns of language behavior. More specifically, in western societies women are reported to use more overt standard forms than men (Labov 1966, Holmes 1992). Whether the same pattern can be found or not in the eastern context remains to be investigated.

Socioeconomic Class: Socioeconomic class is “a relatively continuous scale on which individuals are ranked according to assorted personal characteristics such as levels of education, income, occupation, etc.” (Guy 1988:41). In the existing

sociolinguistic studies, we see that different studies may use different factors to stratify the socioeconomic class. Some may only use occupation of the subject to decide his or her socioeconomic class (e.g. Macaulay 1977); others may use education level as the indicator (e.g. Jahangiri 1980); still many others may use several indicators such as occupation, education, income, etc. (e.g. Labov 1966).

In this current study, socioeconomic class is a composite term covering three factors: occupation, education and income. With the beginning of economic reform and opening up of China since 1978, a new configuration of socioeconomic structure has emerged (Lu 2002). Occupation has been traditionally, and still is, considered the best indicator of a person's SEC. However, education and income are playing a more and more important role in the social mobility of people in today's China (Lu 2002, Bian 2002). Many people from low working class or poor farmer's family move up to the upper class after receiving their bachelor's or master's degree. Meanwhile, some people who have received no higher education may become very successful in their private business, which is much advocated by the government; thus their money may channel them into the status of social elites. Therefore, in the modern society of China, we need to incorporate all three factors of occupation, education and income in the categorization of SEC.

To construct the subjects' SEC, an index score is given to each of the three factors making up the composite:

Occupation:

3 high government and business officials

- 2 professionals, owners of private enterprises
- 1 semi-professionals, small businessmen, white collar workers
- 0 blue collar workers, laborers, employees of service industry, peddlers

Education:

- 3 college and higher
- 2 high school & technical school
- 1 middle school
- 0 elementary or less

Income (monthly)

- 2 Over 4500 Yuan (approximately \$600)
- 1 Between 1000 to 4500 Yuan (approximately \$130-\$600)
- 0 lower than 1000 Yuan (approximately \$130)

Thus, the total score for SEC will range from 0 to 8 points, which is then further grouped into the following three socioeconomic classes:

- 6-8: High class
- 3-5: Middle class
- 0-2: Low class

Style: For this study, speech in four different styles was elicited: casual conversation, matching game, passage reading, and wordlist reading (see section 3.6 for a detailed description of each task). The assumption is that as the style shifts from the casual to the more formal end of the continuum, subjects will produce more standard

forms and show less variation (Labov 1966). In the analysis of the data, however, the casual conversation part of data was not analyzed for this study due to the fact that the occurrence of the target variables in this style is extremely unevenly distributed among subjects.

Note that “matching game” is not a style used in Labov or other western studies. This game is designed to elicit the subject’s matching term in Korean to the interviewer’s term in Standard Modern Chinese spontaneously. The point here is to ask the subject to respond as quickly as s/he can, so that her/his focus will be on the content rather than on the pronunciation. In this sense, this style stands in the middle between a real casual conversation and a formal reading style. A similar method, for example, using a picture to elicit the target word is not unknown in such studies (Ahn 1987, Silva 2005).

Another point in using this style is that casual conversation does not guarantee that all the linguistic variables under study will show up. In the absence of the casual conversation style, the matching game would be a compensation for it, making at least three-style contrast possible.

3.4.2 Linguistic Factors Considered in Current Study

Linguistic factors considered in this study vary depending on which variable is concerned. For the VOT variable, attributes of the target segments--place of articulation and phonation type are considered. Also, word position -- word initial and word internal are taken into consideration. For the two front rounded vowels, three factor groups are included: preceding segment, syllable context and syllable onset.

The preceding segment factor group consists of ten factors: null (no preceding segment), vowel, /t/, /n/, /s/, /tʃ/, /tʃʰ/, /k/, /kʰ/, and /h/. Since there is no combination of labial consonant and the front rounded vowels in Korean, labials are not considered. The syllable context factor group includes: one syllable, first syllable of two syllable word, second syllable of two syllable word, first syllable of three syllable word, last syllable of three syllable word. There are no front rounded vowels in the second syllable of three syllable words, so this context is not examined. Syllable onset factor group includes two factors: with onset and without onset.

3.5 Subjects

Participants in this study were drawn from the community of Korean Chinese living in Shenyang city, Liaoning Province, China. This city was chosen because it has one of the biggest Korean Chinese communities in China, with all the Korean ethnic schools, hospital, culture center and entertainment center including department stores, shops, restaurants, etc. Thus it has a great potential for social stratification.

Subjects were recruited through the selection of speakers within the researcher's network and then those within the networks of the already interviewed speakers (Horvath 1985). I first contacted relatives and friends in the city, and then through them, I became acquainted with their friends and relatives, and then through friends' friends I got to know even more Korean Chinese with differing social status and education levels. Among the speakers willing to participate in the study, I chose the ones who fit the criteria for my research design, to which we now turn.

To avoid any potential variation due to dialect difference, only speakers of the Phyengan variety of Chinese Korean (the variety spoken by the researcher) were asked to participate in the interviews. For an individual to qualify for the study, both of the speaker's parents had to be Phyengan variety speakers; moreover, the individual must have been raised in a Phyengan-variety community between the ages of 4-16. All the subjects were at least 18 years old, and were Chinese citizens, not temporary visitors from North Korea, and self-reported as speakers of both Chinese and Korean (the Phyengan dialect). No subjects reported any difficulty in speech or hearing. Subject number and distribution are as follows:

Table 3.1 Subject distribution in this study (total 29)

Age	LowerClass		MiddleClass		UpperClass	
	Male	Female	Male	Female	Male	Female
18-25	1	1	1	2	0	0
26-55	2	2	2	2	2	2
55+	2	2	2	2	2	2

As we can see from the table, while the subject distribution for middle aged and old groups are balanced, that of young group is not. Except for the middle class female group, each of other cells of the young group has fewer than two subjects, and no subjects were recruited for the high class of the young group. This is due to various reasons. First of all, with the implementation of one-child-per-family birth control policy in China, the Korean Chinese population growth rate has been decreasing.

Secondly, the proportion of those young Korean Chinese who have given up using Korean is very high (an estimation of over 60% was reported by Zheng 1996), which means not many young Korean Chinese are actually speaking Korean at all. Thirdly, within the short period of time of data collection in the field, it was hard to locate young Korean Chinese individuals who speak Korean and also meet other criteria that define each of the cells of the young group.

These 29 subjects were all Korean Chinese speakers who had already left schools, though of different levels. Besides the 29 non-student subjects, six Korean Chinese college students aged between 18 and 20 were also interviewed. In the literature, there are three different ways to deal with students' status (Hong 1991, Chae 1995, Kang 1997, Ahn 1987). One common way is to assign each student's status on the basis of the father's status, i.e. if the father is considered as of high social status, then his children are also of high status; if the father is regarded as belonging to the lower class, then so are his children. A second way is to rank the college students as the highest status. Students who attend college and are 19 years or older are treated as professionals (the highest level of occupation), because they are believed to have high potential for social mobility in the very near future. Still a third way to deal with the students is to treat them separately, not allocating any level of occupation to them. In this study, the six college students are treated separately due to the following facts in China: in the current society of China, a father's social status may not be able to predict the children's future status. Often, what we see is that a son of a low class farmer or worker moves into the high social level through education. On the other hand, however,

attending a college or university does not guarantee upward mobility in society in the near future, especially due to the intensive competition in today's job market. Often, one comes across some students who graduate from a college/university only to find that they are unemployed. What is more, college students in China all live on campus in specified dorms (except for those few students who are from the city where the college or university is located) and their life is basically confined to the campus, taking classes most of the day, eating at the school cafeteria, doing self-learning at night either in the classroom, the dorm or the library. Thus students often have limited access and exposure to the outside society compared to other non-student subjects. Considering the current situation of all these, it may be more appropriate to treat the students as a separate group.

3.6 Data Collection

3.6.1 The Fieldwork

The data collection for this study was conducted in the summer of 2006 in the urban area of Shenyang city. As mentioned above, social networking was the method used in recruiting the subjects. I first contacted my relatives in Shenyang, and through them I got to know some of their neighbors, members of a local Korean church, and some people in the business area. All these recordings were conducted at the place of the interviewee. Through a friend in the municipal government who is in charge of the Korean ethnic affairs, I became acquainted with a Dean at the Korean Normal College and the director of Korean Senior Association of Shenyang. Hearing that I was working on our ethnic language as a Ph. D student in United States, both the Dean and the

Director felt very proud of me and were willing to try their best to help me. They not only introduced me to people of various statuses, from full professors, lecturers, students and janitors to retired senior persons from various occupations, but also offered me a room to record the interviews at the college and the Association. And then through the people I interviewed, I was able to get access to more other people who met my criteria in subject selection. Most people were nice and supportive, and they were rewarded with a token of thanks such as a T-shirt. Occasionally, I came across some people who were too busy to participate in what they believed to be an “impractical” thing. In total, I interviewed 47 people, among which 7 were from the suburban area, hence not included in this current study. Of the remaining 40 people, five were excluded either due to the poor recording quality or to make a balance in the overall subject distribution in each cells, thus for this current study, 35 subjects were examined.

3.6.2 Data Collection Procedure

The interview with each subject lasted for about one hour. With some young people, it was less than an hour, while with some old people it could be a bit longer due to slower responses. The interviews were recorded with a Dell laptop using Cool Edit 2000. An ATR20 Unidirectional Dynamic Microphone attached to the laptop was held at about 3cm under the chin of the subject by an assistant of the researcher. The recordings were saved as wave files for further acoustic and statistical analyses.

Upon meeting with the potential subjects, I first gave them the approved Informed Consent Form for them to read through, raise questions if there were any, and make a decision about whether they wanted to participate in the study or not.

Once consent to participate was secured, the interviews were conducted by the researcher following the steps listed below. As the first step, subjects were asked to complete a demographic questionnaire, which was meant to collect some background information about the subjects, such as age, gender, languages they speak, education level, and hometown. This part took about 2 minutes.

The second section was 15 minutes of casual conversation. The first part of this section was around questions on subjects' background information, such as family members, original hometown in the Korean Peninsula, how often and where they use Korean and Chinese, is Seoul Korean more prestigious than Chinese Korean, etc. Then the conversation moved on to topics introduced by the researcher such as "my favorite movie," "an unforgettable event," "my hobby," "my wedding day," etc. The purpose here was to obtain more natural speech as they shifted their attention more towards the communicative task rather than linguistic forms. In such an interview situation, it is possible to obtain spontaneous speech when the subject was emotionally charged (Labov 1972). Indeed, when it came to topics like "your unforgettable event," some subjects would smile or sob while they recalled their old memories, sweet or sad. They were often so caught up in the stories that pronunciation was the last thing in their mind, thus producing natural spontaneous speech which was the goal of this part of research design.

The third section was the matching game which took about 20 minutes. This section turned out to be the most interesting section, where subjects were often so

engaged in it that they would forget about the interview format and focus on searching for and uttering the target words as quickly as possible.

The list of terms used in this section was based on common nouns, numbers, verbs, adjectives, etc. frequently used in daily life so that difficulty was not an interfering issue. Meanwhile these words were carefully selected to make sure that all the linguistic variables considered in this study were embedded in counterpart Korean word items. For the VOT variable, all the stop consonants were embedded in both word initial and word internal positions of three-syllable Korean words where each of the target stop was immediately followed by the same vowel /a/. Three-syllable words were chosen to examine the target stop consonant in real word-internal position. For the front rounded vowels, every possible position was taken into consideration. All the Chinese counterpart words, with mixed order, were printed out on a piece of paper available only to the researcher.

During the game, the researcher first produced a word in Modern Standard Chinese, and then the subject would match it with the corresponding term in Korean as fast as s/he could. For example, the researcher said “狗” gǒu (dog) in Chinese, and the subject responded quickly with “개” kae (dog) in three repetitions. In cases where subjects didn’t know the Korean counterpart to the Chinese item, the researcher would just say “that’s ok” and move on. When subjects did provide a matching word, but not the one expected by the researcher, the researcher would ask the subject whether there was a second term that might also match it. In most cases, this worked, and subjects

were able to provide the expected one. In those very rare non-working cases, the researcher would just move on.

The fourth section was about three minutes of sentence reading. In this section, some of the words from section three above that were representative of all the linguistic environments where the variables were embedded were put into sentences. Thus, this time the target linguistic variables were examined in sentence style. The purpose was to examine whether a shift in style from matching game to sentence reading would make a difference in the realization of the target variables within the same immediate linguistic environment. These sentences, in mixed order for different variables, were printed out in Korean script in two copies, one for the subject to read from, the other for the researcher to keep track during the subject's reading. Subjects were asked to read the sentences at a normal comfortable speed one time for each sentence.

The fifth section was a wordlist reading which took about 10 minutes. This list consisted of all the Korean counterpart words used in the matching game section. The goal was to examine the target variables in word reading style and determine the difference in the realization of the variables in different styles. These words were printed in Korean script on a piece of paper in two copies, again, one for the subject to read from, the other for the researcher to keep track during the subject's reading. Subjects were asked to read these words three times each at a normal, comfortable speed. In cases where subjects became kind of impatient and started to read faster,

especially producing no adequate length of silence between the three repetitions, the researcher would always remind him or her to slow down.

The last section was a self-evaluation test that took about five minutes. The one-page test sheet included some items drawn from the fifth section of wordlist reading above, and each item had various optional ways of pronunciation. Subjects were given a copy to look at, but the researcher would read them out clearly and then ask the subjects to decide among the different options which one was their usual pronunciation, which was then marked by the researcher. The purpose was to examine the discrepancy between what they “think” they do and what they actually do to determine the possible prestigious form and whether it affects the production of the subjects of different gender and/or social groups (Labov 1972, Trudgill 1978).

3.7 Acoustic Measurements and Transcription

Acoustic measurements and transcription in this study were conducted by the researcher using PRAAT software.

3.7.1 The VOT Variable

Eighteen isolated three-syllable Korean words were used where each of the nine target stops were embedded in word initial position and word internal position, immediately followed by the same vowel /a/. Three-syllable words were chosen so that the behavior of the stops in real word-internal position could be examined.

Among the three repetitions for each of the carrier words, the second utterance was selected for measurements, yielding a total of 630 tokens. This decision was based on the following facts about the data: the first utterance often turned out not to be so

natural due to the presence of a listing intonation, and the last, often low in amplitude with a falling intonation. Also, as VOT is sensitive to the prosodic position of the stop (Silva 1991), what has been found in the data was that in most cases, as expected, the first utterance, being in the initial position, had the longest VOT, and then came the second utterance, and last the third utterance. Thus, the second utterance was used as a representative one. In rare cases, the second utterance showed obvious list intonation, not the rest two, then the first or the third whichever sounded more natural and better in quality was used. Also, if for a certain subject, first utterance was used for the lax stops of /p/, /t/, /k/, then for the corresponding /ph/, /th/, /kh/ also the first utterance was chosen in order to be consistent in prosodic position for that specific case. Alternatively, a mean value of VOT from the three repetitions could be calculated, but was not chosen in order to be consistent in methodology with the measurement of F0 where the averaging of three values does not make much sense when the intonation distorts the F0 to a substantial degree.

Acoustic measurements for the variable of VOT include five categories: VOT of the stop consonants, F0 onset and offset of the immediately following vowel after the target stops, intensity build-up and vowel length of the immediately following vowel, and the length of closure for the stop consonants.

VOT measurement sounds pretty simple, but actually presents a quite complicated picture in literature depending on where the ending point of VOT is considered to be. In the first version as represented by Lisker and Abramson (1964), VOT was measured from the beginning of the release to the onset of voicing as

indicated by the beginning of periodic cycle in the wave form of the following vowel. In the second version (e.g. Han and Weitzman 1970, Cho 1996), it was the period between the beginning of the release to the point where the periodic striation and the first formant starts. And a third version is from the point of release to the onset of the second formant of the immediately following vowel (e.g. Choi 2002).

The first version seems to confirm to the exact definition of VOT, the voice onset time, but as far as the data for this current study are concerned, often it is hard to tell exactly where the periodic cycle starts on the wave form. The second version presents itself as a more practical method in that it incorporates the concept of beginning of voicing as indicated by the periodic striation in the spectrogram, and meanwhile makes the accurate measurement possible with the aid of more clear first formant onset. The third version, however, captures a different concept in my understanding. Since onset of the second formant is usually later than the onset of voicing and the first formant, VOT measured this way is often longer than in other ways, as it includes not only the real VOT period, but also the transitional period between the onset of voicing and the full onset of the vowel. Thus, it is not “voicing onset time,” but “vowel onset time,” or in Silva’s (1992) term, “vowel lag.”

Therefore, for this study, VOT was measured from the first zero crossing of the stop release as indicated by the spike on the wave form after the closure period of the stop to the point where the periodic striation and the first formant (F1) of the immediately following vowel start in the spectrogram, which was set in wide band with View Ranges between 0-3000Hz and Window Length of 0.005s (see the following

Figure 3.1 for illustration). In intervocalic position, the stop might become voiced, thus VOT is negative.

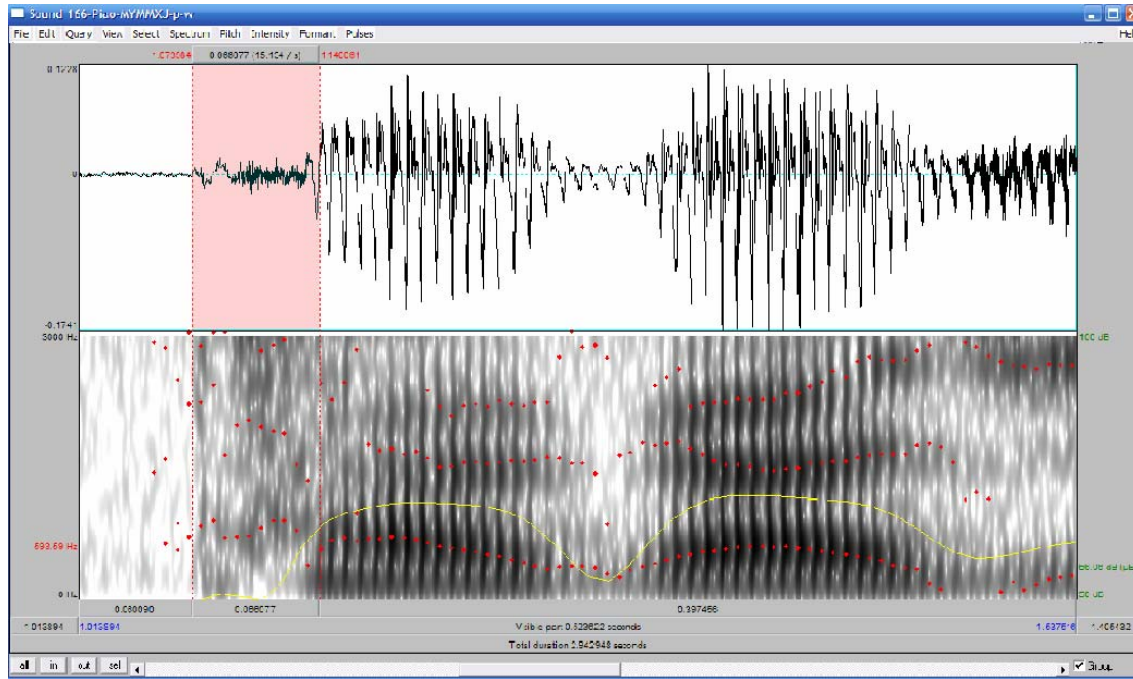


Figure 3.1 Illustration of VOT measurement for [p] of [pa]

F0 onset was measured at the ending point of VOT: placed the cursor at the ending point of VOT as defined above, and took the automatic figure for F0 that PRAAT presented (see Figure 3.2). F0 offset was measured at the point where the second formant set off. In cases of uncertainty, I also looked for the start point of reduction of complex periodic waves in the waveform (see Figure 3.3).

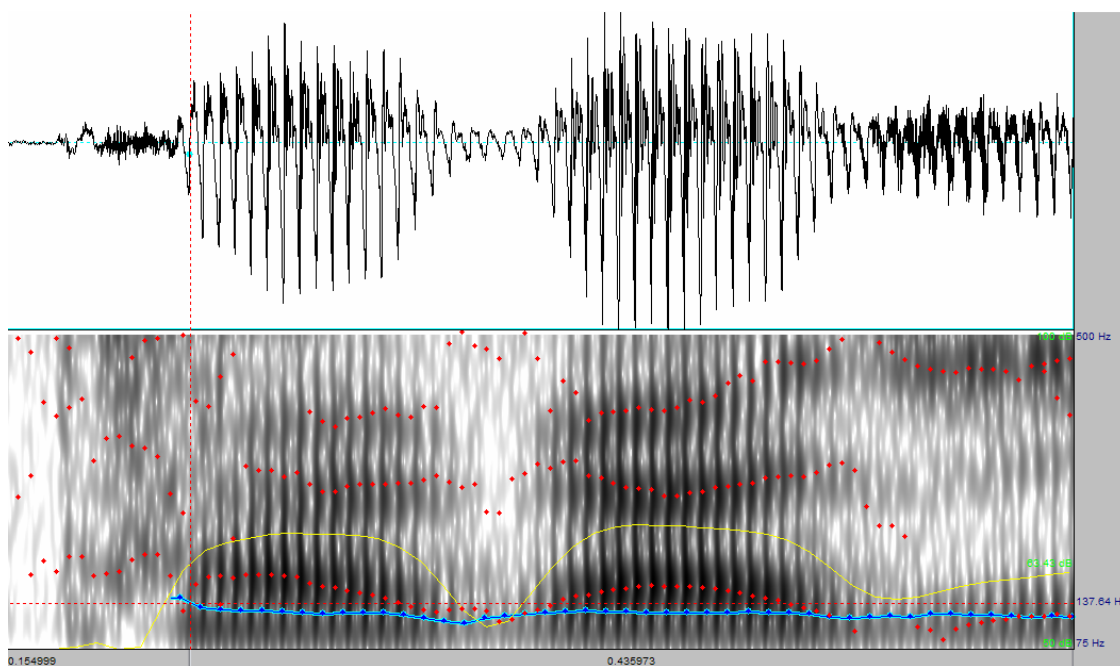


Figure 3.2 Illustration of F0 onset measurement for [a] of [pa]

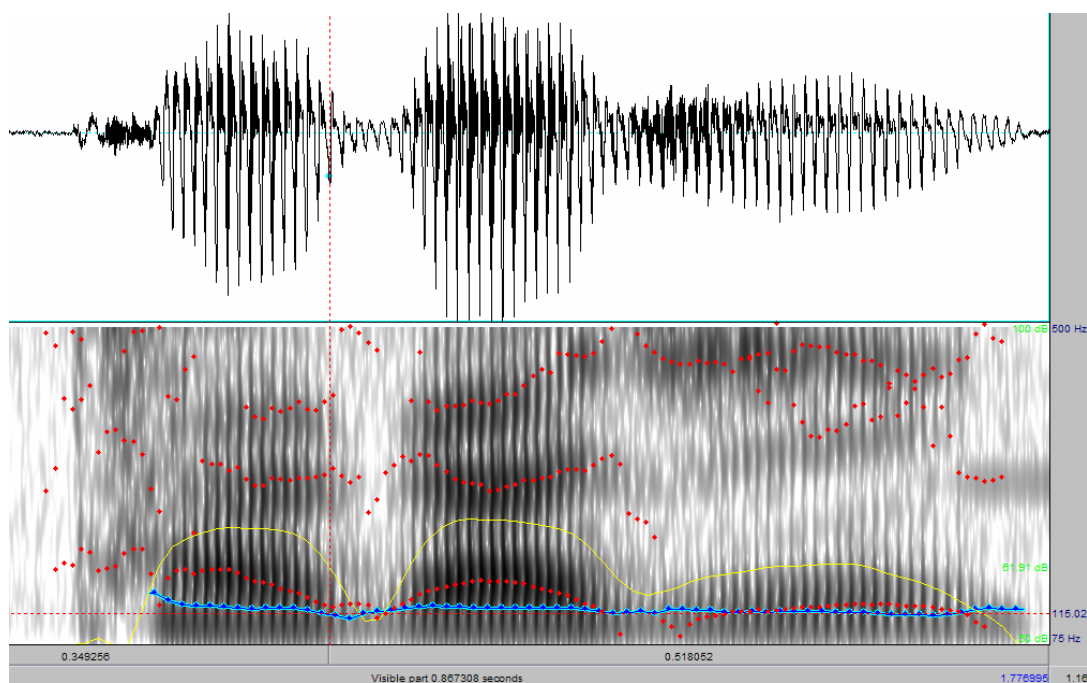


Figure 3.3 Illustration of F0 offset measurement for [a] of [pa]

Intensity build-up in the vowel after consonant stop was first studied in Han and Weitzman (1970). Based on the observation of the waveform oscillograms after the onset of voicing, it reported the difference in time needed for the intensity to build up after different types of stops, but when was the intensity considered to have been built-up, was it when 50 %, or 80%, or 100% of the highest intensity level has been reached? No quantitative objective description was given as to what this intensity build-up exactly means; rather, it was a subjective judgment. Following them, Cho (1996) gave some qualitative description of intensity build-up after the different stops: intensity build-up was relatively more rapid after reinforced and aspirated stops than after lax stops. In an effort to quantify the intensity build-up, Jin (2007) measured the time needed for the stops to reach the fullest amplitude in the waveforms. The results showed that intensity build-up defined as such was fastest after aspirated stops and significantly slower after lax and tense stops, and no significant difference was found between after tense and after lax stops, which was sort of counter-intuitive based on what is known in the literature about tense and lax stops. A careful examination of the data revealed that it might take the same amount of time for a tense and a lax stops to reach the fullest amplitude (i.e. the intensity rise time), but considering the fact that vowels after tense stops are often longer than lax stops (Cho 1996), the ratio of intensity rise time to the total vowel length should be different between after a tense stop and after a lax stop, and this ratio should be a quantitative indication of how fast the intensity builds up

during the vowel production. Thus, intensity build-up in this current study was defined as the following:

Intensity build-up = intensity rise time (ms) / vowel length (ms), i.e. intensity build-up equals intensity rise time divided by vowel length. Intensity rise time was defined as a temporal measurement from the onset of voicing to the point of fullest development of amplitude in the wave form of the following vowel (see Figure 3.4). The duration between the cursors indicates the intensity rise time as defined in this study.

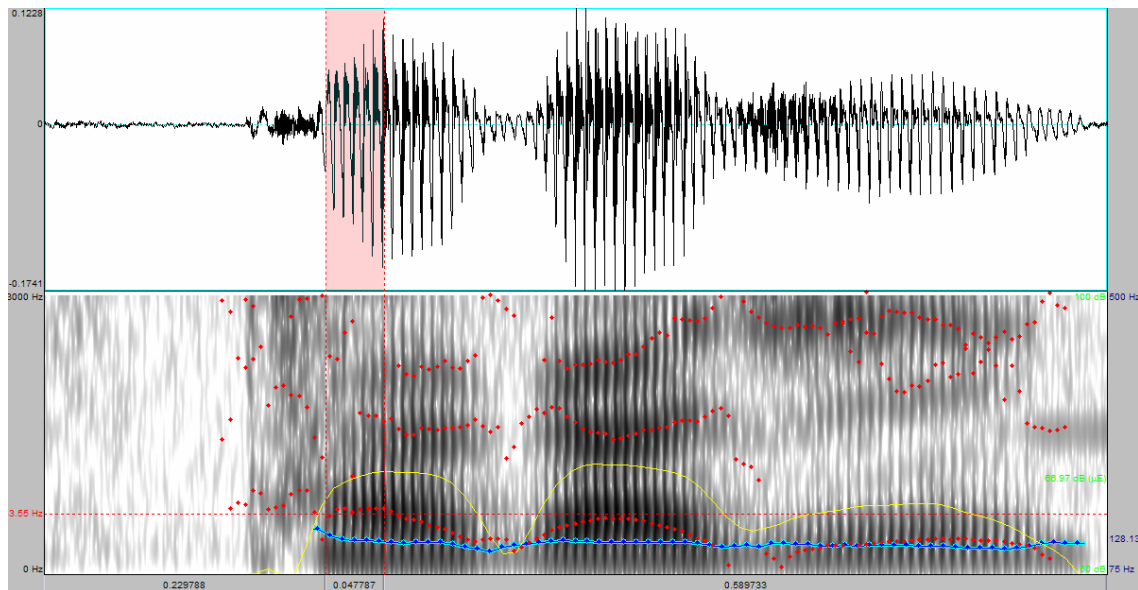


Figure 3.4 Illustration of intensity rise time measurement for [a] of [pa]

Vowel length is often measured as the interval between the voice onset and the point where the amplitude of the waveform falls to zero (Cho 1996). In the data for this study, however, the vowel was followed sometimes by another sonorant segment, so the

amplitude would not fall to zero in such cases. Thus, in this study, vowel length was measured as the interval between onset of the voicing to the offset of F1 and F2 formants. In cases of uncertainty, waveform and the spectrogram were also examined for changes indicating the beginning of a transition into the following segment (see Figure 3.5).

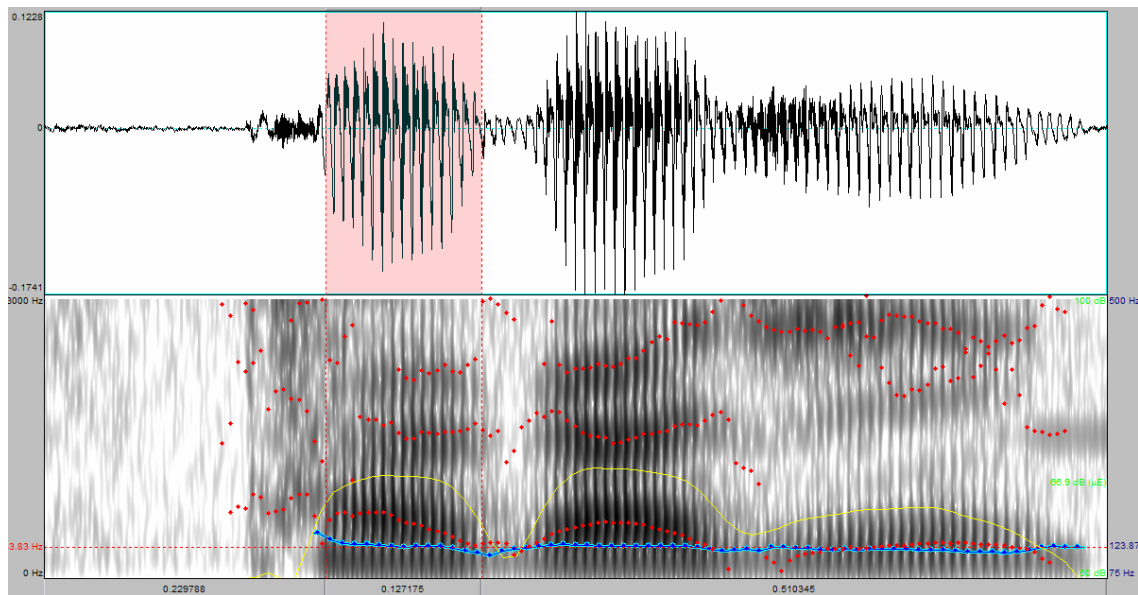


Figure 3.5 Illustration of vowel length measurement for [a] of [pa]

Stop closure period was measured for stops in both word initial and word internal positions in sentence style. With the isolated words, initial closure was not possible to measure, so only word internal stop closure was measured. Beginning point of stop closure was marked here in terms of the reduction of complex periodic waves in the waveform and the attenuation of F2 for the preceding vowel in the spectrogram, and

the end point of the closure is the releasing point of the stop as indicated by the spike on the wave form (see Figure 3.6).

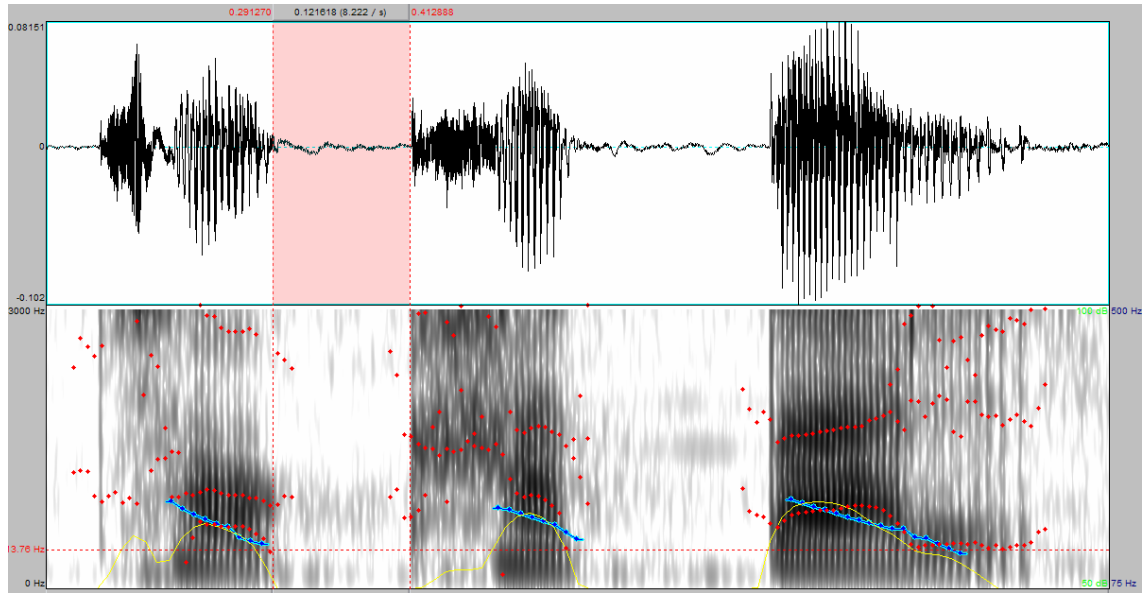


Figure 3.6 Illustration for the closure period measurement for $[k^h]$ of $[k^h a]$

Besides the above mentioned acoustic parameters, originally two more items were also suggested for measurement: F0 onset and offset of the vowel of the second syllable with the target stop embedded in the first syllable. However, they were not considered in this study due to the fact that the onset stop of the second syllable was not controlled in this study, thus making it impossible to infer any acoustic manifestations of the second vowel as a result of the effects of the target stop in the first syllable.

3.7.2 The Front Rounded Vowels

Acoustic measurement and transcription for the two front rounded vowels /y/ and /ø/ were conducted by the researcher. There were three repetitions for each word in wordlist and matching game. Given that the wordlist style was meant to elicit more formal careful verbal production and matching game for the spontaneous one, the second utterance of each word was chosen for the wordlist and the first utterance was chosen for matching game as the representative. This decision was based on the observations made in the field. For the wordlist reading, subjects could misread the word at first, which was then corrected right away in the second utterance by the subjects. In the matching game the first utterance was often the most instinctive natural one that subjects would produce without careful thinking, but then s/he would say “oh, no, that’s not standard” and then gave a more “standard” one in the second utterance. Thus, it is believed that the second utterance for wordlist reading and first utterance for the matching game would best serve the purpose of the research design. Potential intra-personal variation in the three repetitions of the same word would be topics of future study.

For the transcription task, the researcher both listened to the sound and examined its formant trajectories and values in the spectrogram. More specifically, the first three formants, i.e. F1, F2, and F3 were measured for the rounded vowels to determine the different phonetic variants of the underlying phonemes. In the literature, F1 and F2 are usually considered to be sufficient to define a vowel in the acoustic space, which is also true for most of the data in this study. F1 value identifies vowel

height and is roughly inversely proportional to vowel height, i.e. the higher the F1 value, the lower the vowel. F2 value is roughly directly proportional to vowel frontness, i.e. the higher the value, the more fronted the vowel. However, there were some cases in this study where two variants differed only in terms of F3 (for example, [i] and [y]). Thus, all the three formants were examined for the current study. For each of the formant, three points were measured: early, mid, and late points, roughly at 20%, 50%, and 80% through the duration of the vowel shown in the spectrogram. The very ends of a vowel were thus skipped to avoid any potential influence from the immediately adjacent consonant. The three point scale was designed to capture both the static nature of a monophthong variant and the dynamic nature of a diphthong variant of the underlying vowel. The assumption is if an underlying vowel is realized as a monophthong, then the line drawn through the three points will be a straight line, i.e. it is the same target sound throughout the vowel duration; if it is realized as a diphthong, the line will manifest a dynamic movement, i.e. a change from one target sound to another.

One thing I noticed during this transcribing and measuring process was that when we work with the computer software for the measurements, we have to actively get involved with the process; that is, instead of blindly writing down the number that the computer gives automatically, we need to do critical thinking: could this be right? Is this normal? In some cases, for example, the red lines in the spectrogram indicating formant movements may not accurately capture the real formant trajectories. Consider the following example:

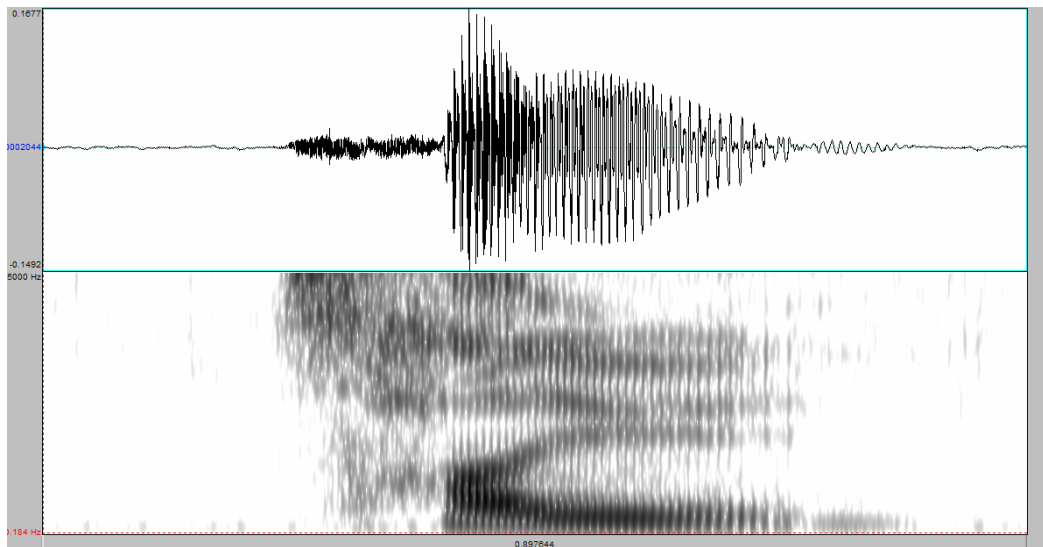


Figure 3.7 Spectrogram of [sa.y] without formant trajectory

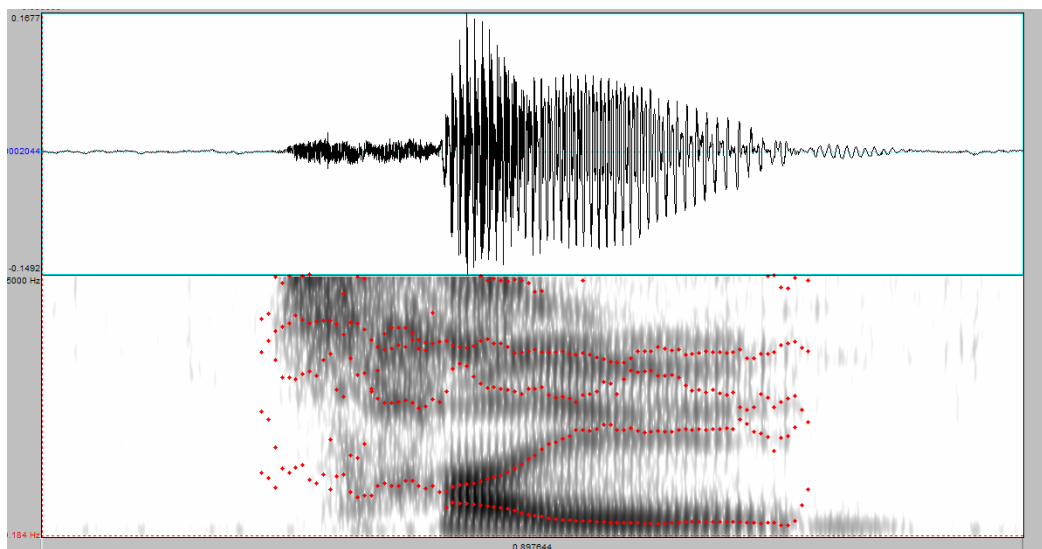


Figure 3.8 Spectrogram of [sa.y] with automatic formant trajectory

The two figures are exactly the same except that one shows formant trajectory and the other does not. From Figure 3.7 we could see clearly with our own eyes the paralleling F2 and F3 that are very close to each other, indicating a typical [y] in the data. However, in Figure 3.8 we see that with the standard formant setting, the automatic trajectory lines do not capture the real formant movements. Of course, it does not look like a [y] and if we blindly follow it and just take the automatic values, it would be F2=2043Hz and F3=2980Hz with a difference of 937 Hz, but the actual values for F2 and F3 as measured from figure 37 are: F2 around 1950Hz and F3 around 2400Hz with a difference of 450Hz. Thus, sometimes we cannot just blindly trust the analysis that the computer provides. We need to listen with our ears, observe with our eyes and check with our brain.

3.8 Statistical Methods

As mentioned above, three variables were considered in this current study, VOT and two front rounded vowels. The VOT data were of gradient type, i.e. the voice onset time (milliseconds) might be longer or shorter depending on different target stop. The data of the two front rounded vowels, however, were categorical, i.e. the underlying vowel might realize as different monophthong or diphthong. Given the different nature of the two types of data, two different statistical methods were employed: for VOT variable, basically SPSS 13.0 was used for the analyses of correlation, ANOVA, regression, etc. (in all the statistical tests for significance, confidence interval was set at 95%); for front rounded vowels, in addition to SPSS 13.0, VARBRUL software

program was applied, which computes the probabilistic weight of different coded conditions for the variable patterns.

As we know, a linguistic variable may have variant realizations in different contexts, which could be defined in terms of internal linguistic constraints and external social constraints. In VABRUL, this linguistic variable is considered as the dependent variable, and one of its variants is defined as the application rule. For example, in Labov's (1972) (r) deletion in New York City English, /r/ had two variants: the presence of [r] and the absence of [r], and the latter was chosen as the application rule, i.e. the forms of words where /r/ was deleted represent the rule application, and consequently the presence of [r] was the non-application rule. The linguistic and social constraints are considered in VARBRUL as independent variables and are coded into factor groups. Each factor group includes a set of mutually exclusive factors, i.e. they are independent of each other. Again, take the above (r) deletion study as an example. Social and linguistic factor groups could include store (Saks, Macy's, Klein's), occupation (floor-worker, sales person, stock clerk), gender (male, female), age (young, middle, old), race (white, black, Puerto-Rican, Asian, non-native speaker, other), floor (ground, upper), elicitation (normal, emphatic), word (fourth, floor), etc. As required by VARBRUL, all the factor groups and factors within each group are categorical and mutually exclusive.

The variable rule analysis can separate, quantify and test the significance of the effects of conditioning factors on a linguistic variable. Each factor of a significant factor group is assigned a probability weight calculated on the basis of the distribution

of tokens of the variable in the data. The probability weight in variable rules falls between 0 and 1. A weight greater than 0.5 is considered to favor the rule application, while that less than 0.5, disfavor it. 0.5 is considered a neutral value, neither favor nor disfavor. In addition, the relative magnitudes of the weights indicate different strengths of the effect. For instance, suppose in the (r) deletion study above the factor of “normal” has a weight of 0.86, while that of “emphatic” has a weight of 0.55, then normal elicitation would have a much stronger effect than emphatic elicitation in the application of [r] deletion.

The choice of factor groups that have statistically significant effects on the variable rule application is conducted automatically in VABRUL through the statistical process known as stepwise regression analysis. This procedure consists of two phases: step-up and step-down. In the first phase, VABRUL considers increasingly complex models by adding factor groups one at a time and comparing each new model with the last using the likelihood ratio statistic. When a model cannot be significantly improved by adding more factor groups, the step-up phase stops, and then it moves on to the second step-down phase. This phase, in contrast to the first phase, starts with the most complex model and considers increasing simpler models by eliminating factor groups one at a time that does not significantly affect the likelihood of the model. Once it reaches the stage where none of the factor groups can be thrown out without significantly affecting the likelihood of the model, the step-down process stops. The two phases usually ends with the same number of significant factor groups that comprise the simplest model. In cases where they do not match, chances are that two factor groups in

the model may interact with each other (Paolillo 2001), which then requires further adjustment through the process of data-recoding.

The current study used GOLDVARB (2001). Original Fortran programs were developed by David Sankoff, Pascale Rousseau, Don Hindle and Susan Pintzuk, which were converted to Pascal to run on Macintosh in 1990 by David Rand and David Sankoff, which was further converted into this version (2001) to run under Microsoft Windows using Borland Delphi by John Robinson, Quantic Computing, for the Department of Language and Linguistic Science, University of York.

CHAPTER 4

VOT OF CHINESE KOREAN STOPS

4.1 Introduction

Korean has been considered typologically unique for its three-way-contrastive stop consonants-- tense, lax and aspirated-- and voice onset time has long been regarded as the single most important phonetic basis for the distinction between the three different phonemic categories (Lisker and Abramson 1964). The landmark work of Lisker and Abramson (1964), however, did reveal the existence of an overlap in VOT between tense and lax Korean stops, though they both can be distinguished from that of aspirated stops. This finding was confirmed in further studies by C-W Kim (1965), Han and Weitzman (1965), Han and Weitzman (1970), Abramson and Lisker (1971). Follow up studies in the 1990s by Silva (1992), Cho (1996), and Han (1996), however, showed that the observed overlap has been replaced with a clear distinction in VOT with the lax stops being more aspirated and standing between the other two categories, confirming the major role of VOT in marking the phonological distinction of the three types of stops. The most recent studies by Silva (2004, 2006) on Seoul Korean speakers living near Dallas, TX in United States (hence American Korean speakers) revealed that speakers born after 1965 neutralize the VOT differences between lax and aspirated

stops, suggesting a diachronic shift in VOT values and a change in the primary phonological role played by VOT.

A similar study on Chinese Korean revealed a different pattern of variation. Zheng and Li's (2005) investigation on six young Korean Chinese in Yanbian, China indicated a tendency toward merger in VOT between lax and tense stops, though aspirated stops remain distinct from both lax and tense stops in VOT. If this is true, then the three-way distinction in Korean VOT is shifting to a two-way distinction, albeit by two different paths: for American Korean speakers, the merger in VOT is between lax and aspirated stops while for Chinese Korean speakers it is between the tense and lax stops.

Whether this VOT shift also occurs in other varieties of Chinese Korean remains a topic meriting further systematic study. Thus, the purpose of this chapter is to investigate the VOT in stops of Chinese Korean to capture and better understand the patterns of Korean language variation and change. More specifically, this chapter addresses the following questions:

1. Is there any shift in VOT of the stop consonants in Chinese Korean?
2. If VOT shift does exist, what is the pattern?
3. What are the valid acoustic cues for the three-way phonemic distinction of the stops?
4. What does the variation and change in Chinese Korean suggest about the Korean language development?

This chapter is arranged as follows: section 4.2 presents the observed patterns of VOT variation in Chinese Korean; section 4.3 describes patterns exhibited by other acoustic cues of F0, intensity build-up, closure duration and vowel length; section 4.4 discusses implications of the observed patterns; and the chapter concludes with a summary in section 4.5.

4.2 Patterns of VOT Variation

As the target stops in the data were imbedded into two different prosodic positions, i.e. word initial and word internal, we will accordingly examine the data for the VOT variation pattern in two parts. In section 4.2.1, we will look at words with stops in word initial position, and in section 4.2.2, words with target stops in word internal position.

4.2.1 VOT Patterns in Word Initial Position

The examination of VOT variation was conducted along two dimensions: place of articulation and phonation type. To capture any general pattern of VOT variation in terms of place of articulation, the mean VOT values for the stops in word initial position regardless of the different phonation types were first calculated and the results were plotted in Figure 4.1.

From Figure 4.1 we can see first that while velar stops are more detached from labial stops, alveolar and labial stops seem to overlap with each other. Secondly, mean VOT values for all the three places of articulation showed a general tendency to decrease over time as captured by the trend lines imposed on the figure. In addition, the overall VOT range has also shrunk over time: from 30ms~95ms for older speakers to

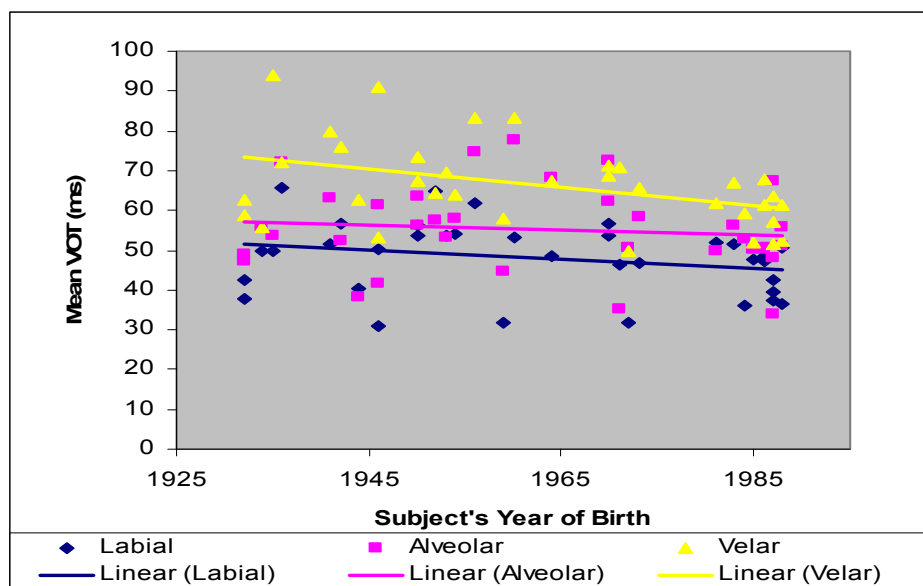


Figure 4.1 Distributions of Mean VOT Values for Different Places of Articulation (ms)

35ms~68ms for younger speakers. However, the three nearly parallel lines suggest that the relative distinction between the three categories was maintained, with labial position showing the lowest values, velar position showing the highest value, and alveolar position standing in between, confirming thereby previous observations in the literature that VOT tends to increase as the point of articulation moves toward the posterior region of the oral cavity (Ladefoged 2003, Silva 2006).

However, given the documented difference in VOT between the different phonation types of stops as mentioned in chapter 2, it is necessary to take the phonation type into consideration in the examination of VOT variation in different places of articulation. Thus, as the next step, for each of the phonation types, i.e. tense, lax and aspirated, VOT of stops of three different places of articulation were examined and

compared. The results showed that the above observed general pattern of VOT being shortest in labial position, intermediate in alveolar position, and longest in velar position was held true across these different phonation types as illustrated in Table 4.1.

Table 4.1 Mean VOT values for stops of different phonation types in different places of articulation (ms)

	Tense	Lax	Aspirated
labial	13.3	53.7	76.3
alveolar	13.8	63.8	88.6
velar	25.1	76.2	97.3

One way ANOVA analysis revealed that mean VOT values of velar stops of each of the three different phonation types were significantly different from those of labial stops, but no significant difference was found between alveolar and labial stops. For example, for tense stops, Mean VOT of /pp/ was not significantly different from mean VOT of /tt/, but that of /kk/ was significantly different from both of the former. For lax stops, there was no significant difference in Mean VOT between /p/ and /t/, but that of /k/ was significantly different from those of both /p/ and /t/. For aspirated stops, /kh/ was significantly different from /ph/, though /th/ was not significantly different from /ph/.

When examined in the dimension of phonation type, similar shrinking pattern of VOT values was observed.

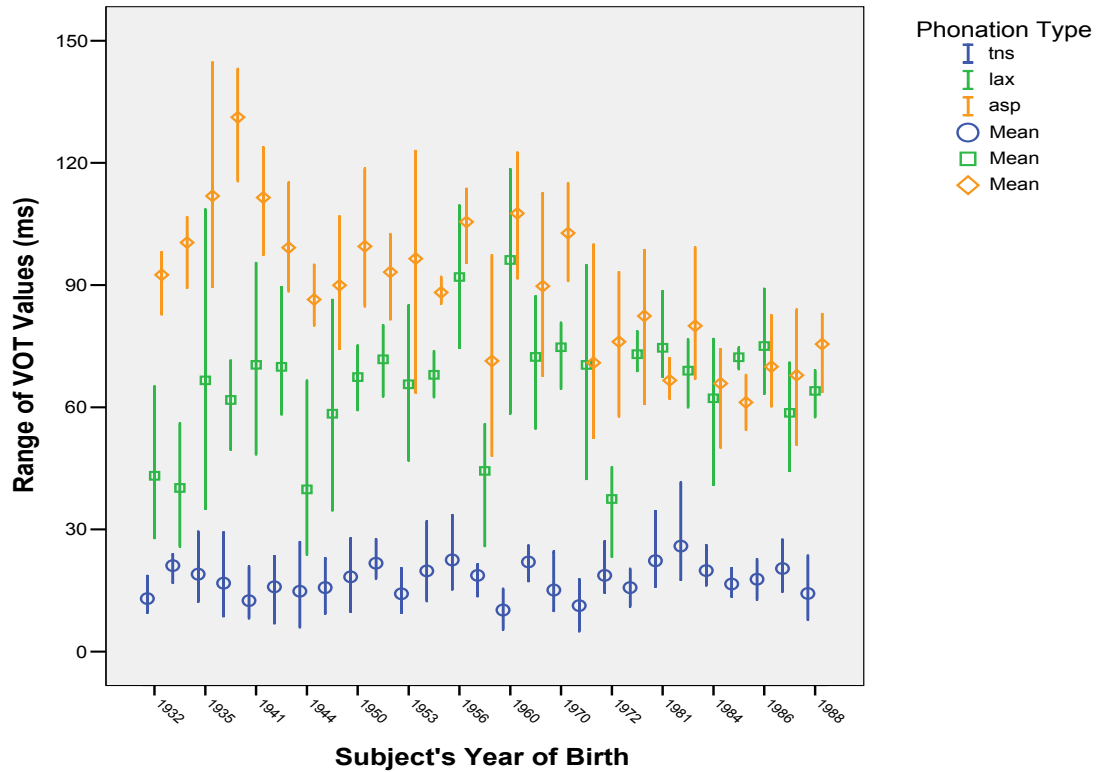


Figure 4.2 Range of VOT Values for Different Phonation Types (ms)

As we see from Figure 4.2, the overall VOT range has decreased over more than 60 years of time from 1930s to 1980s. While the VOT values of tense stops remained pretty much the same over time (around 15ms), the maximum VOT values of aspirated stops has decreased from as high as 144.6ms for older speakers to as low as 67.9ms for younger speakers. Also, among the older speakers, we can see clearer distinction between the three phonation types, but among younger speakers, while tense stops were clearly distinct from stops of the rest two phonation types, the overlap in VOT between lax and aspirated stops is substantial.

To better capture the apparent shift over time, mean VOT values of the three phonation types for each subject were calculated and plotted as a function of each subject's year of birth as in Figure 4.3.

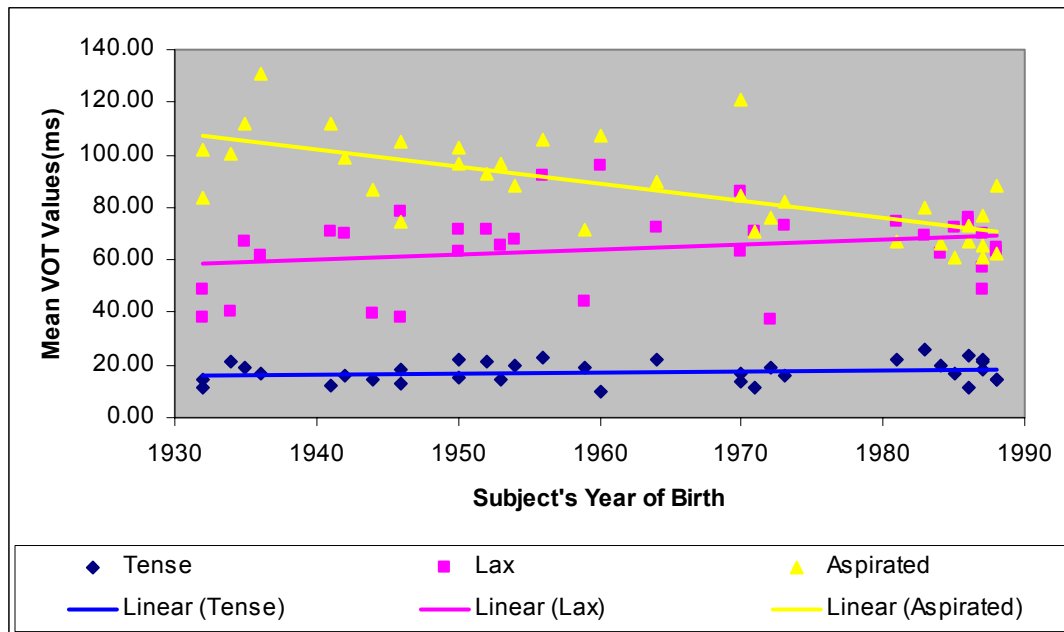


Figure 4.3 Mean VOT Values for Different Phonation Type (ms)

As illustrated in Figure 4.3, For older speakers, the mean VOT value for the three phonation types were clearly distinct, with aspirated stops having higher VOT values than lax stops, which in turn showed higher VOT values than tense stops. However, for subjects born in and after 1970, we could see the emerging of a different general pattern where mean VOT values of lax stops were almost as high as those of aspirated stops, and there was a substantial overlap between mean VOT values of these

two categories, though the mean VOT values of tense stops remained pretty much stable.

The trend lines imposed on the chart exhibited the different variation patterns of stops of the three different phonation types: mean VOT values of aspirated stops have decreased substantially from as high as 131.2ms for the older speakers to as low as 60.95ms for younger speakers over the more than 60 years of time; in contrast to the aspirated stops, mean VOT values of lax stops have increased over the same period of time; mean VOT values of tense stops, however, remained basically stable over the time. The change then was basically one in the relative difference in mean VOT values between lax and aspirated stops, hereafter referred to as ‘delta VOT’: $\Delta VOT = \text{Mean } VOT_{\text{asp}} - \text{Mean } VOT_{\text{lax}}$ (Silva 2006:293). Thus, ΔVOT for each of the subjects was calculated and plotted as a function of subject’s age as in the following Figure 4.4.

The general pattern we observe in Figure 4.4 is that as subject’s age moved towards the younger end of the age axis, ΔVOT becomes continuously lower until it stabilizes among the youngest speakers in the data. More specifically, the difference in mean VOT values between aspirated and lax stops produced by older speakers could be as high as about 70ms, which continuously decreases to around 20ms for middle aged speakers, reaching the lowest negative values in the young subjects’ utterances. Further correlation test revealed that among all the factors of age, gender, and socioeconomic status, only age was significantly correlated with the ΔVOT .

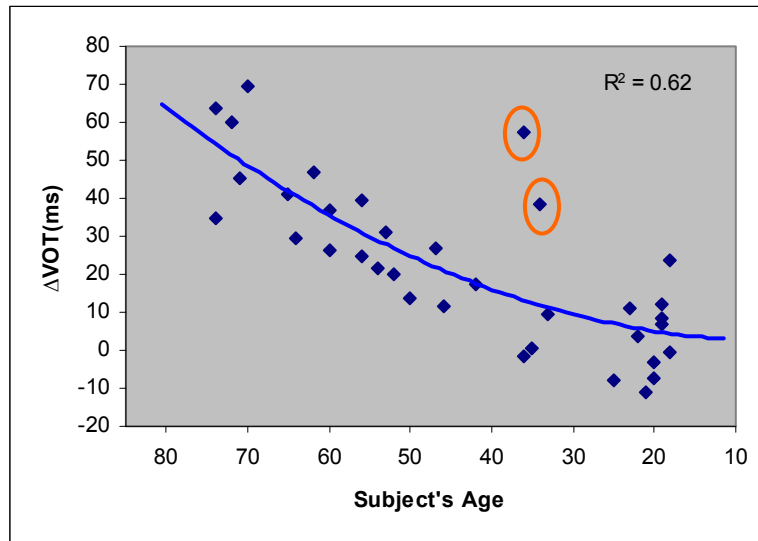


Figure 4.4 Distribution of ΔVOT (ms)

The best fit curve imposed on the chart for the data was Quadratic ($R^2 = 0.62$), indicating a non-linear relationship between ΔVOT and subject's age. We did notice, however, two speakers around the age of 35 (circled ones on the chart, born in 1970 and 1972 respectively), did not confirm to the behavioral pattern of other speakers of their age, exhibiting themselves as “outliers” to the general tendency. Disregarding the two speakers, the R^2 of the best quadratic line could be raised substantially to 79.19 (a difference of 18.03). The demographic information collected of the subjects revealed that these two subjects were Korean language teachers in a Korean ethnic college. As language teachers, they tended to be more conservative by adhering to the traditional pattern rather than adopting the new emerging pattern exhibited by speakers born in and after 1970.

To examine the difference between the two groups, i.e. the older group with subjects born before 1970, and the younger group with subjects born in and after 1970, mean VOT of the three phonation types were calculated for each group.

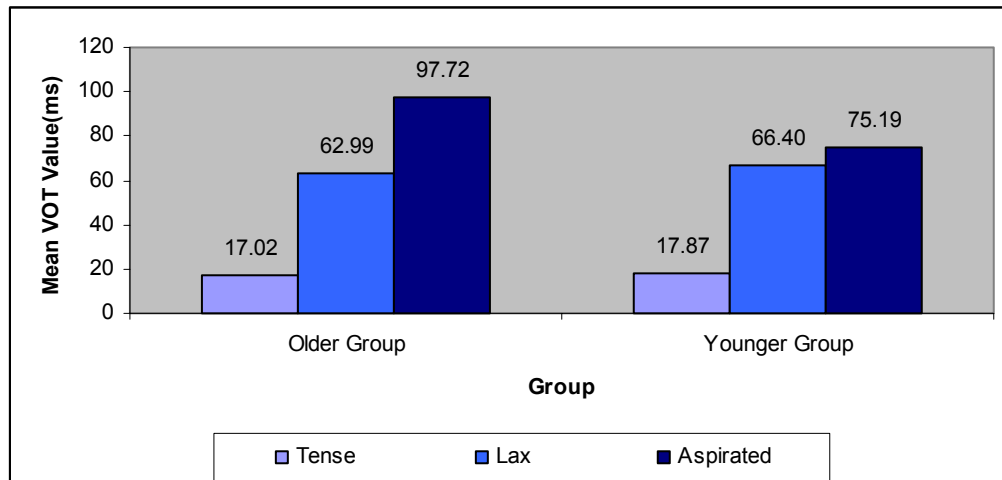


Figure 4.5 Mean VOT Values for Older and Younger Groups

As illustrated in this Figure 4.5, for the older group, the three phonation types clearly were distinct from each other in mean VOT values, with the Tense being the lowest, Lax the intermediate, and Aspirated the highest. One way ANOVA analysis confirmed that the difference between them were significant at the confidence interval of 95%, forming three different groups. For the younger group, the general pattern of Tense stops manifesting the lowest mean VOT value, Lax the intermediate, and Aspirated the highest was still maintained. However, One way ANOVA revealed that although mean VOT values of Tense stops were significantly different from that of both lax and aspirated stops, mean VOT value of Lax stops was not significantly different

from that of Aspirated stops ($p > 0.05$), thereby forming two separate groups, one of Tense stops and the other consisting of Lax and Aspirated stops, suggesting a merger in VOT values between these two phonation categories. Thus, VOT may no longer be a sufficient cue for the three way distinction of the stops in word initial position.

So far we have looked at the VOT variation pattern in word initial position, and in the next section, we will examine the same issue in word internal position.

4.2.2 VOT Patterns in Word Internal Position

In most studies of Korean stops in word internal position, it is generally believed that tense stops are voiceless unaspirated; aspirated stops are voiceless aspirated; and lax stops are voiced in intervocalic position. For example, Abramson and Lisker (1970: 179) mentioned that lax stops “assimilate to preceding voicing in medial position and VOT separates all three categories.” Han and Weitzman (1965: 4) believed that the voicing of the plain stops is “automatically conditioned by the environment” and that the intervocalic lax segments are “really voiced,” though later they weakened their claim that the intervocalic lax stops are “either voiced or not aspirated at all” (1967: 42). Silva (1992: 139) summarized the surface acoustic realizations of the Korean stops in word internal position as the following: lax stops are voiced and unaspirated; reinforced (tense) stops are long, tense, unaspirated; and aspirated stops are voiceless and aspirated. According to these studies then, VOT alone will be sufficient for the three way distinction of the stops in word internal position with lax stops manifesting negative VOT, tense stops showing short but positive VOT, and aspirated stops longer and positive VOT.

However, one study by Han (1996) on the lax stops in word internal position reported that a certain number of tokens were not voiced or only partly voiced. More specifically, one lax token out of the six was voiced; another of them was partly voiced, and the rest of them were voiceless, suggesting an inconsistency of Korean native speakers with respect to the voicing of lax stops. Her further perceptual experiment on lax and tense stops in word internal position revealed that VOT was not a valid cue for the word internal distinction between lax and tense stops when the former was voiceless.

The data in this current study revealed that while speakers were basically consistent with tense and aspirated stops in word internal position, they exhibited variation in voicing of lax stops, confirming Han's finding about the inconsistency of Korean speakers in terms of voicing of lax stops in word internal position. More specifically, tense and aspirated stops remained voiceless across speakers in word internal position, but lax stops exhibited different properties in the same prosodic position: fully voiced, partially voiced, and voiceless. In addition, fricative-like variants (Silva 1992) and even vowel-like variants were also observed in intervocalic position. Following were sample spectrograms and wave forms illustrating each of these cases.

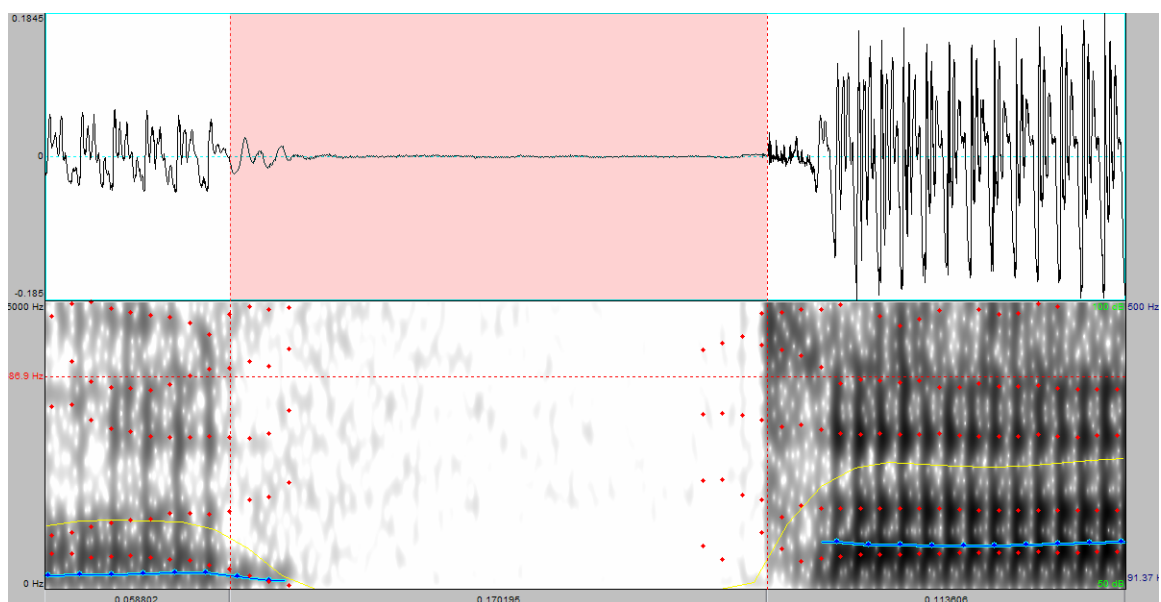


Figure 4.6 Sample voiceless tense stop /t/ as in /pottari/ ‘parcel’

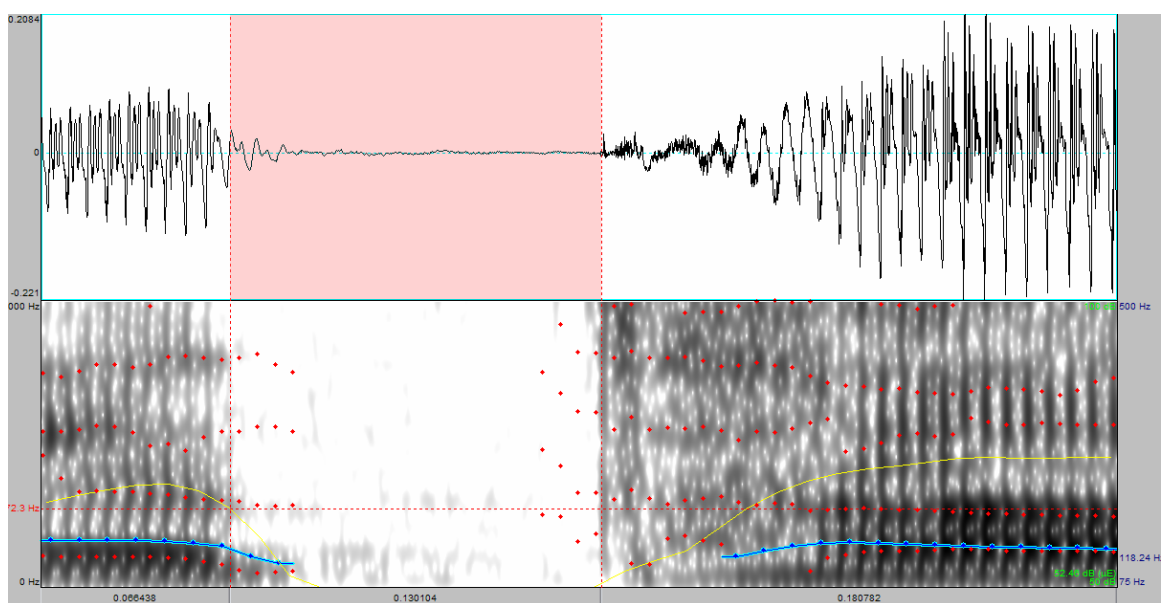


Figure 4.7 Sample voiceless aspirated stop /tʰ/ as in /ɛtʰata/ ‘anxious’

In Figures 4.6 and 4.7, the selected parts were the closure period of the tense stop /t/ and the aspirated stop /t^h/ respectively. As indicated by the straight lines in the wave forms and also the corresponding parts in the spectrograms, the tense stop and the aspirated stop were voiceless in the word internal position, and this remained true regardless of the differences in place of articulation and across speakers. Thus, for these tense and aspirated stops, VOT was positive.

Lax stops, however, manifested a total of five different phonetic realizations as presented in the following figures.

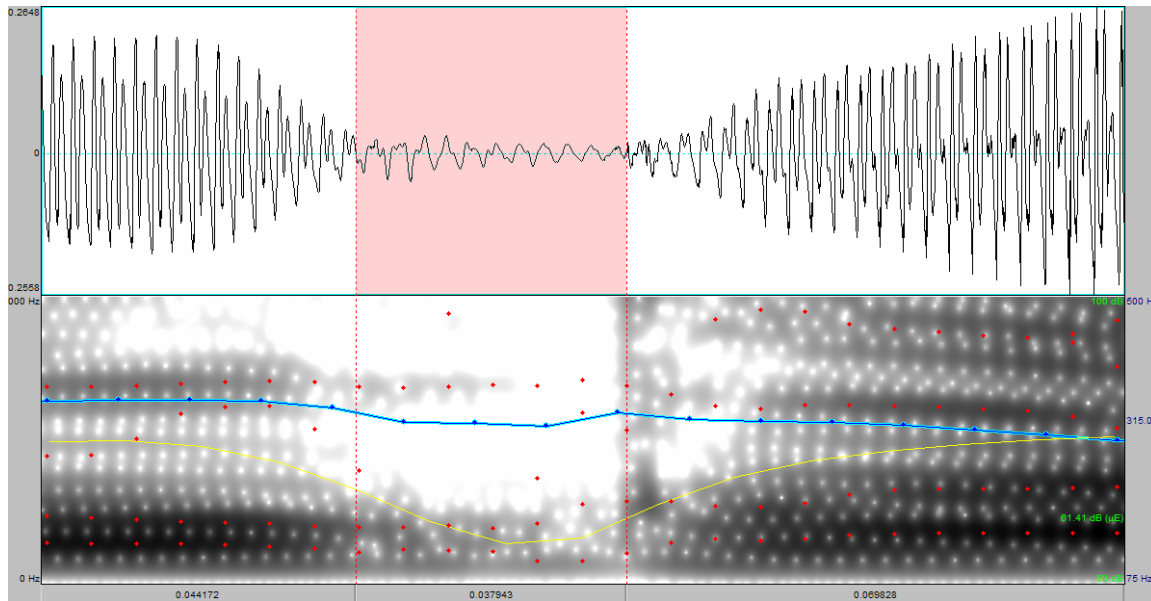


Figure 4.8 Sample lax stop /k/ with unbroken voicing in /t^hokatʃip/ ‘thatched house’

In this first instance of word internal lax stop, we see that during the whole closure period of the lax stop /k/, it was voiced and there was no break of voicing, i.e. it

realized as the voiced stop [d]. Still, we are able to tell the release (the second vertical dotted line) of the closure as indicated by the spike in the wave form and the vertical stripe in the spectrogram. In cases like this, VOT would then be a negative value.

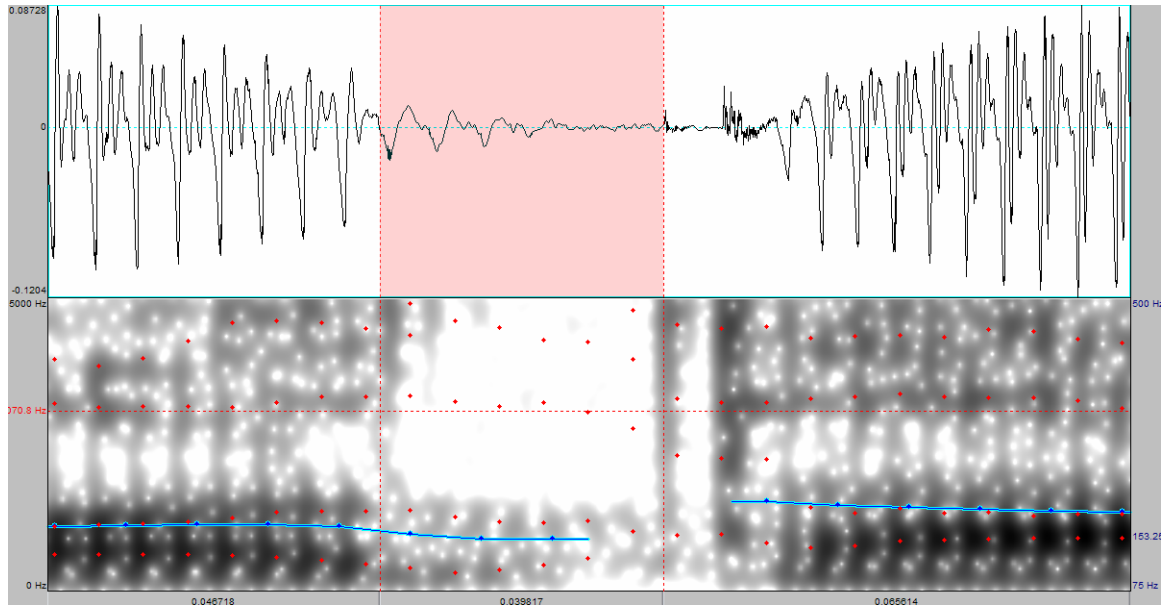


Figure 4.9 Sample lax stop /t/ with partial voicing in /motaku/ ‘nail’

In this second instance of a lax stop, we can see from the waveform and also the corresponding part in the spectrogram that this word internal lax stop /t/ is partially voiced with the first half of the closure period voiced and the rest voiceless. In cases like this, VOT would be a positive value measuring the duration from the release of the closure to the onset of the voicing for the following vowel.

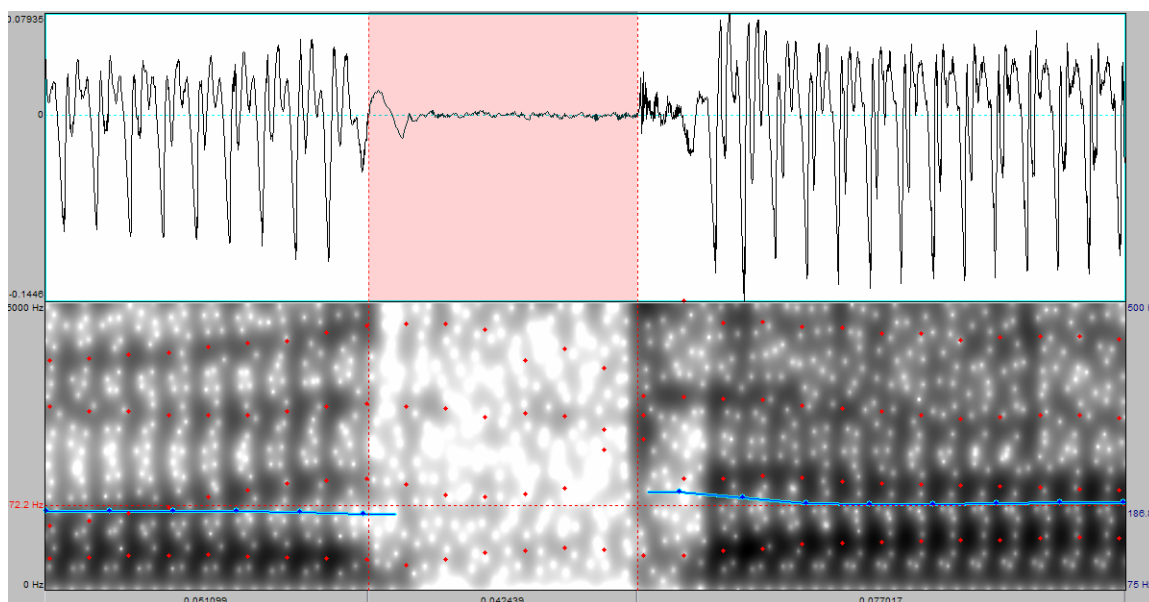


Figure 4.10 Sample lax stop /t/ realized as voiceless [t] in /motaku/ ‘nail’

In this third instance of a lax stop, we can see from the straight line in the waveform and also the corresponding part in the spectrogram that this word internal lax stop /t/ is voiceless in its phonetic realization. In such cases, VOT is positive.

For all these three different instantiations of word internal lax stops, we are able to discern the beginning and release points of the closure period of the stop. However, in the data there were also some extreme cases where the target lax stop no longer sounded or looked like a stop at all.

In the selected part in Figure 4.11, we could see the pulses produced from the vocal fold vibration as well as random energy of higher frequency in the spectrogram produced by forcing air through a narrow gap as in the production of a fricative

(Ladefoged 2001), thus this variant of /t/ was a voiced fricative [ð] rather than a voiced stop [d], thus for cases like this, VOT would then be irrelevant.

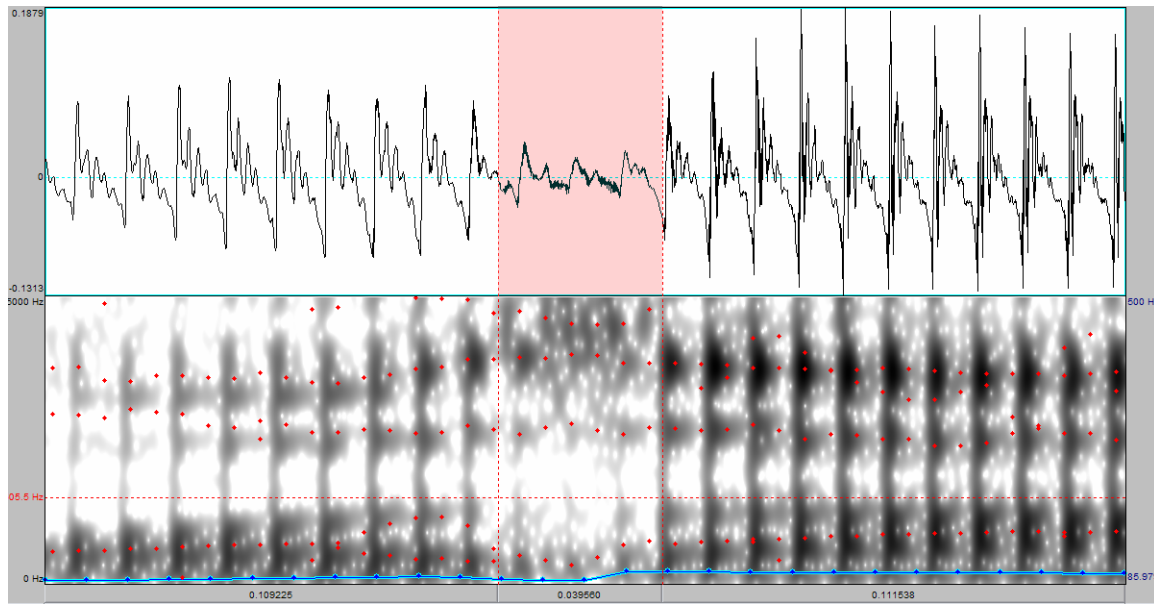


Figure 4.11 Sample lax stop /t/ realized as voiced fricative variant in /motaku/ ‘nail’

This kind of fricativization of a lax stop in intervocalic position was previously reported in Silva (1992), where velar lax stop /k/ was found to surface as voiced velar fricative [ɣ] in intervocalic position, suggesting that “velar stops are susceptible to lenition that goes beyond simple voicing and shortening: they may also become fricatives” (Silva 1992:119). In the data of this current study, however, this fricativization was found in alveolar lax stop /t/ in intervocalic position, and velar stop /k/, as illustrated in the following figure, manifested even further different properties from those of a stop or a fricative.

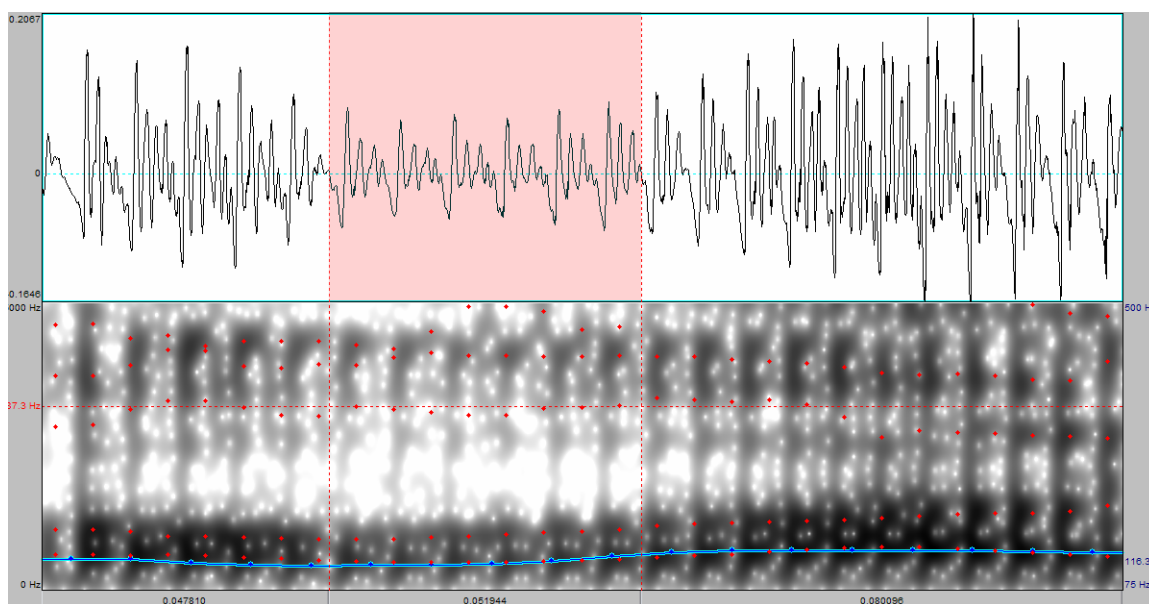


Figure 4.12 Sample lax stop /k/ realized as an approximant in /tʰokatʃip/ ‘thatched house’

We can see from Figure 4.12 clear pulses produced from the vocal fold vibration, but no random energy of higher frequency in the spectrogram as in the production of a fricative by forcing air through a narrow gap, nor did it involve any kind of closure of the vocal tract as in stop consonants. We can also see some degree of formant structure (like a vowel) but without the robustness of structure (e.g. the weakness in amplitude) that one would associate with a full vowel, suggesting a certain extent of narrowing at some point of the vocal tract where the active articulator approximated the passive articulator without forming any closure. Thus, this variant of /k/ was best interpreted as the velar approximant [ɰ]. Again, VOT would then be irrelevant to cases like this.

To summarize, in terms of VOT, we have seen three different patterns manifested by stops of different phonation types in word internal position: negative VOT, positive VOT, and VOT irrelevant cases of fricative and approximant variants. In the following analysis of word internal VOT patterns, all the fricative and approximant variants of lax stops were excluded from the analysis.

In comparison with stops in word initial position, a general VOT pattern found for stops in word internal position was that VOT of the latter was shorter than that of the former, confirming the findings of previous studies (e.g. Han 1996, Lisker and Abramson 1964, Silva 1992). This was true even when different phonation types were taken into consideration. A note about lax stops was that negative VOT only occurred in word internal position when the stop was voiced. Given the different nature between voiceless and voiced lax stops, it does not make sense to compare the positive VOT values in word initial position with the negative VOT values in word internal position. Thus, only those positive VOT values of word internal lax stops were taken into this following comparison.

Table 4.2 Mean VOT values of stops in word initial and word internal positions (ms)

Phonation Type	Word Initial	Word Internal
Tense	18.361	16.758
Lax	64.549	16.005
Aspirated	87.417	60.995

Independent Samples t-tests revealed that although the difference between VOT_{INITIAL} and VOT_{INTERNAL} for tense stops was not statistically significant, those for both lax and aspirated stops were significant at $p < 0.05$.

Examined in the dimension of place of articulation, VOT of tense and lax stops in word internal position exhibited the same pattern observed in word initial position as shown in the following tables, i.e. VOT_{LABIAL} was the shortest; VOT_{ALVEOLAR} stood in the middle; and VOT_{VELAR} was the longest. Also, VOT_{VELAR} , but not VOT_{ALVEOLAR} , was significantly different from VOT_{LABIAL} .

Table 4.3 One-way ANOVA analysis on Mean VOT values of Tense stops in word internal position (ms)

Place of Articulation	N	Subset for alpha = .05	
		1	2
bilabial	35	12.988	
alveolar	35	13.457	
velar	35		23.829
Sig.		.937	1.000

Table 4.4 One-way ANOVA analysis on Mean VOT values of Lax stops in word internal position (ms)

Place of Articulation	N	Subset for alpha = .05	
		1	2
bilabial	7	12.581	
alveolar	11	15.889	15.889
velar	6		20.212
Sig.		.500	.314

For aspirated stops, however, although VOT_{LABIAL} (61.969ms) was still shorter than VOT_{ALVEOLAR} (67.620ms), VOT_{VELAR} (53.396ms), unexpectedly, showed the

lowest value. We have seen above some samples of exceptional behavior of word internal lax stops in velar place, but why word internal aspirated stops in velar place would exhibit such counter-intuitive feature remains to be explored in future studies.

Examined in the dimension of phonation type, VOT of stops in word internal position showed different patterns from that of word initial position. Recall that in word initial position, a VOT merger was reported in lax and aspirated stops, and mean VOT values of both were significantly longer than that of tense stops. In word internal position, two different patterns were observed depending on the phonetic nature of the intervocalic lax stops. When the intervocalic lax stops exhibited negative VOT, the three phonation types were clearly distinguishable from each other: lax stops showed

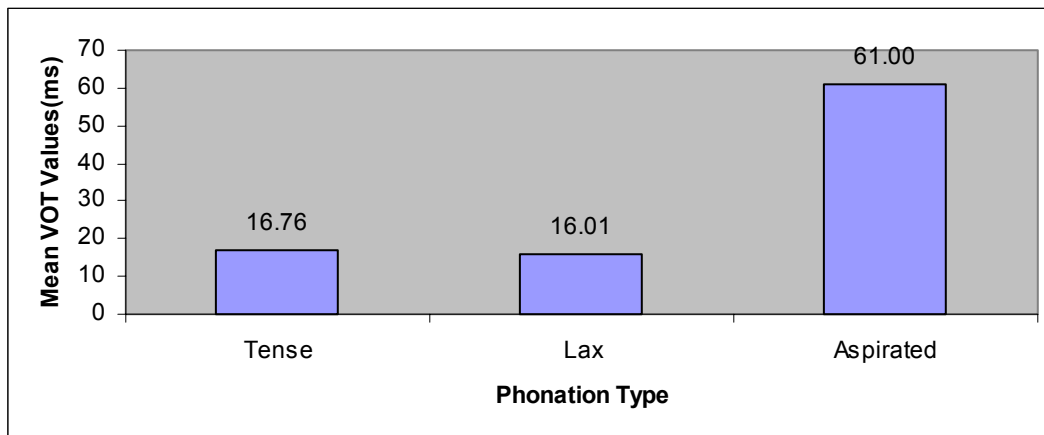


Figure 4.13 Mean VOT values for three different phonation types in word internal position

negative VOT and tense stops showed shortest positive mean VOT of 16ms, which was significantly shorter than that of aspirated stops, 61ms. When the intervocalic lax stops

exhibited positive VOT values, a VOT merger was found to exist (see the Figure 4.13), but this time in the categories of tense and lax stops, and mean VOT of aspirated stops was significantly longer than both of the former two types.

As revealed by One-Way ANOVA analysis, there was no significant difference between the mean VOT values of tense and lax stops, but that of aspirated stops was significantly longer than both of the other two categories. As illustrated in Figure 4.14, this overall pattern was maintained even when different places of articulation were taken into consideration.

Different from the merger in word initial position, however, this merger in word internal position was not a newly occurring VOT shifting pattern limited only to subjects of the younger group; rather it is a stable consistent pattern across the age groups as the older group also exhibited the same pattern of merger as shown in Figure 4.15.

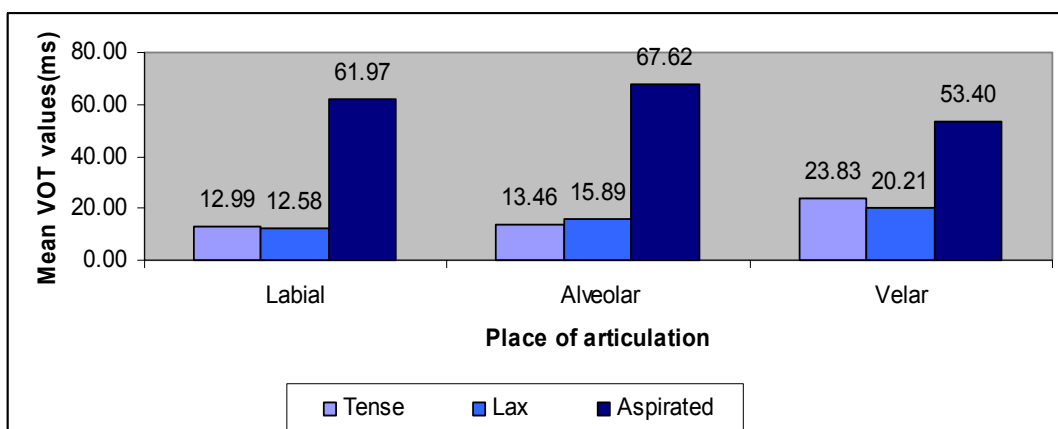


Figure 4.14 Mean VOT values for different phonation types in different places of articulation in word internal position

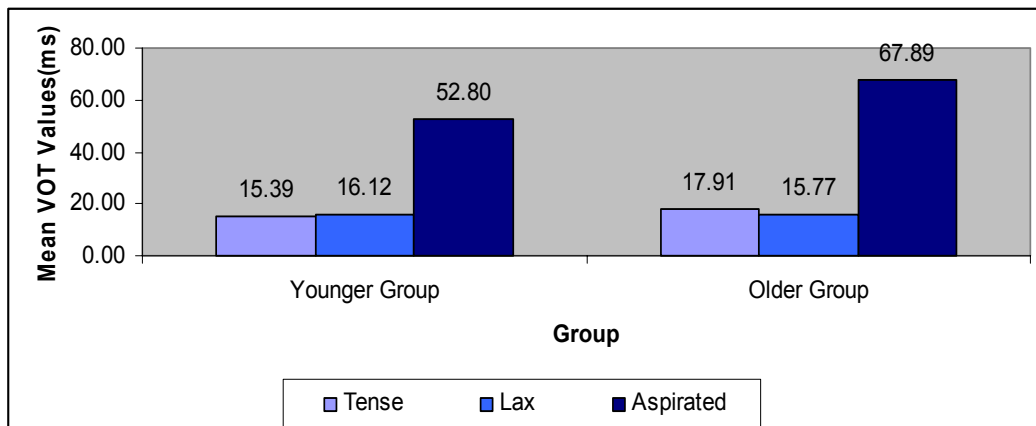


Figure 4.15 Word internal Mean VOT values for different phonation types for younger ad older groups

Thus, in word internal position, when lax stops manifest positive VOT values, VOT is not a valid cue to distinguish the tense stops from lax stops, though it does successfully separate aspirated stops from the other two. This finding is consistent with Han's (1996) conclusion on her study of tense and lax stops that VOT does not contribute to the perception of tense and lax stops in word internal position when the lax stops are not voiced. Coupled with the finding made above in word initial position that VOT fails to distinguish lax stops from aspirated stops, though it separates tense stops from the other two types, this suggests that VOT---formerly claimed to be sufficient to “distinguish the aspirated set from the other two” and “the single most important measure for separating the latter” (Lisker and Abramson 1964), is not a sufficient cue by itself to distinguish the three different phonation categories. Now the question is: what are other possible valid cues for the distinction of the different phonation types? The following section addresses this issue.

4.3 Patterns of Other Acoustic Cues

This section examines patterns exhibited by other acoustic dimensions, and discusses their role as acoustic cues for the distinction of the three phonation categories. This section is divided into two subsections: the first part covers cases of word initial position, and the second part examines word internal position.

4.3.1 Patterns of Other Acoustic Cues in Word Initial Position

In searching for other working acoustic cues for the distinction of different phonation types, three dimensions were examined for the word initial position data: F0 onset and offset, length of the vowel immediately following the target stop, and intensity build-up.

Analysis of the F0 onset and offset of the immediately following vowel after the target stop reveals a pattern shared by both the younger group who showed a merger in VOT between lax and aspirated stops and older group who showed clear distinction between the three categories. As illustrated in Figure 4.16, F0 after a lax stop shows the lowest value, while after an aspirated stop shows the highest value and after a tense stop, an intermediate value. This pattern was consistent across the groups regardless of subject age difference, suggesting that the effects of different types of stops on the F0 of the immediately following vowel has remained stable amidst the diachronic shift in VOT values of the stops in word initial position. This finding is consistent with conclusions by studies on F0 pattern in the variety of Seoul Korean (Han and Weitzman 1970, Cho 1996, Han 1996, Silva 2004, 2006).

One-Way ANOVA revealed a significant difference in F0 between those after a lax category and those after aspirated category, though not between after- aspirated and after-tense categories. Thus, F0 of the immediately following vowel signals the distinction between lax and aspirated stops, but not between aspirated and tense stops. Recall that in the above section we have mentioned that in word initial position VOT is a valid cue for the distinction between tense category as one group and lax and aspirated categories as another group, but not between the latter. Thus, we see here complementary functions played by VOT and F0 in the successful distinction of all the three phonation types of stops which neither of them could fulfill on its own.

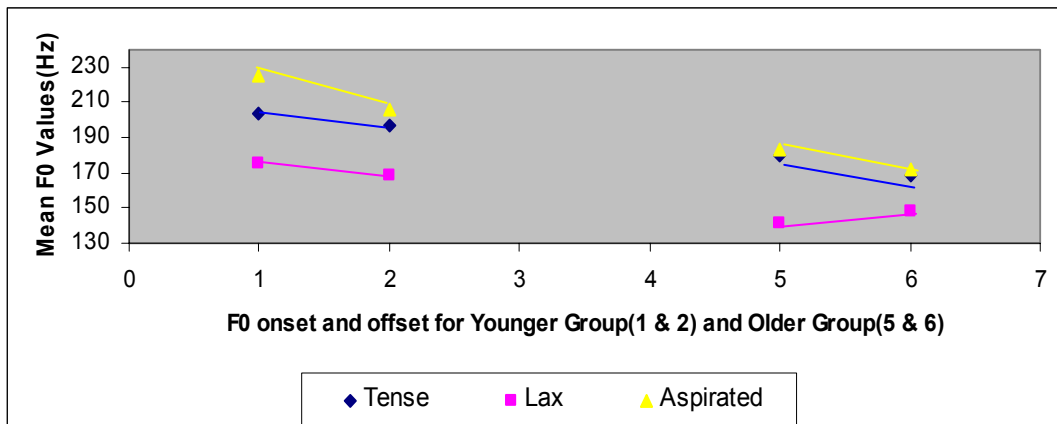


Figure 4.16 F0 onset and offset for the vowel immediately following a stop of different phonation type in word initial position for Younger and Older Groups

A second dimension examined was the length of the immediately following vowel. As shown in Figure 4.17, the vowel was longest after a tense stop and longer after a lax stop, and was short after an aspirated stop. Again, this is same with the observation made by Cho (1996) about vowel length in Seoul Korean speakers. One

note is necessary here. Based on his observation of VOT in his data that VOT is shortest for tense stops and longest for aspirated stops, and was intermediate for lax stops, Cho suggested a temporal compensation relationship between VOT and vowel length, i.e. longer duration in the former leads to shorter duration in the latter. In this current study, however, given some data sets where VOT of lax stops were longer than that of aspirated stops but vowel length after the lax stops were still longer than those after aspirated stops, Cho's reasoning of the compensation relationship is not equally applicable to the data in this current study.

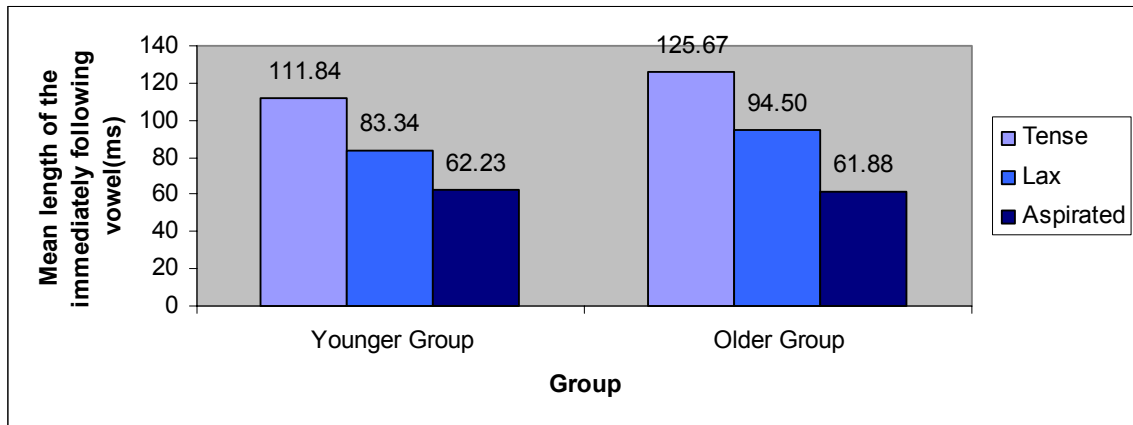


Figure 4.17 Length of the vowel immediately following a stop of different phonation type in Younger and Older Groups

Further One-Way ANOVA analysis proved that the vowel length differences after different types of stops were significant at $p < 0.05$, and this pattern was consistent across the different age groups, suggesting it is a stable valid cue for the distinction of different phonation types of the preceding stops.

A third acoustic dimension examined was intensity build-up. Recall that intensity build-up in this current study is defined as:

$$\text{Intensity build-up} = \text{intensity rise time (ms)} / \text{vowel length (ms)}$$

Also, intensity rise time here refers to the temporal measurement from the onset of voicing to the point of fullest development of amplitude in the wave form of the following vowel. Thus, this definition of intensity build-up is to objectively capture how fast the intensity builds up after the release of the stops of different phonation types.

Results of the analysis on intensity build-up revealed a co-variation in intensity build-up along with the diachronic shift in VOT. For the older group, as we see from the following table 4.5, intensity build-up was significantly longer after lax stops than after both aspirated and tense stops, though there was no significant difference between the latter. This agreed with the qualitative observations on intensity build-up of stops in Seoul Korean (Han and Weitzman 1970, Cho 1996). Thus, for the older group, intensity build-up would then be a working cue to distinguish the different types of stops in cooperation with VOT as the latter can separate tense stops from aspirated stops.

Table 4.5 Post Hoc Tests of intensity build-up after stops of different phonation types for older group

Phonation Type	N	Subset for alpha = .05	
		1	2
aspirated	57	.4250	
tense	57	.4562	
lax	57		.5657
Sig.		.637	1.000

However, as shown in table 4.6, for the younger subject group where VOT values of lax stops were found to be merging with those of aspirated stops, the intensity build-up after lax stops became shorter and was no longer significantly different from the intensity build-up after aspirated stops as it was in the older subject group, though it was still significantly different from after tense stops. So, along with the change in VOT of the lax stops, the intensity build-up after this lax category has also changed over time. Thus, intensity build-up contributes no more to the distinction of different stops types than VOT does for the younger speakers.

Table 4.6 Post Hoc Tests of intensity build-up after stops of different phonation types for younger group

Phonation Type	N	Subset for alpha = .05	
		1	2
tense	48	.3675	
aspirated	48		.4639
lax	48		.5074
Sig.		1.000	.358

In word initial position then, we found two other acoustic cues that contribute to the distinction of different types of stops. One is F0 that has to work with VOT to fulfill the task in that F0 can distinguish lax stops from aspirated and tense stops but not between the latter two, and VOT can distinguish tense stops from the other two categories but again not between the latter. The other valid acoustic cue is vowel length that consistently distinguishes all the three different categories of stops. Intensity build-up, however, may only be a secondary acoustic cue due to its inconsistent pattern among speakers of different age groups.

4.3.2 Patterns of Other Acoustic Cues in Word Internal Position

In word internal position, four acoustic dimensions were examined: F0 pattern, vowel length, intensity build-up, and closure duration of the stops. As we have seen above, the VOT of stops in word internal position, especially of lax stops, are substantially different from those in word initial position, and we would assume that other acoustic cues may also present complicated different patterns from those in word initial position. Indeed, very few studies (Silva 1992, Han 1996) have addressed word internal stop issues in Korean literature.

As positive VOT cases are where VOT fails to separate tense stops from lax stops word internally, stops with positive VOT values were examined. Results of the analysis revealed that of all the other acoustic dimensions examined here, the only valid acoustic parameter that contributes to the distinction of three different types of stops in word internal position was stop closure duration, while all the rest showed no significant difference after stops of different phonation types.

First, mean F0 of the vowel after the three different types of stops all showed a falling contour as presented in the following figure 4.18 , but there was no significant difference between them ($p>0.05$), neither in F0 onset nor in offset, thus F0 failed to provide any cue for the stop distinction.

Secondly, vowel length was not a valid cue for the distinction of word internal stop categories. There was no significant difference in the mean length of the vowel after tense (129.5ms) and lax stops (133.5ms), though after aspirated category (92.0ms) it was significantly shorter than after both of the former. Accordingly, the Post Hoc Test

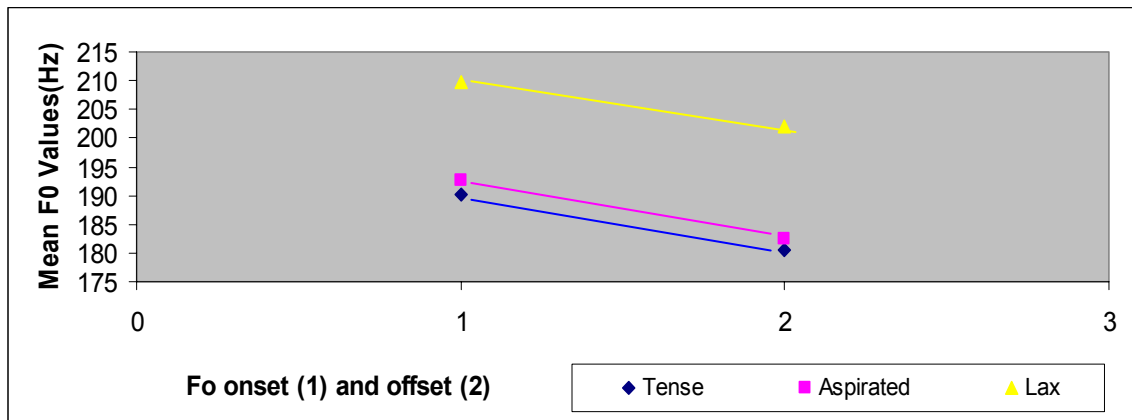


Figure 4.18 F0 onset and offset for the vowel immediately following a stop of different phonation type in word internal position

revealed two subset groups, with tense and lax in one same group and aspirated in the other group. Thus, vowel length failed where VOT failed, i.e. unable to distinguish the tense category from the lax one word internally.

Analysis of intensity build-up showed similar pattern as presented by the vowel length. No significant difference was found in intensity build-up between after lax (0.31) and after tense (0.32) stops, though both of them were significantly shorter than that of after aspirated stops (0.47). Thus, word internally, intensity build-up contributed nothing more than VOT to the distinction of three stop categories, i.e. it failed to separate the tense category from the lax one.

However, closure duration of the stops was proven to be reliable means of differentiating the stop categories in word internal position.

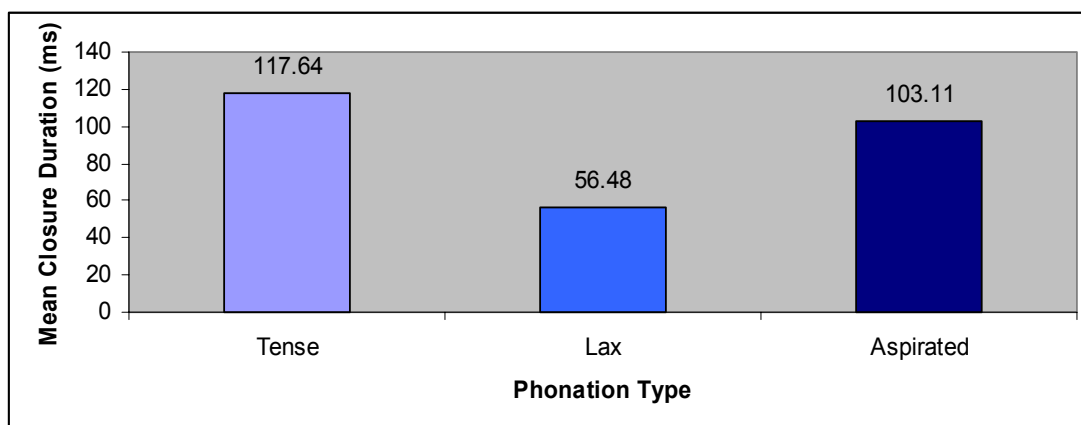


Figure 4.19 Word internal closure duration for stops of different phonation types

As illustrated in Figure 4.19, tense stops showed the longest closure period; lax stops had the shortest closure period; and aspirated stops stood in between. One-Way ANOVA tests revealed that closure period of lax stops were significantly shorter than those of both tense and aspirated stops, but no significant difference between the latter. Thus, closure duration can successfully distinguish lax stops from tense and aspirated stops, but not aspirated from tense stops. Recall that word internally VOT was found to be a valid acoustic parameter for the distinction between aspirated stops and the other two categories, but not between the latter. Thus, we found complementary functions played by stop closure and VOT in the distinction of different types of stops in that where one failed, the other succeeded, and neither of them alone could signal the distinction of all the three types.

This finding was consistent with Han's (1996) study on tense and lax stops in Seoul Korean where she found the role of stop closure as a primary cue and VOT a secondary one for the distinction of tense and lax stops.

One interesting thing I also observed in the examination of all these acoustic dimensions was the features related to lax stops. Recall that in word initial position, after lax stops the mean F0 was the lowest, vowel length was the shortest, and mean intensity build-up was the slowest. In word internal position, however, we found that after lax stops mean F0 was the highest, mean vowel length was the longest, and mean intensity build-up was the shortest. It seems as if with VOT of lax stops becoming substantially short word internally to the extent of being not significantly different from that of tense stops, other acoustic dimensions such as F0, vowel length, and intensity build-up of lax stops also manifested patterns similar to those of tense stops. Interesting as this is, I would leave further exploration on this for future research.

4.4 Discussion

As early as in the 1960s, studies on Korean pointed out that in word initial position VOT may well be the single most important measure for separating the three Korean stop categories (Lisker and Abramson 1964). Later studies in the 1990s (Silva 1992, Cho 1996, Han 1996) proved that VOT alone is sufficient to mark the distinction of the three phonation types of the stops with VOT of aspirated stops being the longest, that of tense stops being the shortest, and that of lax stops the intermediate. However, recent studies on Seoul Korean speakers in Dallas (Silva 2004, 2006) revealed a change in the role of VOT as the primary indicator, downgraded now to the secondary level with F0 being promoted to the primary level. Is this a unique phenomenon of Seoul Korean or is it that the Korean language as a whole is undergoing this change? Thus,

studies on other Korean variety along the similar line may contribute to a better understanding of Korean language variation and change.

Acoustic and statistic analysis on the Chinese Korean data in this study reveals a diachronic shift in VOT values in word initial position and a change in the role of VOT in separating the three stop categories in Chinese Korean. As illustrated in Figures 4.1 and 4.3, the range of mean VOT values have shrunk over time both in terms of place of articulation and phonation types of the stops, and there is a three-category to two-category VOT shift over time, i.e. younger speakers born in and after 1970 manifest a merger in VOT values between aspirated and lax stops, suggesting that VOT alone is not sufficient anymore to mark the distinction of the stops.

The observation of VOT shift over time entails three questions:

1. If VOT fails to mark the three-way distinction of stops, what are the other acoustic parameters that signal the distinction of the different phonation categories?
2. What is the nature of this VOT shift?
3. How does this VOT phenomenon of Chinese Korean fit into the larger picture of Korean language variation and change?

In answer to the first question, Silva (2006) suggested a primary role of F0 based on the finding that mean F0 for words beginning with lax stops is significantly lower than the mean F0 for comparable words beginning with tense or aspirated stops. Hence the argument is that the underlying contrast between lax and aspirated stops is maintained by younger speakers, but is phonetically manifested in terms of

differentiated tonal melodies: L tone after lax stops and H tone after aspirated and tense stops.

In the data for this current study, I found a similar pattern in terms of F0. Mean F0 onset and offset for the vowel immediately after lax stops was significantly lower than the mean F0 for the vowel after tense or aspirated stops. However, no significant difference was found between the mean F0 of after tense and after aspirated stops. Thus, although F0 was able to separate lax stop from the other two categories, it failed to separate the latter. In terms of tonal melody then, although the L tone after lax stop could be easily distinguished from the H tones after tense and aspirated stops, the H tones after tense and aspirated stops were not separable based on F0. And this was exactly where VOT still played a role: it clearly separated tense stop from the aspirated stops by showing significantly shorter VOT for the former than for the latter. Thus, F0 and VOT complemented each other by each undertaking half of the task in the complete distinction of the three different categories of stops, and neither of them could achieve it individually.

However, one acoustic measure, length of the vowel immediately after the stop, has been found to be able to mark the different stop categories independently. Mean vowel length after tense stops was significantly longer than mean vowel length after aspirated stops, which in turn was significantly longer than that after lax stops. Although the absolute values of vowel length may vary depending on different speakers, this general significant pattern was held true across different words and speakers of different generations. Thus, amidst the diachronic shift of VOT, the contrast

between vowel lengths after different types of stops has remained constant, justifying vowel length as a reliable cue for the stop distinction.

A third acoustic measurement of intensity build-up could only play as a secondary cue. Intensity build-up takes longer time after lax stops than after tense and aspirated stops, and this pattern is true across speakers of different generations. However, this difference is not statistically significant for the younger group of speakers where there is the merger of VOT between the lax and aspirated stops, though it is significant for the older group. This inconsistency suggests that intensity build-up may only function as a secondary cue for stop distinction.

In answering the second question, we need to refer back to Figure 4.4. The change in VOT is well captured in this figure: oldest subjects show the greatest gap (Δ VOT) between lax and aspirated stops, and as the subject cohort moves towards the younger end of the age axis, the observed gap becomes increasingly small, reaching the lowest value for the youngest subjects. Will this trend continue with even younger people than the youngest subjects in this study? The answer appears to be no. As indicated by the best fit quadratic line, Δ VOT for the youngest subjects in the study are stabilized around 0ms. Also, for the younger group, statistical analysis shows no correlation between Δ VOT and age, and every member of the group consistently show no significant VOT difference between lax and aspirated stops. Along a similar line, should more subjects be added who are older than the oldest subjects here, Δ VOT is not likely to go continuously higher and higher; rather it is predicted that Δ VOT will stabilize somewhere around the highest Δ VOT value in this analysis. Thus, with a little

bit of imagination, we can see the observed quadratic line is a component of an s-shaped or z-shaped curve, which is often believed to be indicative of a language change in apparent time (Labov 1994, Guy 2003), with the assumption that different age groups available in the study reflect the language use of young adults of some time in the past.

Being the first systematic study on VOT of Chinese Korean, there is no previous data available for the current analysis to compare to, thus examination of the real time change is not possible at this stage. However, as been verified by many studies on other languages (e.g. Guy et al. 1986, Bailey et al. 1991), I believe this apparent time VOT shift phenomenon reflects the real time course of change in Chinese Korean.

When language changes, it may come in two forms: (i) change from below or change from within the system and (ii) change from above or the importation of elements from other systems (Labov 1966). Internal changes are generated by the process of incrementation: “successive cohorts and generations of children advance the change beyond the level of their caretakers and role models, and in the same direction over many generations” (Labov 2007:346). This is exactly the phenomenon we observed here in this study of VOT shift in the Chinese Korean speech community: It begins with the faithful transmission of the adult system, i.e. in our case a clear distinction in VOT between the three categories of stops produced by the older speakers, and Δ VOT is then advanced further in the direction indicated by the inherited age vectors. With Δ VOT getting increasingly small, the incrementation of the change takes the form of “increases in extent” in an unbroken sequence of generation to

generation transmission in this speech community. Thus, I believe this is an internal change within the system of Chinese Korean speech community.

Now the question remains how does this VOT change in Chinese Korean fit into the larger picture of Korean language development?

As mentioned in previous chapter, among several Korean varieties, Chinese Korean has established itself as a branch of the Korean language family tree. Continuity of Chinese Korean as a branch member is then maintained through the transmission within the system of Chinese Korean speech community. Labov made the following comment on such issues:

The continuity of dialects and languages across time is the result of the ability of children to replicate faithfully the form of the older generation's language, in all of its structural detail, with consequent preservation of the distances of the branches of the family tree. But linguistic descent can be preserved even when this replication is imperfect, that is, when language changes. This is the normal type of internal language change ... (Labov 2007:346)

If there were no transmission of structures across generations, there would be no continuity in language. The transmission to the next generation in the speech community, however, does not have to be completely faithful to the structure of last generation (Labov 2007). This is when the incrementation of change occurs in the transmission process. Each younger generation further advances the change, yet the change is still in the same direction as in the older generation. Thus, the existence of the incrementation of VOT change in Chinese Korean does not prevent the transmission process in the speech community from preserving Chinese Korean as a descendant of modern Korean.

In contemporary Korean, we now know there are several different varieties as listed below:

Northern Pyongyang Korean (spoken in North Korea):

Phyongan dialects

Hamgyong dialects

Central and Southern Korean (spoken in South Korea):

Central dialects

Chonlla dialects

Kyongsang dialects

Cheju dialect

Chinese Korean (spoken in China)

Russian Korean (spoken in Russia)

Chinese Korean presents itself as one of the descendants in the Korean language family. Transmission of changes internal to the system of the Chinese Korean speech community would then further justify its status as a branch different from others through the maintenance of the distance between them. This is exactly the way VOT change in Chinese Korean fits into the picture. The presence of internal VOT change in Chinese Korean, not reported in other branches in North Korea, South Korea, Russia, etc., further separates Chinese Korean from the rest branches.

Of course, here is an issue that deserves further comment. The lack of documented VOT change in other branch members may be an existing fact in Korean language family, or it may be due to the lack of relevant research on other Korean branches in current Korean literature. In the former case, it would support the above argument on family tree generated by transmission of internal changes; in the latter case, it would not invalidate our argument, rather, we would have a different story to tell.

Indeed, as mentioned previously, we have seen reports on similar VOT change in Seoul Korean spoken in the United States. The status of Korean spoken in the US as a branch of Korean family tree has not yet been established in the Korean literature. But be it the same as or different from Seoul Korean spoken in South Korea, it belongs anyway to a different branch from the branch of Chinese Korean. The presence of similar VOT change pattern in the two different branches would then diminish the distance between the branches of the Korean language, making them converge rather than branch. This kind of converging between different branches is often the result of contact between the speech communities involved and the transfer of features from one to the other (Labov 2007). Given the geographical remoteness and completely different political and cultural settings between the two Korean branches concerned here, however, this may not be a natural result of mutual contact. Instead, we would say this diminishing of distance happened “spontaneously, when parallel branches converge through independently motivated changes” (Labov 2007:347). Thus, transmission of internal change within the branch may not preclude possible convergence between paralleling branches.

The observation of similar VOT change in Seoul Korean spoken in the United States and in Chinese Korean, in two branches of so different settings, may suggest that the Korean language is undergoing this internal change. Recall that besides this VOT pattern where VOT merger occurred between aspirated and lax stops, we also noticed the existence of a different VOT pattern among young Korean speakers in Yanbian area

in China. Thus we have reports of three different locations with two different VOT patterns as illustrated in Figure 4.20.

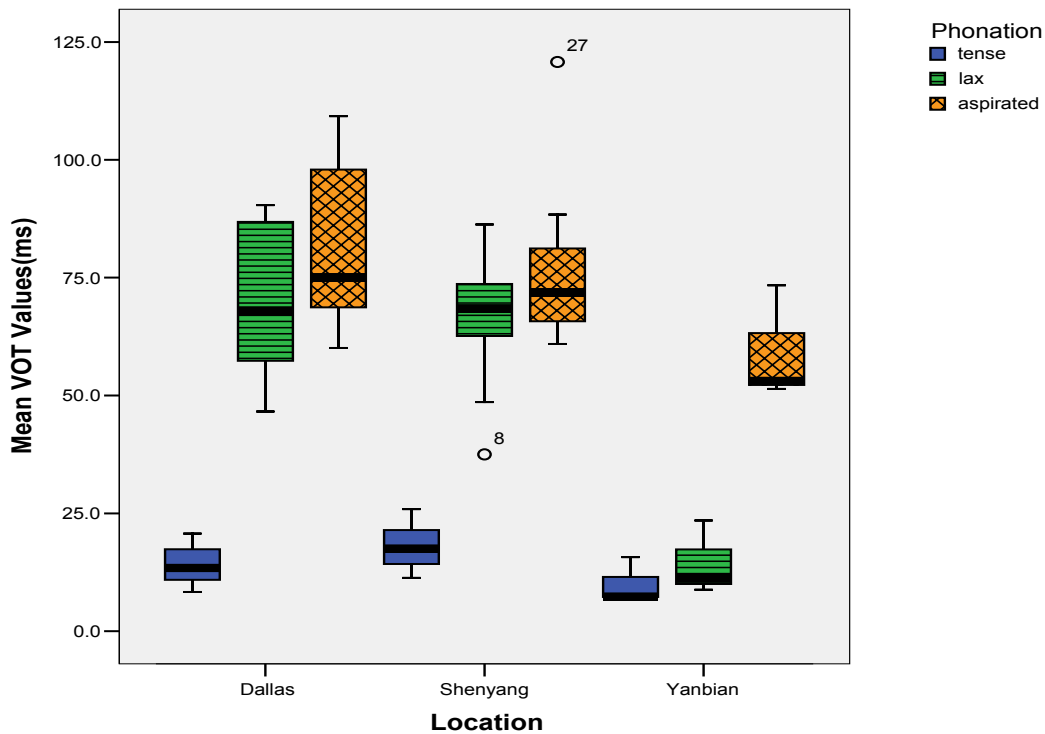


Figure 4.20 VOT Patterns Observed in Young Speakers from Three different Locations⁵

We can see from this figure that Seoul Korean spoken in Dallas and Chinese Korean spoken in Shenyang share similar patterns where VOT overlap is between the lax and aspirated categories, though Chinese Korean is more advanced in the change as the mean VOT range of aspirated stops almost completely overlaps with that of lax stops. For the Korean spoken in Yanbian, however, the overlap is between tense and lax

⁵ The younger speakers included here were all born in and after 1970. Data source for the other two places are from Silva (2004), Zheng and Li (2005).

stops, with aspirated stops clearly distinct from both of the former. We could also notice that its mean VOT range of aspirated stops is much lower than the other two varieties. Overall, what they all have in common is that the aspirated stops of Korean are becoming less aspirated, and the three-way VOT distinction has shifted to a two-way distinction.

This general simplification shift may be explained as a result of language internal change to a universally less marked VOT system with the understanding that two-way VOT distinction is more common among world languages. Meanwhile, the internal change in Chinese Korean could have been facilitated by the VOT system in Chinese language which contrasts voiceless unaspirated stops (/p t k/) with voiceless aspirated stops (/p^h t^h k^h/). Korean Chinese in this study are bilingual in Korean and Chinese. It is possible that Chinese that they speak, with its two-way VOT contrast, may influence in the long run the Korean production of Korean Chinese.

As to the different VOT patterns observed above, a tentative explanation proposed here is that Yanbian, being the biggest Korean Prefecture in China, is like an isolated “speech island” where the Korean language and culture are better preserved than anywhere else in China and also the Dallas area in the US. Thus, it is possible that the Korean variety spoken there may maintain the traditional VOT pattern as documented in Korean studies in 1960s and 70s, where the VOT overlap is between tense and lax stops. If this is the case, then the VOT pattern observed in the young speakers in Yanbian would simply be an indication of language preservation rather than language change. Of course, this claim needs to be further verified with a future study

that incorporates older speakers in Yanbian area. Should the older speakers manifest the same pattern as the young speakers, then the pattern observed in young speakers in Yanbian would simply be language maintenance, otherwise a more complicated explanation is in order. Thus, VOT change may be a result of combined influences from both internal and external factors.

4.5 Conclusion

This chapter investigates variation and changes in VOT in Chinese Korean stops. Acoustic and statistical analysis of Chinese Korean data in this study reveals a diachronic shift in VOT in word initial position and two different patterns of merger in VOT in word initial and internal positions, suggesting the insufficient role of VOT in separating the three stop categories in Chinese Korean. More specifically, word initially, the range of mean VOT values have shrunk over time both in terms of place of articulation and phonation types of the stops, though in the former case the distinction among the three categories of labial, alveolar and velar stops are maintained while in the latter case there is a three-category to two-category VOT shift over time, i.e. while older people show clearer distinction in VOT values for the three phonation categories, younger people born in and after 1970 manifest a merger in VOT values between aspirated and lax stops. Word internally, tense and aspirated stops remain voiceless across speakers, but lax stops exhibit different properties: as stops that are fully voiced, partially voiced, or voiceless, as a fricative, and even as an approximant. In terms of VOT then, stops in word internal position manifest three different patterns: negative VOT, positive VOT, and “VOT irrelevant” cases of fricative and approximant variants.

Analysis on positive VOT cases shows that mean VOT of aspirated stops is significantly longer than those of tense and lax stops, but there is a merger between the latter two, and this merger is consistent across different age groups.

In searching for valid acoustic cues for stop distinction, we found that F0 and VOT complement each other in marking the distinction of three different categories of stops in that Mean F0 onset and offset for the vowel immediately after the stop can separate lax stops from tense and aspirated stops, but not between the latter, while VOT can separate tense stops from lax and aspirated stops but not between the latter. Length of the vowel immediately after the stop, however, has been found to be able to mark the different stop categories independently. Intensity build-up takes longer after lax stops than after tense and aspirated stops, and this pattern is true across speakers of different generations. However, this difference is not statistically significant for the younger group of speakers though it is for the older group. This inconsistency suggests that intensity build-up may only function as a secondary cue for stop distinction. Word internally, the only other acoustic measure that contributes to stop distinction is stop closure duration. Closure period of lax stops were significantly shorter than those of both tense and aspirated stops, but no significant difference between the latter, revealing a complementary functions played by stop closure and VOT in the distinction of different types of stops.

Examination on the data along the dimension of Δ VOT suggests the observed VOT shift is a language change in apparent time. This internal change is generated by the process of incrementation in the transmission within the Chinese Korean speech

community with successive generations advancing the change in the same direction beyond the level of their previous generations. Transmission of the change internal to the system of the Chinese Korean speech community further justifies its status as a branch different from others through the maintenance of the distance between them. However, it does not preclude possible convergence between paralleling branches.

In looking at the larger picture of Korean language, the different VOT change patterns observed across different locations suggests that three-way VOT system in Korean stops is shifting towards simpler two-way system. This change may be a result of combined influences from internal and external factors.

Further studies will need to systematically incorporate other Korean varieties spoken in China and also in other countries such as Korea itself, Japan, Russia, Spain, etc. to better understand the mechanism, direction and course of Korean language change and development.

CHAPTER 5

FRONT ROUNDED VOWELS OF CHINESE KOREAN

5.1 Introduction

As mentioned in the previous chapter, Chinese Korean in its broad sense includes several different varieties. Some varieties (e.g. the Cholla dialect spoken in Jiaohe, Jilin) have 10 simple vowels in the vowel inventory, while others (e.g. the Kyengsang dialect spoken in Suihua, Heilongjiang) may have as few as six simple vowels (Xuan et al. 1991).

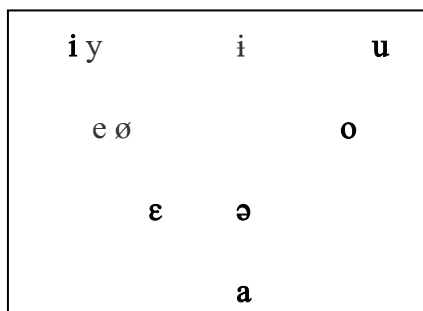


Figure 5.1 Simple vowels in Chinese Korean (adapted from Xuan et al. 1991)⁶

Among these ten simple vowels, the six vowels of / i ε ə a u o / are shared by all the varieties, while the remaining four, / y ø e i /, may or may not show up depending on the specific variety. According to the report of a 1982 national dialect

investigation, for instance, in Kyongsang dialect spoken in Heilongjiang province, /e/ has merged with /ɛ/; /ø/ is still maintained in the Cholla form spoken in Jiaohe, Jilin province but not in the Hamgyeng form spoken in Hunchun, Jilin; the Kyongsang dialect spoken in Tailai area in Heilongjiang province lacks /ʉ/; and the Hamgyeng dialect spoken in Jidong, Heilongjiang no longer has /y/ though other places like Liuhe, Jilin still preserves it in the sound inventory.

In contrast to these forms, the picture presented by the standard Seoul Korean reveals systematic changes. The vowel system in modern Seoul Korean also has the same ten simple vowels (Lee and Ramsey 2000). However, this vowel system has been reported to be quite unstable and has been undergoing constant change, resulting in a much simpler, symmetrical 7-vowel- system:

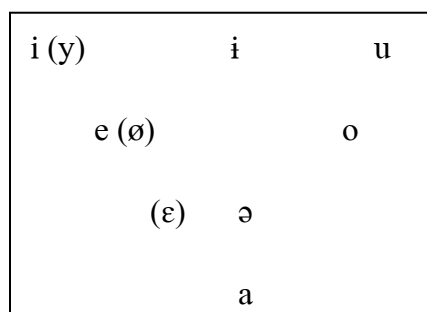


Figure 5.2 Current Seoul Korean simple vowel system

Segments in parenthesis are no longer present in this system: the front rounded

⁶ Korean scholars in China believe it is a segment between /i/ and /ʉ/ and often transcribe /i/ as /ʉ/.

vowels of /y/ and /ø/ have been diphthongized into /wi/ and /we/ respectively, and the two front un-rounded vowels of /e/ and /ɛ/ have merged (Kim-Renaud 1986, Hong 1991, Kang 1997).

To what extent the simple vowel system remains stable in Chinese Korean is still a pending issue that merits systematic study. As we see in figure 5.1, /y/ and /ø/ are the only two high front rounded vowels in Chinese Korean, presenting themselves as the candidates most vulnerable to a potential sound change towards a more balanced and less marked segment inventory. Thus, this chapter will focus on these two structurally important segments.

This chapter is organized as follows. Section 5.2 addresses the diphthongization of /ø/. Section 5.3 discusses the variation in the realization of /y/, including the phonetic variants of /y/, the results of the variable rule analysis, and a discussion on the results. This section is followed by a conclusion on this chapter in section 5.4.

5.2 Diphthongization of /ø/

Although the monophthong /ø/ is reported to have undergone diphthongization in contemporary Seoul Korean and in some other varieties, the current investigation of /ø/ supposes that the underlying phoneme is still the monophthong /ø/, based on the fact that it existed in modern Korean of early 20th century and still exists in at least some varieties of Chinese Korean in its broad sense (Quan et al. 1991).

For this study, nine words with embedded /ø/ were designed for different styles. These words were maximally diversified in terms of syllable structure and the segment immediately preceding the target variable. For all the three styles, sentence reading, wordlist reading and matching game, a total of 910 tokens was collected for the variable of /ø/.

To determine the phonetic realization of the underlying phoneme /ø/, the researcher both listened to all the tokens and examined the corresponding spectrograms. The following are spectrograms of one same word in three different styles of Wordlist Reading, Matching Game, and Sentence Reading from three subjects (aged 70, 45 and 23 respectively), each a representative of the three age groups, old, middle, and young.

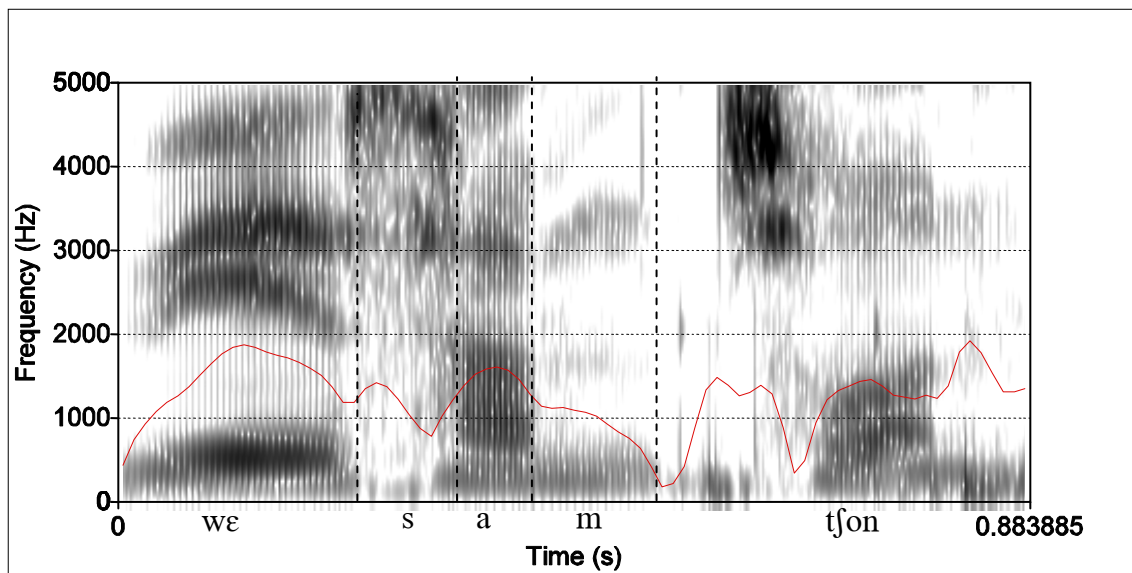


Figure 5.3 Spectrogram and intensity contour of /øsamtʃon/ 'uncle' of an old subject in Wordlist Reading style

For this old subject, the middle front rounded vowel /ø/ has been realized as a diphthong [wɛ] in wordlist reading style. From Figure 5.3 we see that the features presented at left most edge of the spectrogram reveals the presence of a glide [w]. First of all, we see the noticeable downward formant transitions, i.e. all the formants decrease in value, a reflex of what Pickett called a ‘lip-rounding’ phenomena: The more the rounding the more the constriction, and the more the formants are lowered (Pickett 1999:42). Indeed, [w] has been reported to lower the formants in such a way (Ladefoged 2001). Secondly, we notice the overall lack of energy for this leftmost part compared with the immediately following vowel. This state of relative weakness can be detected in both the spectrogram and the intensity contour that has been superimposed on the spectrogram: in the spectrogram the formants for this part are much lighter, and in the intensity contour it remains low until it rises to the energy peak in the following vowel part, both indicating a lack of equivalent energy as needed in producing a vowel. This is due to the constriction involved in the formation of [w]. Pickett argues that lip constriction in [w] causes lowered intensity of F1 and F2, and great reduction of the intensity of F3 and the higher formants (Pickett 1999:105). Also, semi-vowels such as [w] are expected to have strong energy below 600 Hz, but to show weaker mid-frequency energy (Pickett 1999:112), and this is exactly what we see in Figure 5.3: in spite of the overall lack of energy in this part, we still notice the relatively stronger energy, as indicated by the darker color in the lower formant sector (below 1000Hz) and the weaker energy in the higher frequencies as indicated in the lightening the formants.

Besides all these acoustic cues, listening to the word gives the impression of an unambiguous [wɛ], too.

Examination of the same word produced by this same old person in matching game style and sentence reading style reveals exactly the same features for the realization of /ø/, i.e. it is realized as a diphthong [wɛ] (see Figures 5.4 and 5.5).

The same general pattern was observed in the spectrograms of the same word produced by the middle aged subject and the young subject in three different styles as illustrated in Figures 5.6-5.11.

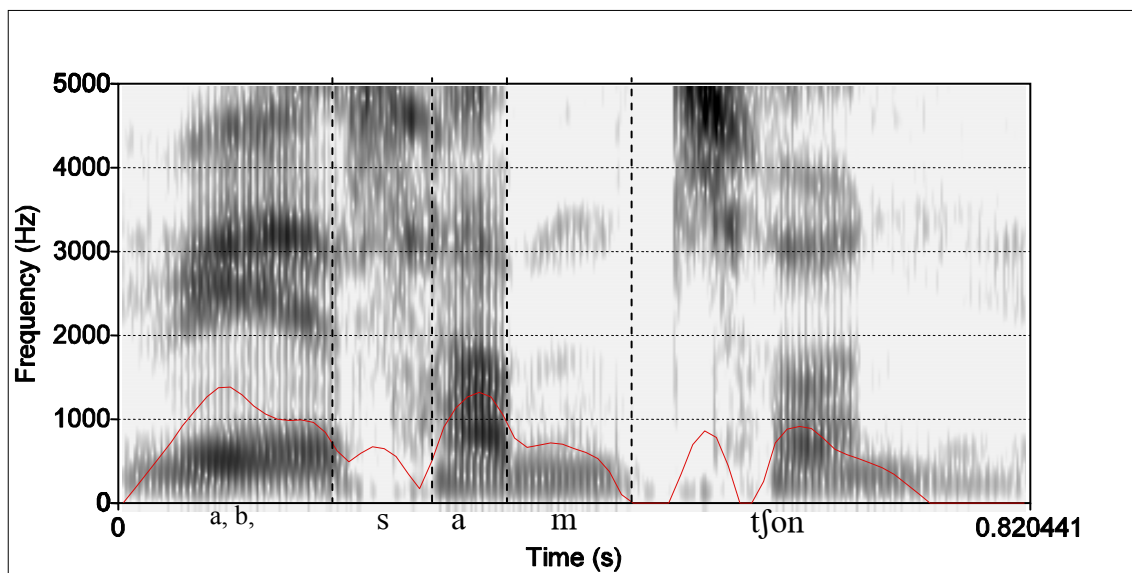


Figure 5.4 Spectrogram and intensity contour of /øsamʃon/ ‘uncle’ of an old subject in Matching Game style

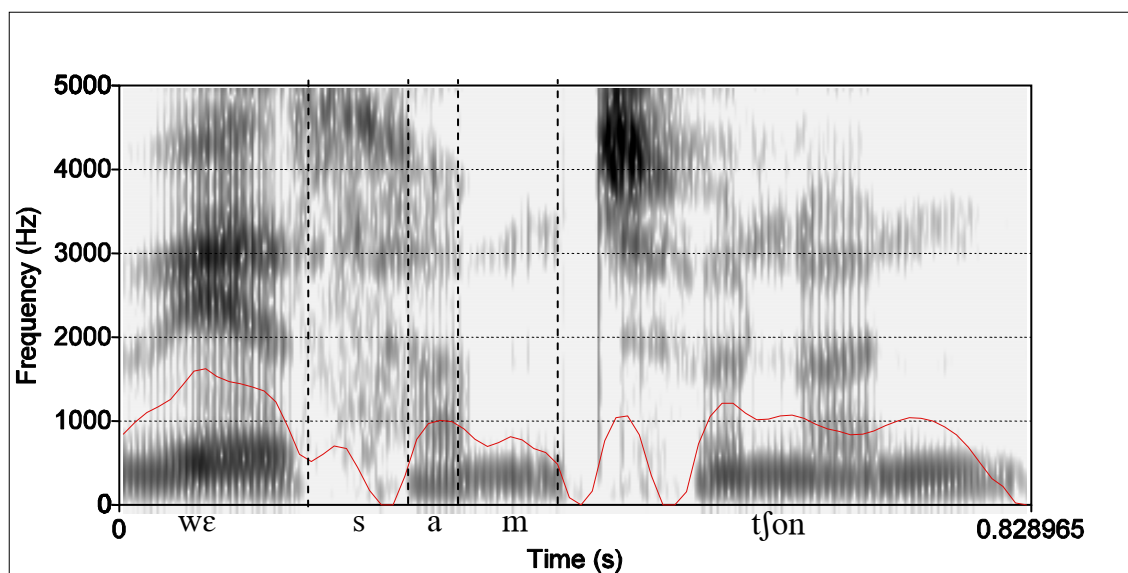


Figure 5.5 Spectrogram and intensity contour of /øsamtfon/ 'uncle' of an old subject in Sentence Reading style

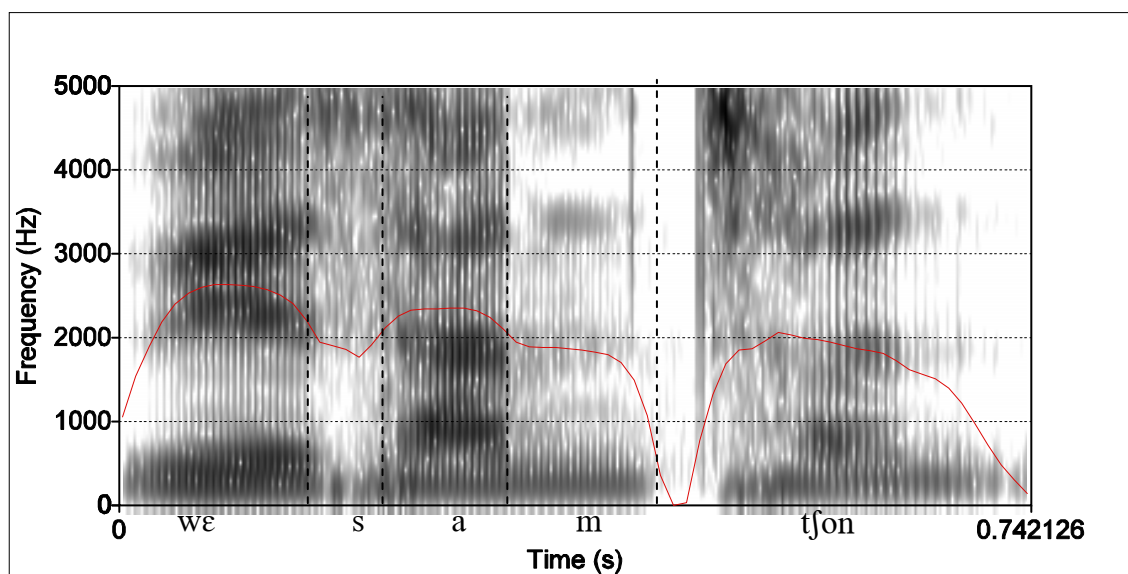


Figure 5.6 Spectrogram and intensity contour of /øsamtfon/ 'uncle' of a middle aged subject in Wordlist Reading style

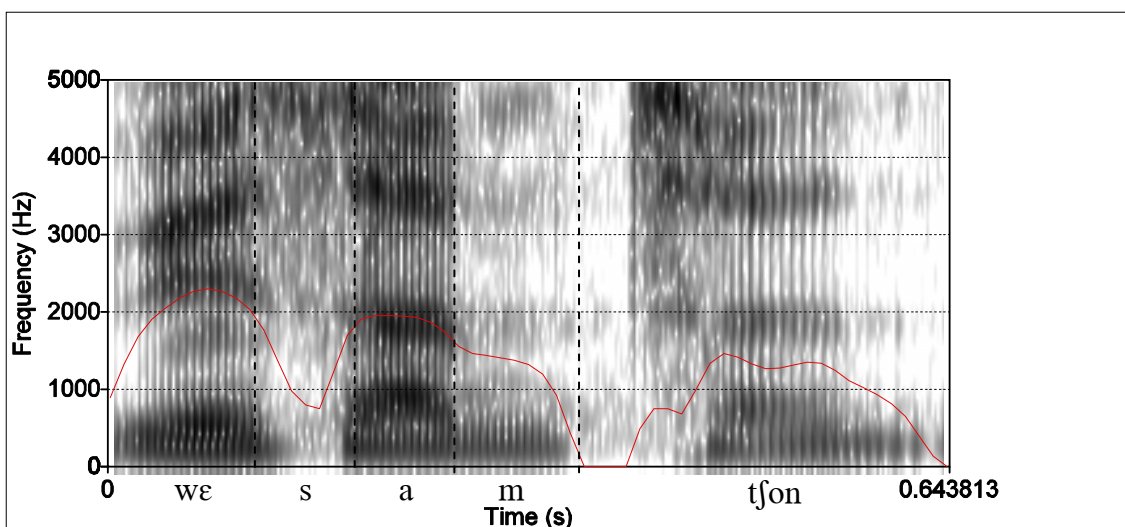


Figure 5.7 Spectrogram and intensity contour of /øsamtʃon/ 'uncle' of a middle aged subject in Matching Game style

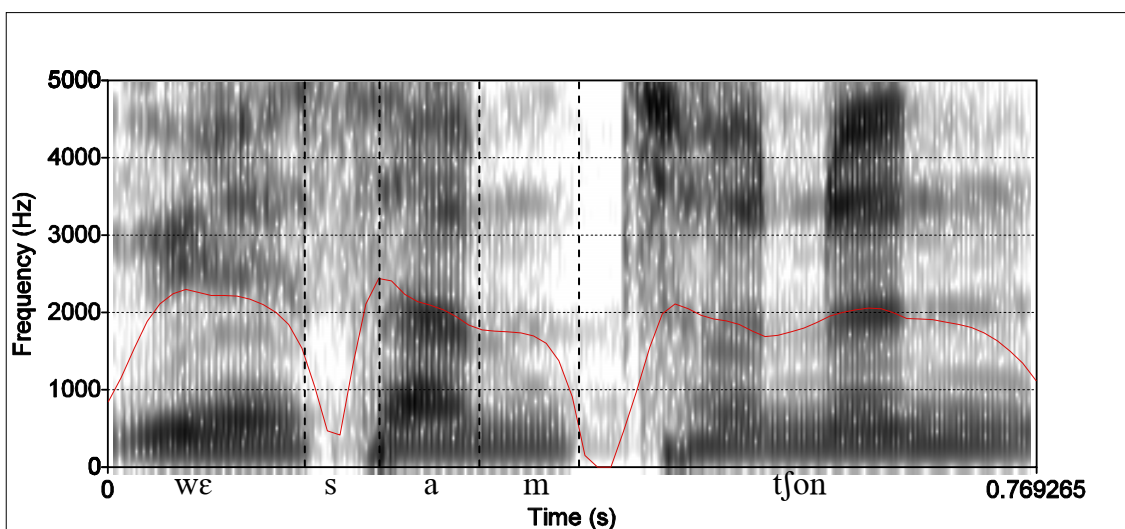


Figure 5.8 Spectrogram and intensity contour of /øsamtʃon/ 'uncle' of a middle aged subject in Sentence Reading style

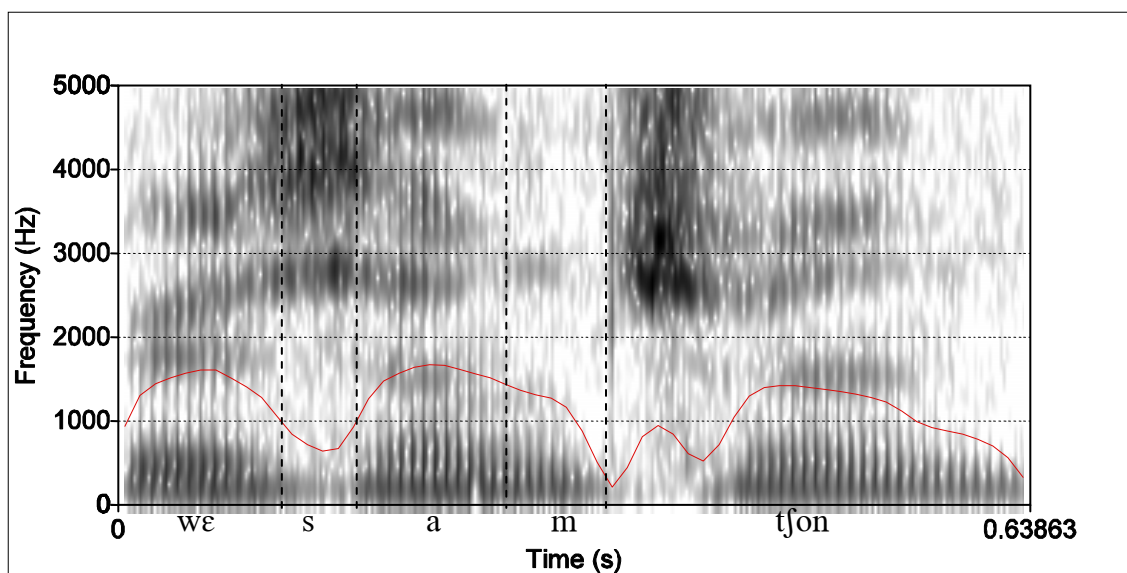


Figure 5.9 Spectrogram and intensity contour of /øsamɪʃən/ 'uncle' of a young subject in Wordlist Reading style

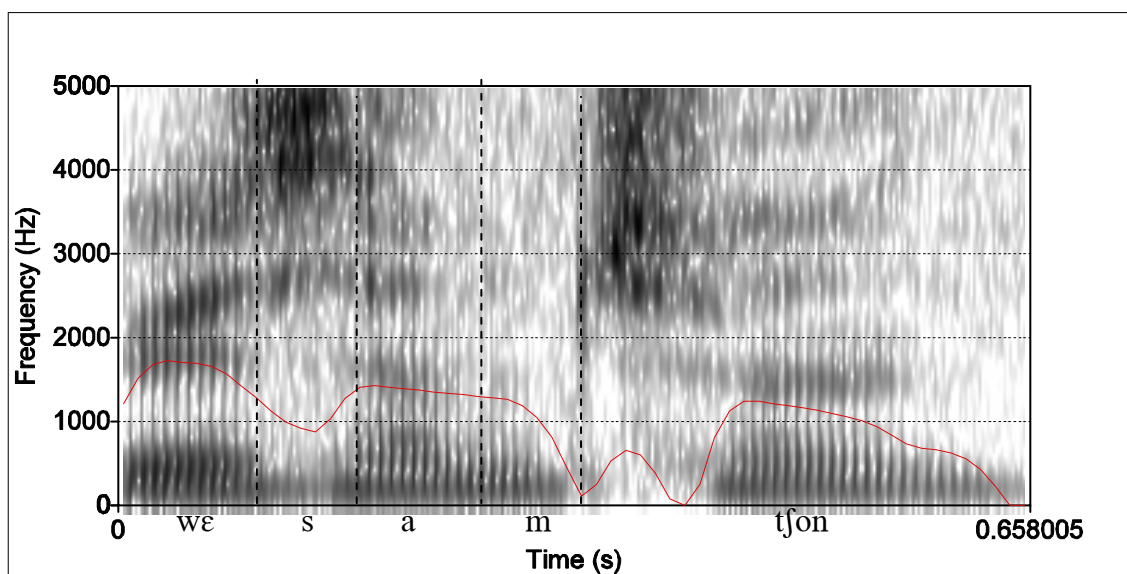


Figure 5.10 Spectrogram and intensity contour of /øsamɪʃən/ 'uncle' of a young subject in Matching Game style

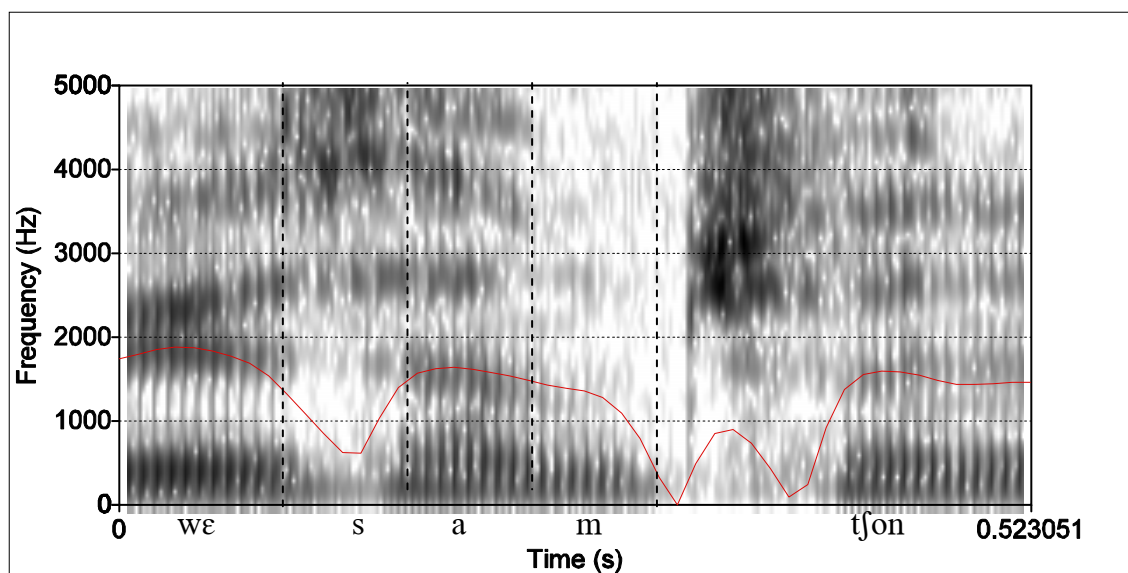


Figure 5.11 Spectrogram and intensity contour of /øsamtʃon/ ‘uncle’ of a young subject in Sentence Reading style

In each figure, one can observe a similar tendency of a lowering of the formants and a decrease in intensity. It is true that in some cases such as those produced by the young subject (especially Figure 5.11, sentence style), the extent of formant lowering may not be as great as those produced by the older speakers. This has to do with the speech rate of the subject. While the old subject and middle aged subject took over 0.8 second and 0.7 second respectively to utter the target word, the young subject produced the same word in about 0.5 second in sentence style; consequently the relative duration of [w] is much shorter in the utterance of the young subject than the older ones, which then affects lip movement in that fast speed will reduce the extent of lip-rounding. Recall that the ‘lip-rounding’ rule states that the more the rounding the more the constriction, the more the formants are lowered. Thus, understandably, less rounding

will lead to less constriction, which causes less lowered formants. In addition, due to this faster rate of speech, there is no pause between words in the young subject's sentence, as there is in those of the older subjects. Thus, the formant features of the final sound of the word immediately preceding the [wɛ] affects the formant movement of the following [w] in the young subject's sentence; this assimilation does not happen in the older subjects' sentences due to the presence of the receding pause, short as it may be.

In sum, the general pattern of diphthongization of [ø] into [wɛ] still holds true for the three subjects regardless of age and style. Indeed, examination of all the tokens of [ø] reveals that this mid front rounded vowel diphthongization holds true throughout the whole corpus, regardless of age, gender, social status, style, etc. Thus, we can confidently conclude that in current Chinese Korean, the former underlying mid front rounded vowel is no longer present in its simple vowel system, and it has completely undergone a sound change of diphthongization into [wɛ]. This splitting into [wɛ] maintains not only the roundness of /ø/ in [w] but also the frontness and height of /ø/ in [ɛ], while the markedness of /ø/ is dropped, confirming thereby the universal tendency of “marked to less marked” process in sound change.

The phonetic realization of the other historical front rounded vowel /y/, however, is far more complex.

5.3 Variation in the Realization of /y/

This section examines the other front rounded vowel in Chinese Korean, i.e. the high front rounded vowel /y/, which has been reported in contemporary Seoul Korean to have undergone diphthongization into [wi] (Kim-Renaud 1974, Kang 1997). Investigation of the status of this phoneme in Chinese Korean will shed light on the understanding of Korean language change and variation, and also language change in general. The arrangement of this section is as follows: section 5.3.1 examines the phonetic variants of the underlying phoneme /y/; section 5.3.2 presents variable rule analysis on this phoneme; and section 5.3.3 discusses the results, which is then followed by a summary in section 5.3.4.

5.3.1 Variants of /y/

As in the case of the historically-attested monophthong /ø/, the current study of the high front rounded segment is based on the assumption that the underlying phoneme is the monophthong /y/.

For this study, 23 words with embedded /y/ were designed for different speech styles. These words were maximally diversified in terms of syllable structure and the immediately preceding segment to the target variable. For the three styles of sentence reading, wordlist reading and matching game, a total of 1802 tokens were collected for the variable /y/.

To determine the phonetic realization of the underlying phoneme /y/, the researcher listened to all the tokens for impressionistic transcription and simultaneously examined the corresponding spectrograms for acoustic features. Recall that for each

token of the target vowel, F1, F2, and F3 were measured at early, mid, and late points, roughly at 20%, 50%, and 80% through the duration of the target vowel shown in the spectrogram. Across the spectrum of speech styles, a total of five different variants were detected for the underlying phoneme /y/: [y], [yi], [i], [u], and [wɛ]. The frequency of occurrence was different from one variant to another depending on the speaker and the style. In particular, the variant [wɛ] was extremely rare, and was therefore excluded from the analysis as a mispronunciation made by the speakers under certain specific situations. Thus, the following analysis will focus on only the first four phonetic variants of /y/: [y], [yi], [i] and [u].

Before we move on to the discussion of phonetic variants, one thing needs to be addressed first here, and that is, the understanding of the concepts of monophthong and diphthong. Monophthongs have been commonly understood as static segments. The exact nature and definition of diphthong, however, have long been a topic of controversy in the phonetic literature. Indeed, as Arlund (2006) put it, different definitions of diphthong form a continuum where two views serve as the endpoints and the rest stand in between. One endpoint is known as typical diphthong, composed of the first vowel position from which the glide starts, the glide, and the second vowel position at which the glide terminates (Kopp 1966). The other end point is the view that a diphthong is a vowel that continuously changes formant qualities in one syllable (Ladefoged 2001), i.e. it is a continuous movement. Those in-between positions cover the situations where one of the components of a typical diphthong is absent, say the glide, or the steady offset vowel (Bladon 1985, Solomon 1984, Weil 2001). Thus no

cross-linguistic agreement has been reached so far about the exact definition of diphthongs.

In recent years, however, the application of the prototype concept in the field of phonetics has provided new approach to the study of diphthongs (Arlund 2006, Sole 2003). Under the prototype model, a diphthong with the presence of all the three components of onset vowel, glide and offset vowel is considered as the ideal prototype diphthong, while all the rest with one or two missing components are regarded as various instantiations of ideal diphthongs in actual speech, thus solving the controversy that existed in previous approaches to the study of diphthongs.

Along a similar line, this study defines the prototypical diphthongs as vowels that exhibit three components of onset vowel, glide and offset vowel with the understanding that in some instantiations certain part(s) of the prototype diphthong may be missing. Also, this study assumes that a prototypical monophthong should be reasonably static in contrast to the dynamic nature of diphthongs.

Under these general guidelines, the researcher examined all the tokens and categorized each of the tokens into four phonetic variants in Chinese Korean.

First of all, in a substantial number of cases (over 80%), the underlying form /y/ was faithfully represented in its phonetic realization, i.e. /y/ was realized as [y], as shown in Figure 5.12. Strikingly, what we see in this figure are four paralleling straight lines representing the first four formant trajectories, already telling us that this is a monophthong as it confirms the traditional understanding of a monophthong as a static segment starting and ending with the same acoustic structure.

Indeed, acoustic measurements of the first three formants at 20%, 50% and 80% of the vowel's durational span confirm what we see directly: F1, F2 and F3 at the three points are all around 250 Hz, 2150 Hz and 2570 Hz respectively. The two values of F1 and F2 suggest that this is a high front vowel, which means it could be either [i] or [y]. The principal difference between [i] and [y] is in the frequency of F3, which is distinctly lower for [y] (Ladefoged 2001:177). Recall that lip rounding lowers the frequencies of all three formants. For high vowels, F1 is already low and F2 is not much affected. F3, however, is very much affected by the position of the lips. The lengthening of the vocal tract through lip rounding noticeably lowers F3. In this spectrogram, the closeness of F3 value to that of F2 indicates this is a [y]. Listening to the segment gave an unambiguous impression of [y] sound.

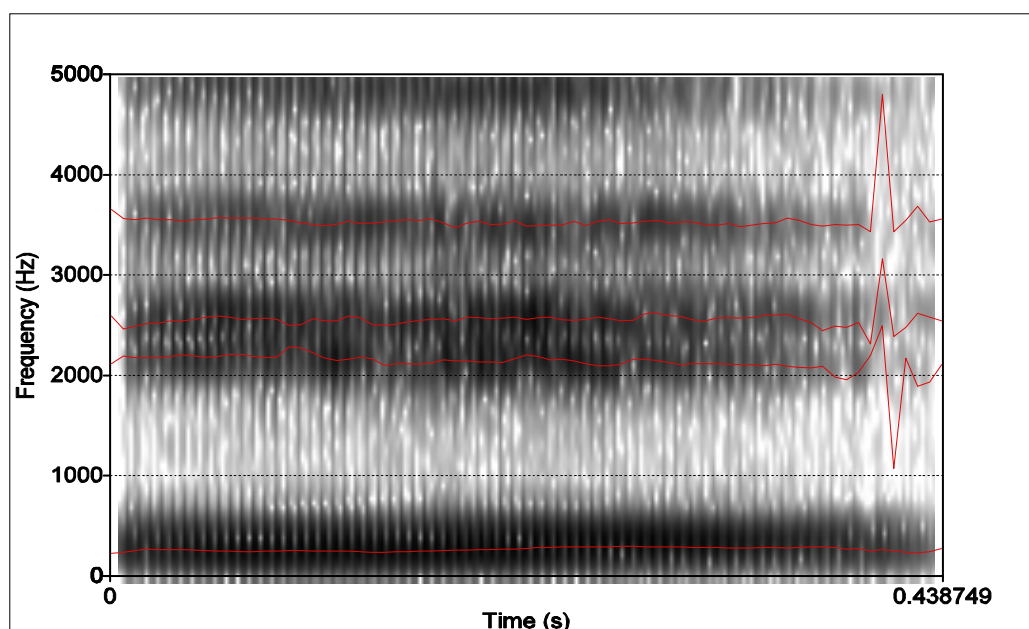


Figure 5.12 Spectrogram of /y/ 'stomach' realized as [y]

A second phonetic variant of /y/ found in the data was a diphthong [yi]. Recall that a prototype diphthong defined in this study includes all the three parts of onset vowel, glide and offset vowel, and actual instantiations of a prototype diphthong may or may not be manifested in all the three components depending on each specific case. Cases of the diphthong [yi] in the data proved the validity of this understanding.

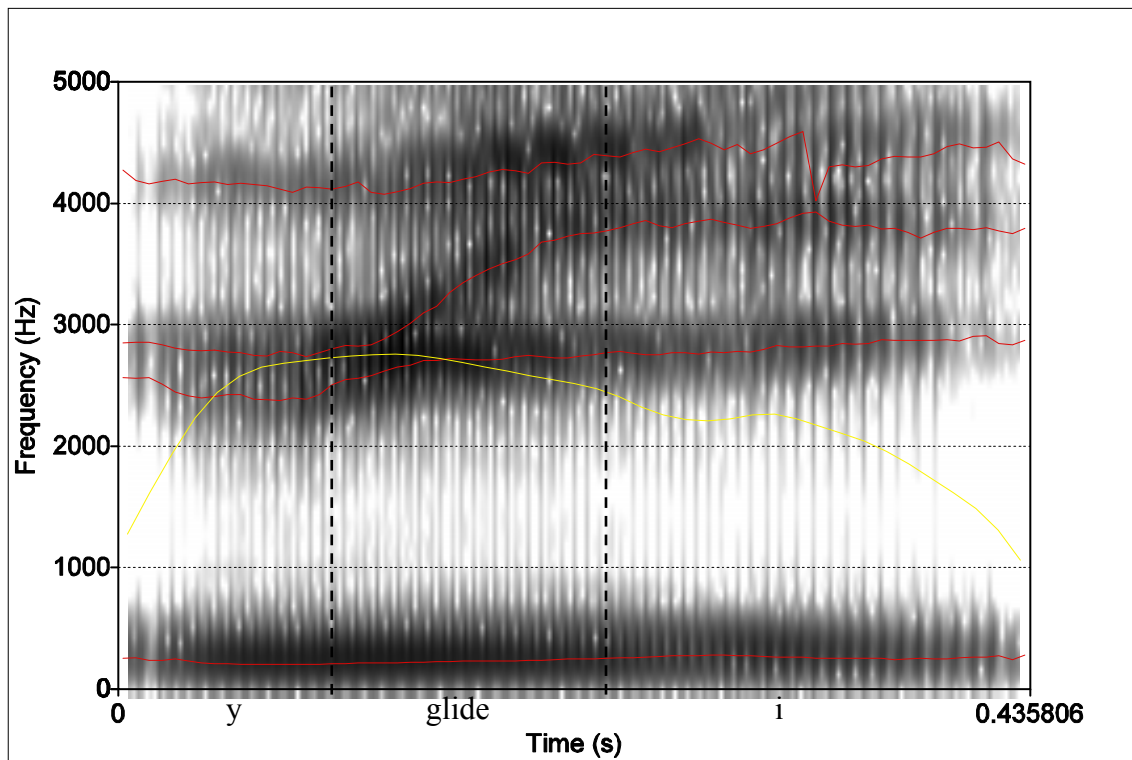


Figure 5.13 Spectrogram of /y/ ‘stomach’ realized as prototypical [yi] with onset vowel, glide and offset vowel

In Figure 5.13, we see an instance where underlying /y/ realizes as a prototypical diphthong [yi]. As indicated by the dashed lines, it starts at the left as a steady vowel [y], moves along the glide section, and then reaches another steady vowel

[i]. The formant trajectory lines imposed on the spectrogram show the dynamic nature of the sound as a diphthong. As the sound moves from the onset vowel to the offset vowel, F1 remains stable around 250Hz, and F2 is raised a little bit by about 500Hz at 80% point (2248Hz at 20% point). However, F3 is raised substantially by as much as 1031Hz at 80% point (2815Hz at 20% point), verifying that this is a lip-unrounding movement from one high vowel to another high vowel, i.e. this is diphthong [yi].

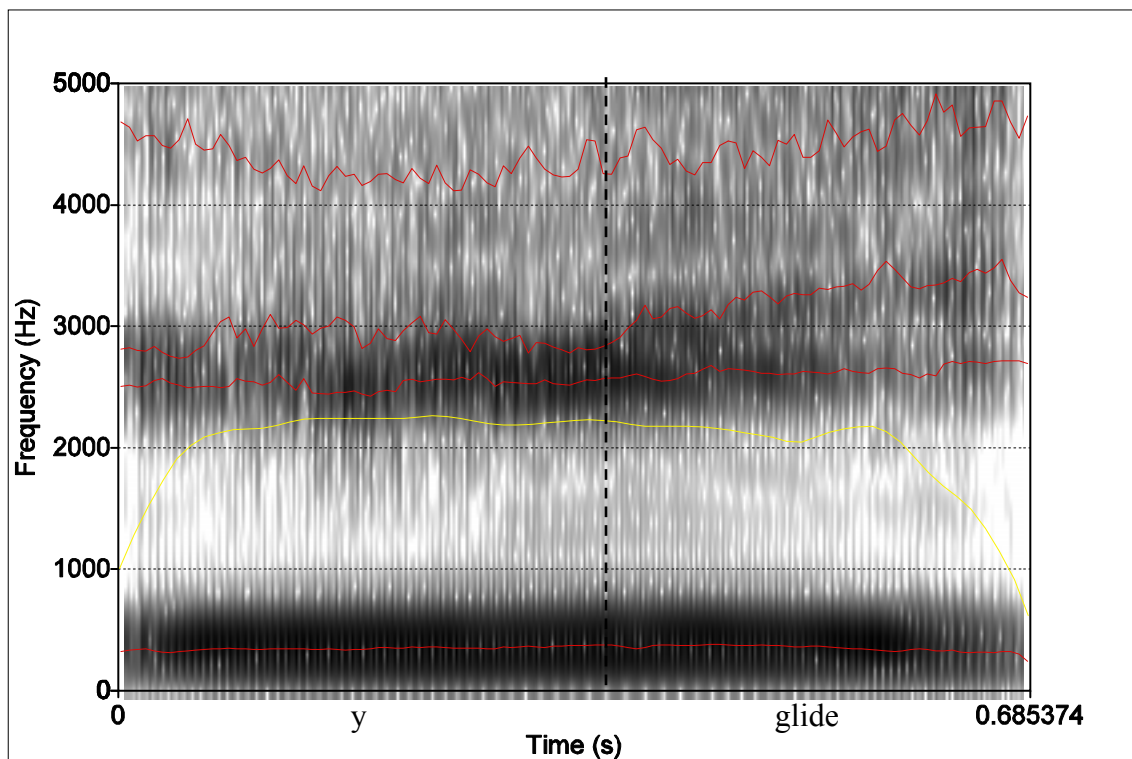


Figure 5.14 Spectrogram of /y/ ‘stomach’ realized as non-prototypical [yi] with only onset vowel and glide

Figure 5.14 presents a non-prototypical instantiation of [yi] where only the steady onset vowel and the glide parts are present with no steady part of an offset

vowel. As indicated by the dashed line that splits the spectrogram in half, the onset vowel and the glide each takes up about half of the whole duration of the diphthong. Comparison of the formant trajectories of the two parts tells us that the major difference between them lies in F3, with F1 and F2 remaining relatively stable. Formant measurements at the three points show that F1 remains around 340Hz and F2 remains around 2515Hz, indicating again a high front vowel. The frequency of F3 at the 20% point is 2861Hz, which remains at about the same level, 2850Hz, at the 50% point and then rises to 3308Hz at the 80% point. F2 and F3 are almost parallel in the first half of the spectrogram, but in the second half F3 rises substantially, while F2 remains more or less unchanged. Once again, the same kind of lip-unrounding movement as described above is involved here. The dynamic movement of the sound as indicated by the formant values and the vectors over time reveals that this is a diphthong [yi], though the final steady state component of a prototypical diphthong is absent. Such a missing final steady state is also reported in other languages. In a study of Maithili, for example, Jha (1985) noted that diphthongs produced at moderate speed, and especially those at rapid speed, often fail to reach and maintain the final steady state. Nonetheless, they are still diphthongs.

Figure 5.15 presents a different kind of non-prototypical instantiation of [yi] where the first onset vowel is absent and only the glide and offset vowel are present. As indicated by the dashed line that splits the spectrogram in half, the glide and the offset vowel again each takes up half of the entire duration of the diphthong. As we see from the formant trajectories of the two parts, the only difference between them lies in F3,

with the other two formants remaining stable. Formant measurements at the three points show that F1 remains around 280Hz and F2 remains around 2154Hz, indicating again a high front vowel. The frequency value of F3 at the 20% point is 2680Hz, which keeps rising to 3101Hz at the 50% point and then maintains this similar level (3162Hz) at the 80% point. We see that once the rising F3 reaches the frequency value of the target vowel, in this case [i], it remains stable as the other formants do, thus exhibiting a glide part followed by a steady offset vowel part, but not an initial steady vowel. Such a lack

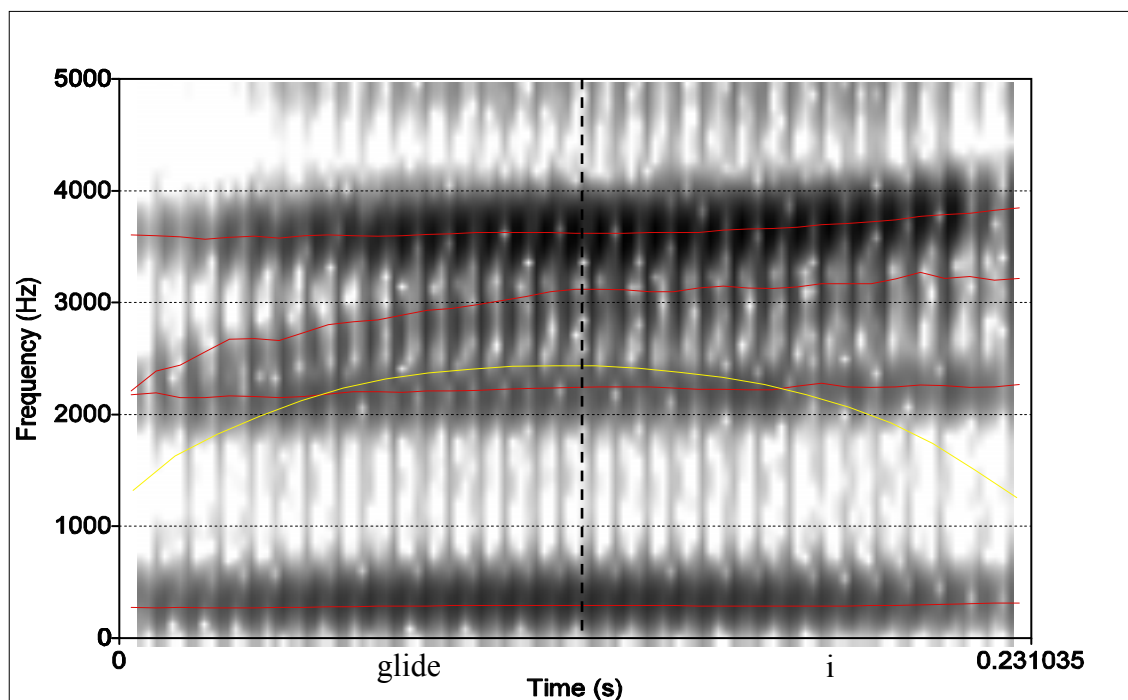


Figure 5.15 Spectrogram of /y/ ‘stomach’ realized as non-prototypical [yi] with only glide and offset vowel

of initial steady state for a diphthong is also commonly encountered. For instance, in the study of Italian diphthongs, Salza (1988) reported an instance of a diphthong where the

formants showed continuous movement and settled into a steady state, but similar steady state was absent from the first part of the diphthong. As in our case, these are non-prototypical instantiation of a diphthong.

Figure 5.16 presents yet a third kind of non-prototypical realization of the diphthong [yi].

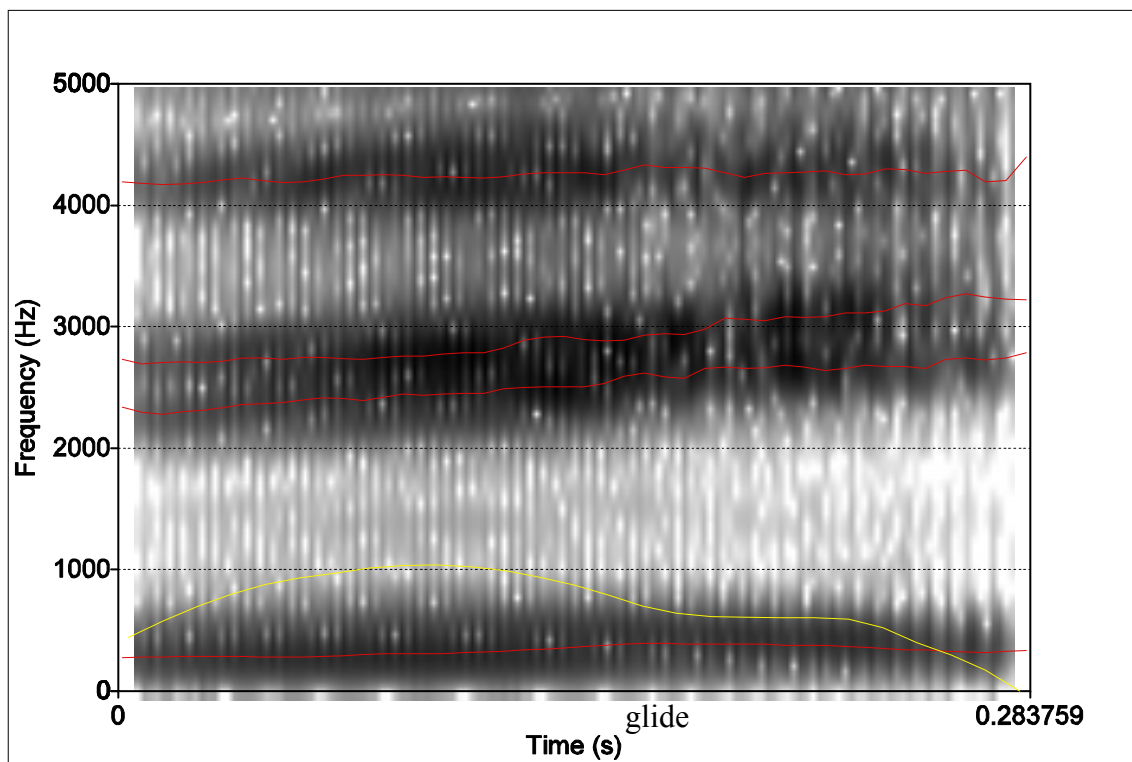


Figure 5.16 Spectrogram of /y/ ‘stomach’ realized as non-prototypical [yi] with only the glide

In this case, no steady state phase is present at all: All we see is movement, indicated by the dynamically changing formant trajectories of F2 and F3. If we consider the whole movement period as corresponding to the glide part of the diphthong that

connects the two steady vowels, this then would mean that a diphthong can also be realized as just a transitional glide. Formant measurements at the three points, of course, document a dynamic movement nature for this diphthong. F1 remains around 340Hz, indicating its status as a high vowel throughout the whole segment duration. F2 is 2366Hz at the 20% point, which then continuously rises to 2505Hz at the 50% point and 2675Hz at the 80% point. Paralleling to F2, F3 is 2741Hz at 20% and rises to 2917Hz at 50%, reaching 3127Hz at 80%.

The four figures of the diphthong [yi] illustrated above reveal that this segment may exhibit different realizations in Chinese Korean: in prototypical instantiation, all the three parts, onset steady state vowel, transitional glide and offset steady state vowel are present; in non-prototypical instantiations, one or both part of the steady state vowel can be absent. What appears to matter then is the overall dynamic movement in the duration of the segment.

Jha 1985 suggested that the missing static components result from the speech rate artifacts. Diphthongs produced at moderate and rapid speed often fail to reach the second steady state, while those produced at slow speed exhibit all three parts. In the Korean case, one might notice that two of the non-prototypical realizations in Figure 5.15 with 231ms and Figure 5.16 with 283ms show more rapid articulation than the prototypical realization in Figure 5.13 of 436ms, making it more likely for the former to lack certain part(s). However, the one in Figure 5.14 with 685ms is slower than the prototypical one in Figure 5.13, but still fails to reach the steady offset phase; thus, it seems that speech rate may not function identically across the subjects. This suggests

that the difference in which part to be absent may be language specific, or even speaker specific (within the same language), which may not be generalized across languages or speakers.

A third phonetic variant of /y/ found in the data was the monophthong [i].

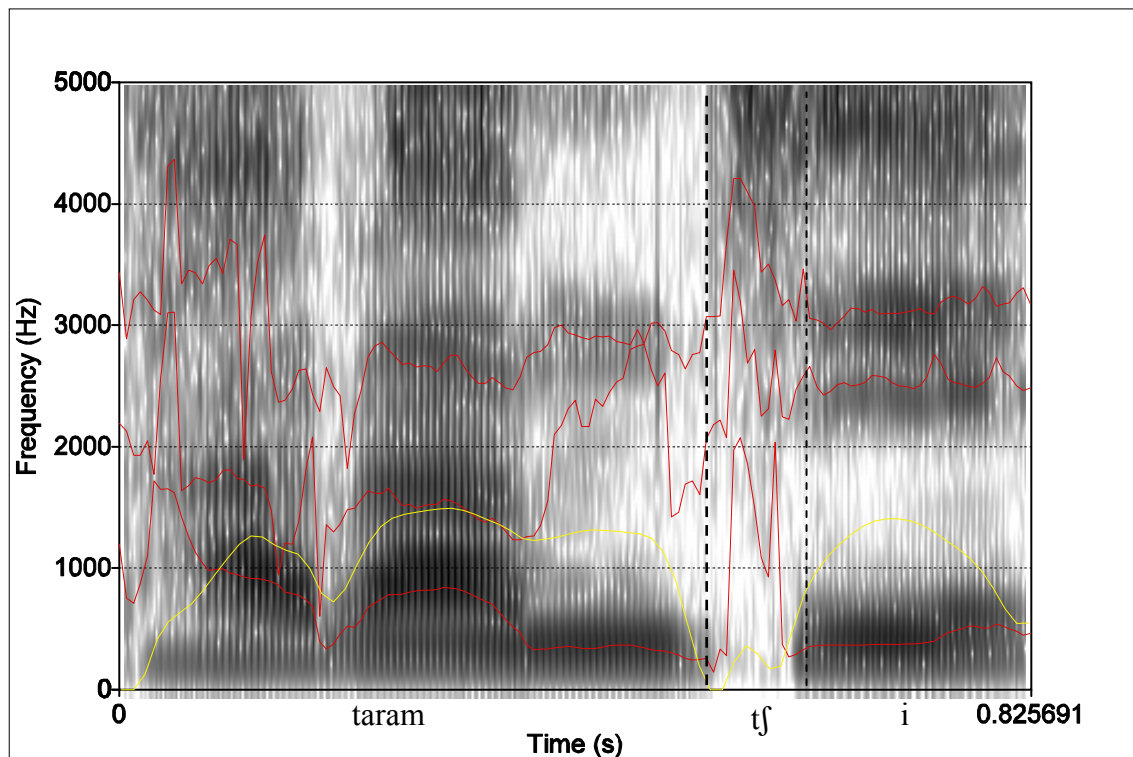


Figure 5.17 Spectrogram of /y/ in /taramtʃy/‘squirrel’ realized as [i]

Figure 5.17 presents a sample case where the underlying phoneme /y/ realizes as unrounded high front vowel [i]. In the right most part of the spectrogram labeled as [i], we see that the first three formants are basically three parallel bands. Formant measurements show that F1, F2 and F3 remain around 395Hz, 2380Hz and 3020Hz

respectively, indicating a phonetic [i]. Auditory impressions confirm the same unambiguously.

The last phonetic variant of /y/ observed in the data is a high back rounded vowel [u] as illustrated in the following Figure 5.18.

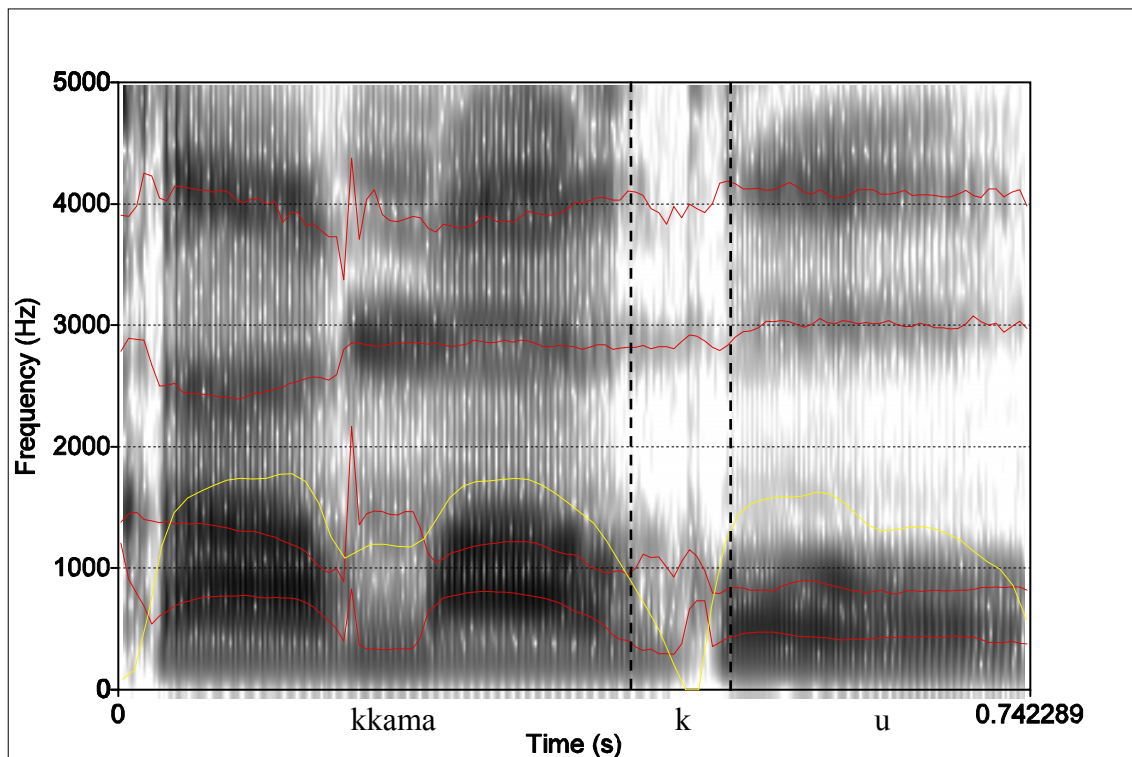


Figure 5.18 Spectrogram of /y/ in /kkamaky/ ‘crow’ realized as [u]

In the rightmost part of the spectrogram labeled as [u], we see again the parallel level formant bands that represent the formant trajectories, suggesting this is a monophthong. Formant measurement at the three points shows that F1, F2, and F3

remain steady around 419Hz, 808Hz and 3016Hz respectively, indicating this is a high back rounded vowel, [u]. Auditory impressions confirm the acoustic values.

In summary, as illustrated in this section, the Chinese Korean high front rounded vowel /y/ manifested four different phonetic variants in this study: a diphthong [yi] and three monophthongs, [y], [i] and [u].

5.3.2 Distribution of the Four Variants

This section discusses variation in the distribution of the four variants of /y/ in the collected data. First we will look at the general distribution of the four variants regardless of age, gender, socioeconomic status and style differences, and then in terms of each external factor, and finally each variant under the matrix of two external factors.

5.3.2.1 Overall Distribution of the Four Variants

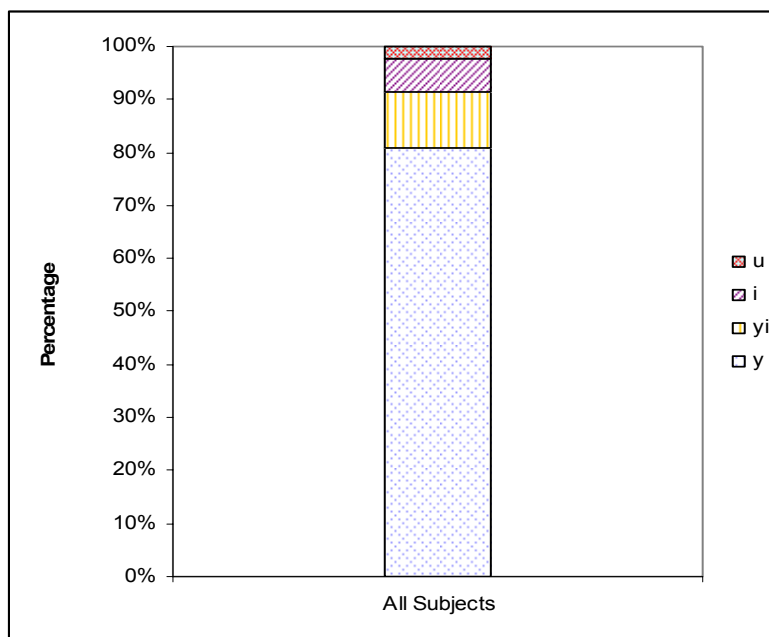


Figure 5.19 Overall distribution of [y], [yi], [i] and [u]

From Figure 5.19, we see that among the four variants, the variant [y] represents the dominant variant making up 80.73% of the tokens produced by all the subjects regardless of age, gender, socioeconomic status and style differences; while the other three variants took up less than 20%, among which the diphthong variant [yi] (10.78%) was relatively more frequent than [i] (6.27%), which, in turn, was more frequent than [u] (2.22%).

5.3.2.2 Distribution of the Four Variants by External Factor

To further detect their distributional patterns, the four variants were examined as functions of each external factor. As illustrated in the following figures, these variants exhibited different variation tendencies along the different factors.

Table 5.1 Percentage of each variant by subject's age

Age	Old	Middle	Young
y	75.97	80.03	93.54
yi	13.06	11.48	3.80
i	8.87	5.32	2.28
u	2.10	3.16	0.38

Figure 5.20 tells us that the overall distributional pattern of the variants observed in Figure 5.19 holds true when different age cohorts are taken into consideration. In addition, we see that while the percentage of [y] increased in younger subjects, the

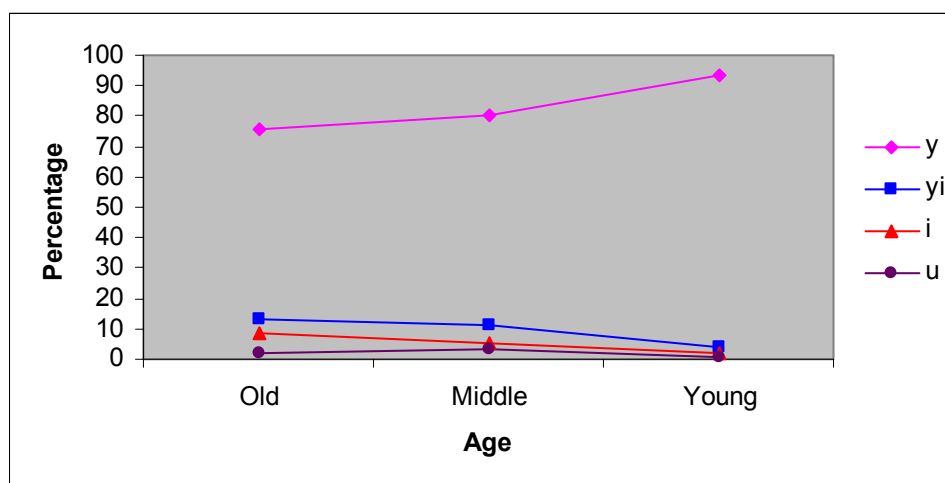


Figure 5.20 Variation in distribution of [y], [yi], [i] and [u] by Age

percentages of the other three variants decreased along the same dimension, forming an opposite distribution pattern to that of the former. One-Way ANOVA revealed that middle-aged subjects produced significantly higher percentage of [u] than younger subjects ($p=0.027$). Although no significant difference was found between the age groups for the rest of the variants, the opposite distribution pattern between variant [y] and the rest was clear. The tendencies presented in the two figures of 5.19 and 5.20 suggest that the monophthong variant [y] is dominant among the four phonetic variants of /y/ and is, in fact, increasing. Although the diphthong variant [yi] was the second most frequent variant, the diphthongization change of the underlying phoneme /y/ reported in Seoul Korean is not a strong tendency in Chinese Korean, suggesting that phonological /y/ will remain as a monophthong in the Chinese Korean phoneme system.

Table 5.2 Percentage of each variant by subject's gender

Gender	Male	Female
y	86.48	75.45
yi	6.34	14.86
i	5.21	7.24
u	1.97	2.45

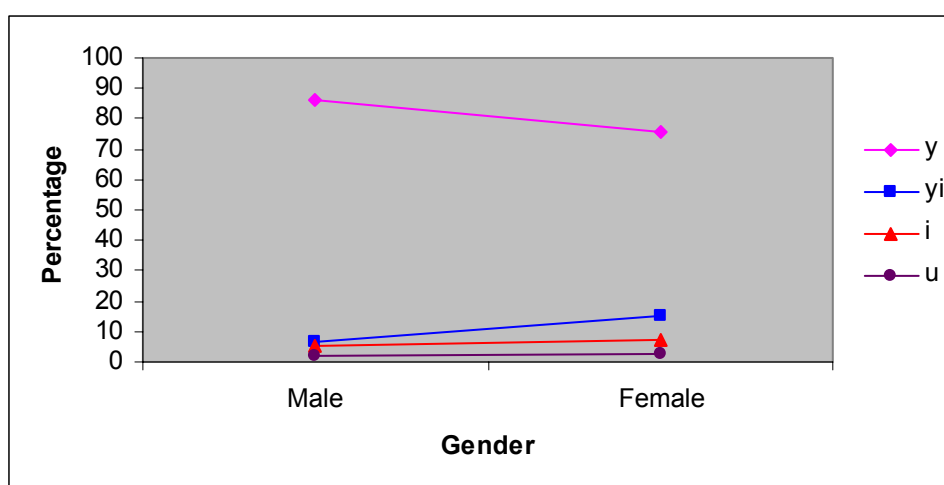


Figure 5.21 Variation in distribution of [y], [yi], [i] and [u] by Gender

Figure 5.21 presents the distribution patterns of the four variants along the dimension of gender. One-Sample t-tests detected no significant difference between the two gender groups on all the variants. However, we can see the some tendencies, especially between the variants [y] and [yi] that women produce lower percentage of [y] but higher percentage of [yi] than men.

Table 5.3 Percentage of each variant by subject's socioeconomic status

Class	High	Middle	Low
y	75.77	82.11	83.37
yi	18.29	8.95	6.49
i	5.94	7.54	5.07
u	0.00	1.40	5.07

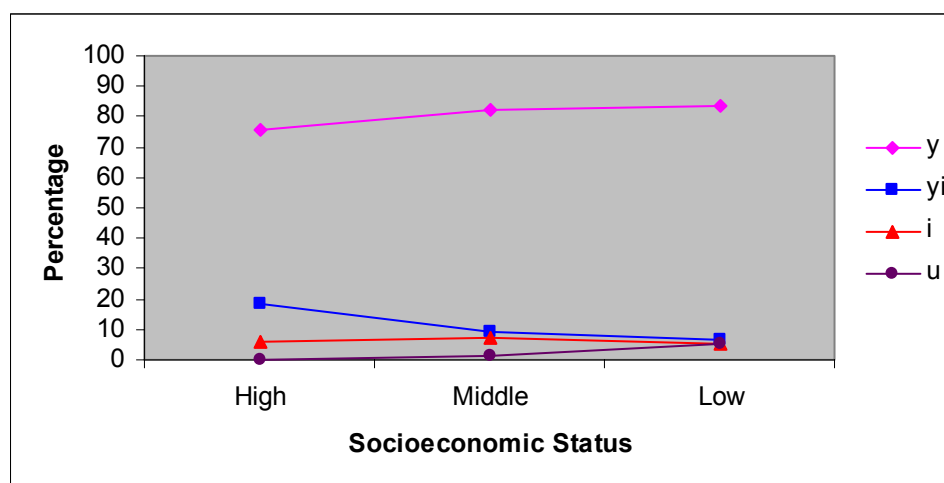


Figure 5.22 Variation in distribution of [y], [yi], [i] and [u] by Socioeconomic Status

Figure 5.22 presents the distribution patterns of the four variants along the dimension of socioeconomic status. For each of the variant, although there was no statistically significant difference between the three socioeconomic status groups, we can see different tendencies, especially those of diphthong [yi] and monophthong [u]: the lower the subject's socioeconomic status was, the lower was the frequency of [yi], which formed a contrast with [u] pattern where the lower the subject's socioeconomic status was, the higher was the frequency of [u].

Style	Wordlist	Sentence	Game
y	82.34	85.74	73.77
yi	15.61	0.00	16.20
i	1.67	13.42	4.26
u	0.37	0.84	5.76

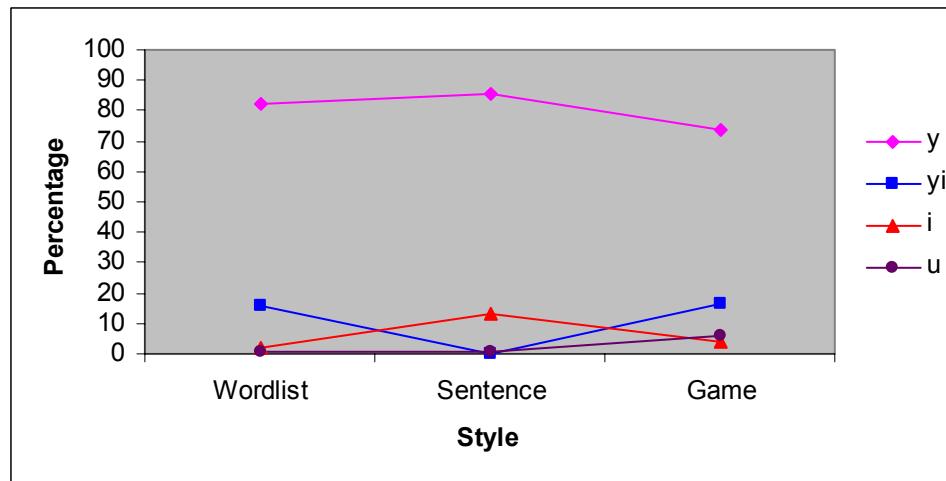


Figure 5.23 Variation in distribution of [y], [yi], [i] and [u] by Style

Figure 5.23 presents the distribution patterns of the four variants along the dimension of style. For the variant [y], although in the casual game style the percentage was a bit lower, no significant difference was found in its distribution among the three styles. The percentage of the diphthong variant [yi] in sentence style, however, tended to be lower than those in wordlist style ($p=0.088$) and game style ($p=0.093$), exhibiting a convex pattern, which formed a contrast with the concave shape exhibited by the distribution of the variant [i], where its percentage in sentence style was significantly higher than that in wordlist style ($p=0.035$), and tended to be higher than that in game

style ($p=0.079$). For the variant [u], its percentage in the casual game style tended to be higher than those in more formal wordlist style ($p=0.08$) and sentence style ($p=0.108$). Thus, while the variant [y] constituted an exception with no significant difference among the three styles, the rest three variants of [yi], [i] and [u] showed stratification in style.

5.3.2.3 Distribution of Each Variant by Two Dimensions of External Factors

In this section, each variant was examined in terms of two dimensions of external factors. First, each variant was studied by Age*Style and Age*Gender (Age*Class was omitted due to the absence of young subjects of high socioeconomic status); then by Style*Gender and Style*Class; and finally by Gender*Class.

Figures 5.24-5.27 illustrate the distribution of each variant by Age*Style. One common phenomena shared by all the four variants was that style stratification occurred more frequently among the old subjects than among the middle aged subjects, and young subjects exhibited no stratification in style at all for all the variants. More specifically, the variant [y] tended to show stratification in style only among the old subjects: One Way ANOVA analysis revealed that [y] percentage in sentence tended to be higher than in game style ($p=0.078$). The variant [yi] showed style stratification among old subjects with significantly lower percentage in sentence style than in both game ($p=0.009$) and wordlist ($p=0.041$) styles. While young subjects showed no style stratification at all forming a contrast to the old group, middle aged group stood in between with [yi] in sentence style tending to be lower than in both of the other two styles. The variant [i] showed clear style stratification among old subjects with

significantly higher percentage in sentence style than in both game ($p=0.035$) and wordlist ($p=0.006$) styles. The middle aged group showed significantly higher percentage in sentence style than in wordlist style ($p=0.007$) and a similar tendency in comparison to game style ($p=0.077$). And this variant was the only case where young subjects manifested a tendency of difference between sentence style and the other two styles ($p=0.063$). In fact, among the four variants, [i] was the one that showed the greatest extent of style stratification. The variant of [u] showed style stratification among old subjects with significantly higher percentage in game style than in both of the other two styles ($p=0.002$). Once again, young subjects showed no style stratification at all, forming a contrast to the old group, and middle aged group stood in between with [u] in game style tended to be lower than in wordlist style ($p=0.092$).

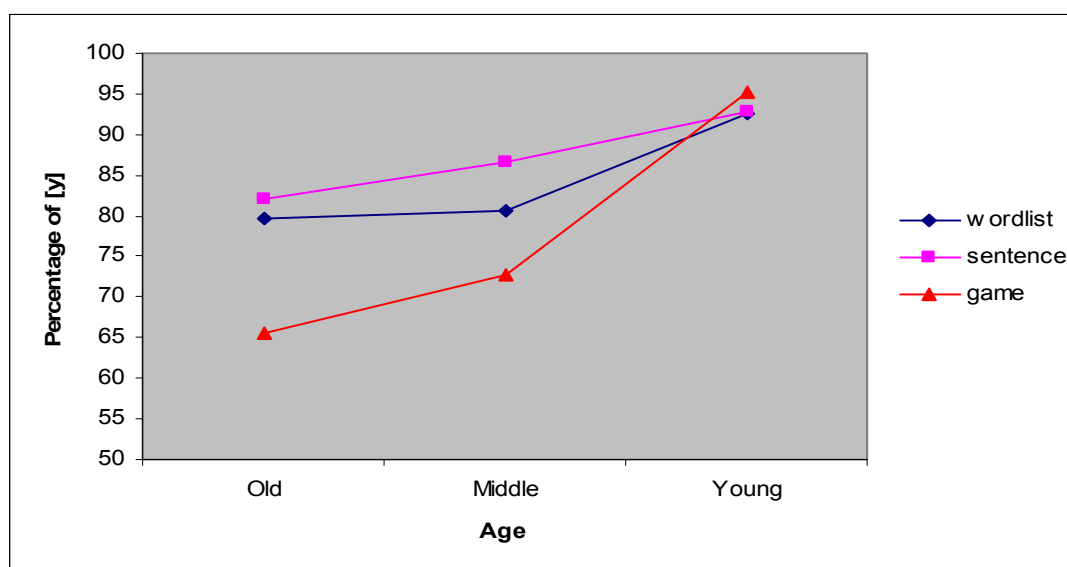


Figure 5.24 Distribution of [y] by Age*Style

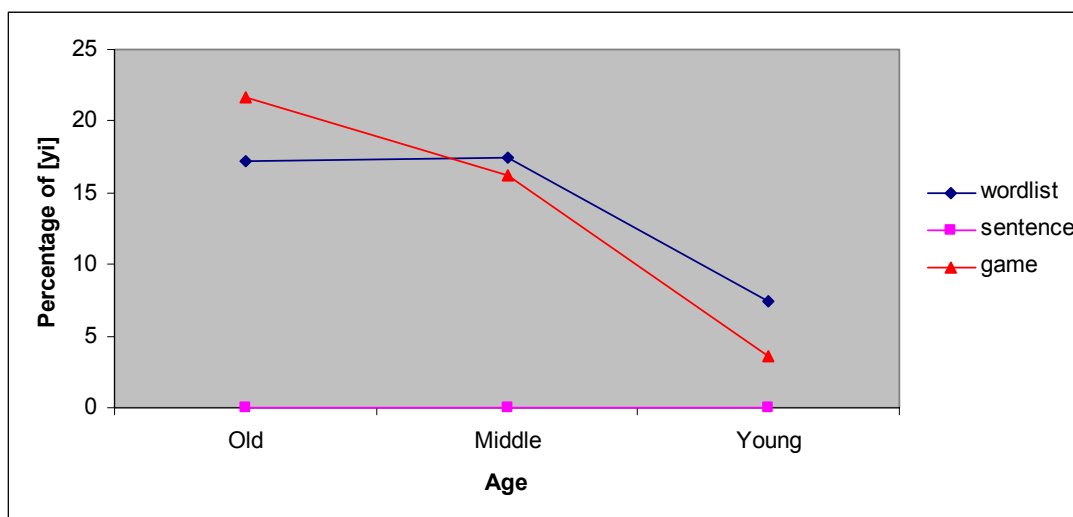


Figure 5.25 Distribution of [yi] by Age*Style⁷

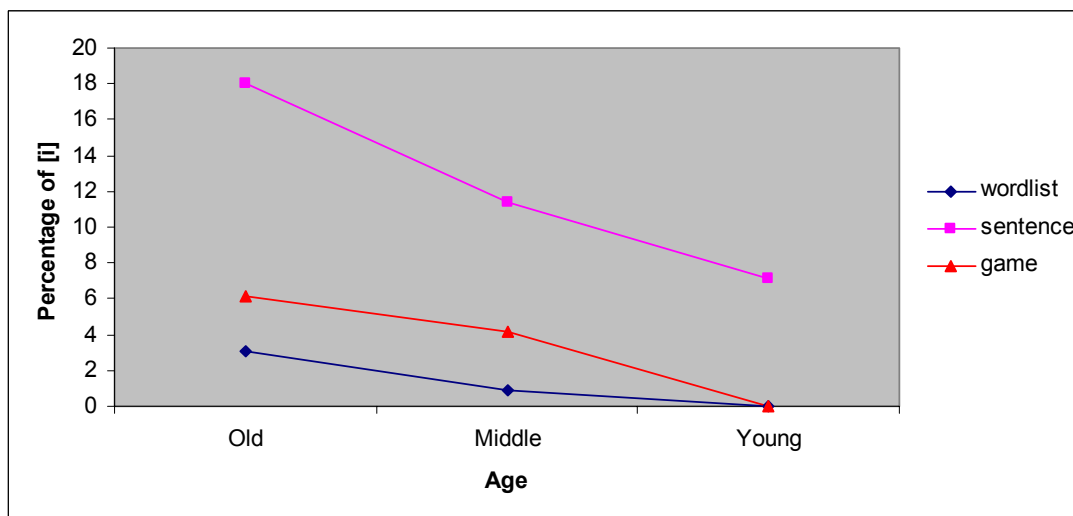


Figure 5.26 Distribution of [i] by Age*Style

⁷ Please notice the difference in scale in Y axis for variants [yi], [i] and [u].

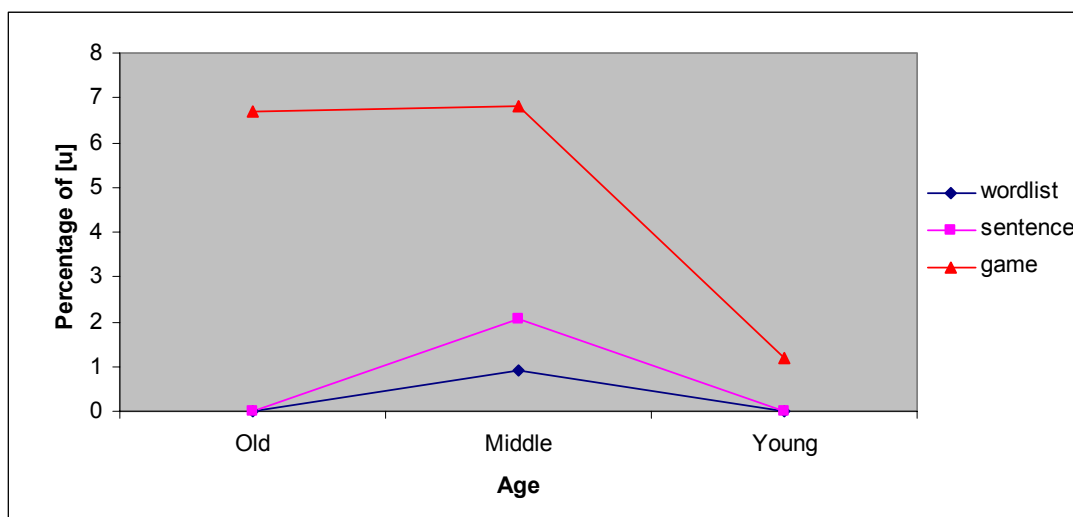


Figure 5.27 Distribution of [u] by Age*Style

Figures 5.28-5.31 illustrate the distribution of each variant by Age*Gender. One noticeable feature presented in these figures was that for all the three variants of [y], [yi], and [i], young subjects manifested a reversed gender pattern to those of the old and middle aged groups: when the females in the older groups showed higher (lower) percentage of the variant than their male counterparts, the females in the young group would show lower (higher) percentage than male subjects. Independent-Samples t-tests revealed, however, that within the young subject group, when equal variances were assumed, female young subjects showed significantly higher percentage of [y] ($p=0.044$) and significantly lower percentage of [yi] use ($p=0.007$) than male young subjects, but when equal variances were not assumed, no significant difference was found. This complicated nature of the young group in contrast to the older groups where no similar problems were encountered suggested that whether the reversed gender

pattern is truly an age issue and not relevant to the limited number of young subjects remains to be confirmed by future study that includes more young subjects than the current one. For now, we will just generalize where possible.

For the old group, we found gender stratification in variants [y] and [yi]: male speakers used significantly higher percentage of [y] ($p=0.008$) and lower percentage of [yi] ($p=0.057$) than female subjects. No significant gender difference was detected in the middle aged group. Also, for both variants of [i] and [u], no significant gender difference was found for any of the age groups.

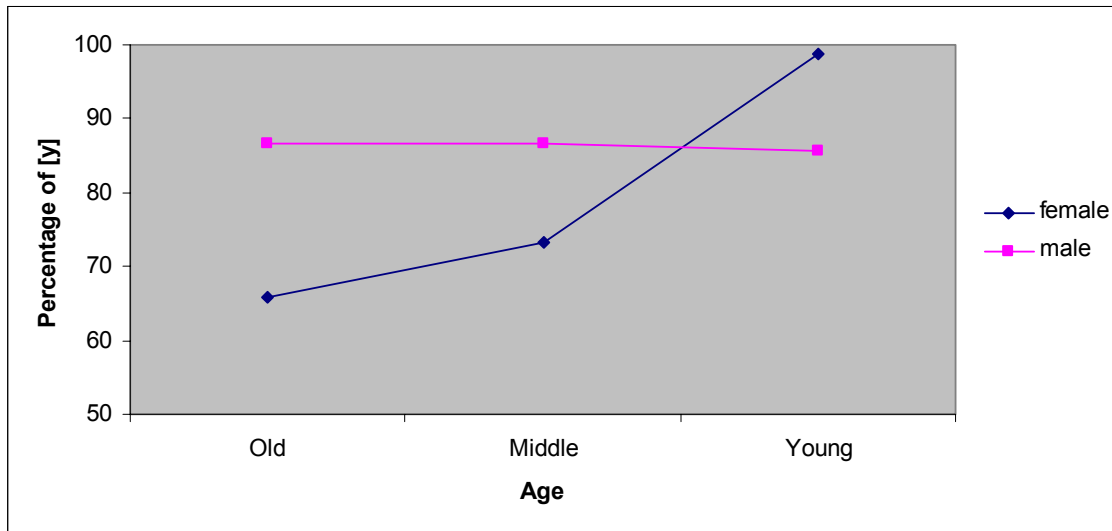


Figure 5.28 Distribution of [y] by Age*Gender

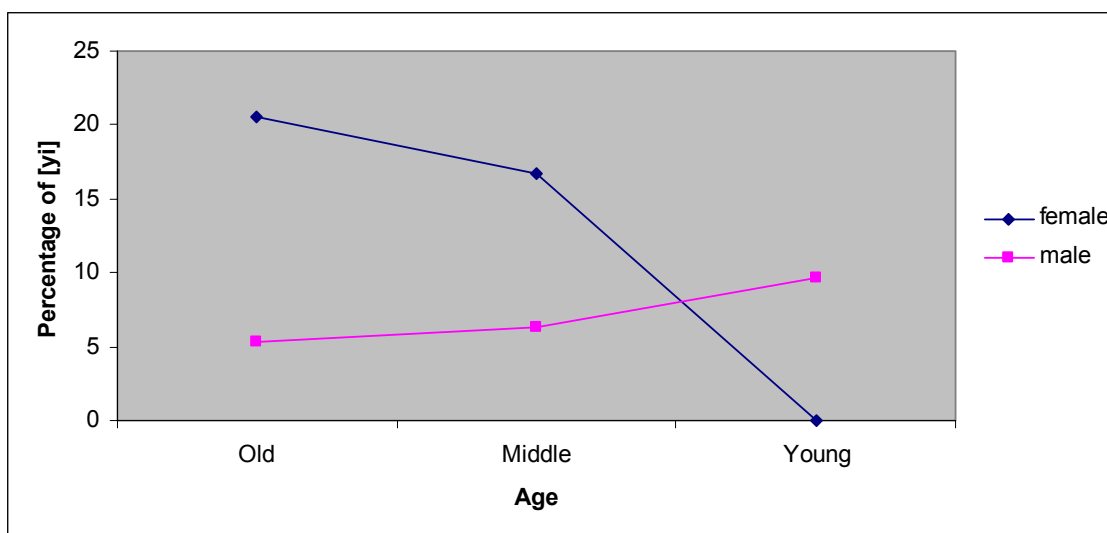


Figure 5.29 Distribution of [yi] by Age*Gender

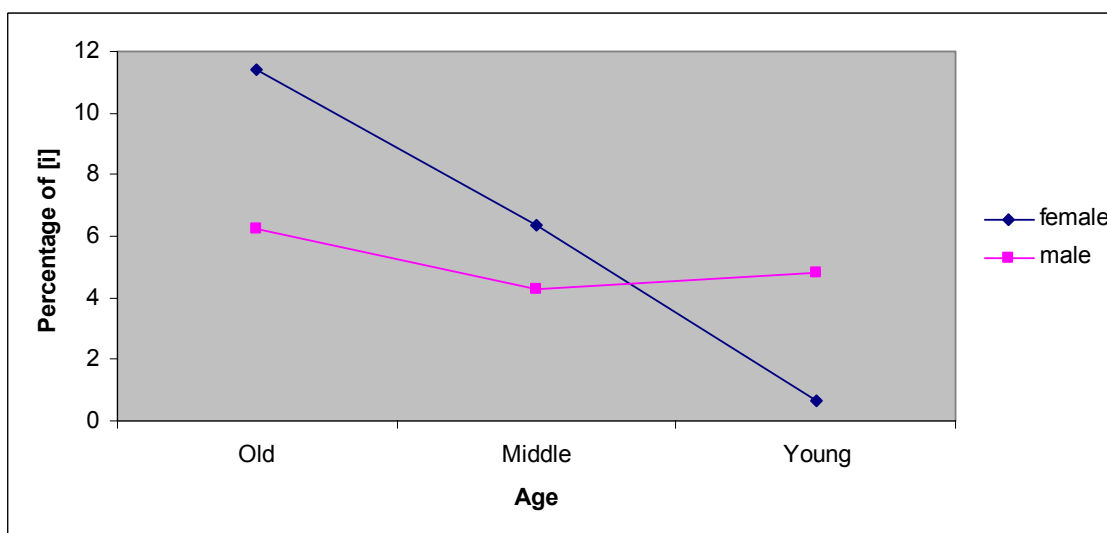


Figure 5.30 Distribution of [i] by Age*Gender

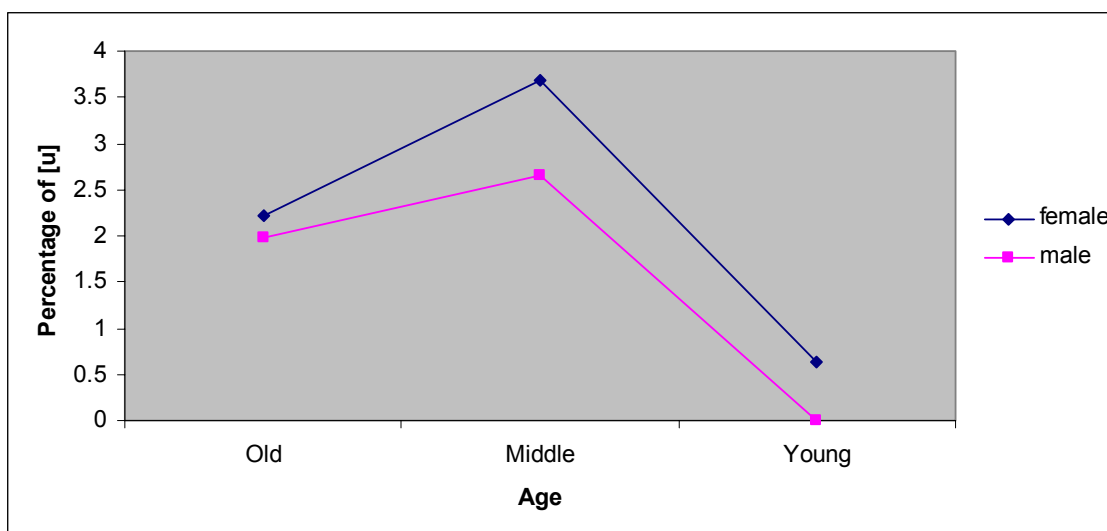


Figure 5.31 Distribution of [u] by Age*Gender

In an examination of the distribution of each variant by Style*Class, the only significant difference was found in the variant [u] in game style: subjects of low socioeconomic status produced significantly higher percentage of [u] than both subject groups of high ($p=0.003$) and middle ($p=0.042$) socioeconomic status, manifesting a class stratification in [u] as illustrated in the following Figure 5.32. Note here that subjects of high socioeconomic status and those of middle status produced zero cases of [u] in wordlist and sentence styles, and the former produced zero case of [u] also in game style.

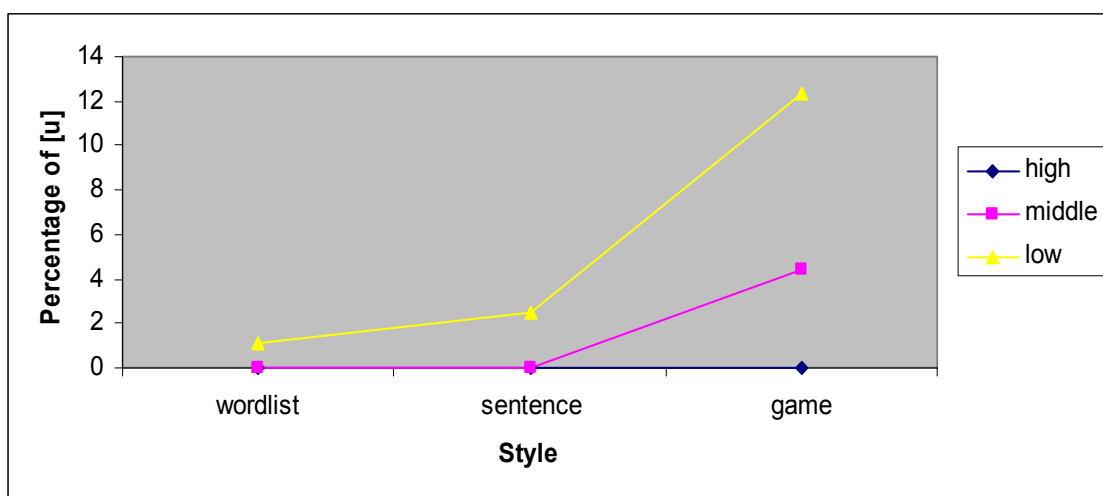


Figure 5.32 Distribution of [u] by Style*Class

Although no significant difference was found in the remaining variants, [y] and [yi] still presented interesting pictures of distribution. As we could see from Figures 5.33, for variant [y], subjects of high socioeconomic status showed lowest percentage in all styles, and those of low socioeconomic status showed highest percentage of [y] and those of middle status stood in between, except for the game style. The variant [yi], however, presented the opposite pattern as illustrated in Figure 5.34: subjects of high socioeconomic status showed highest percentage of [yi] in both styles of wordlist and game, and those of low socioeconomic status showed lowest percentage, with those of middle status standing in between.

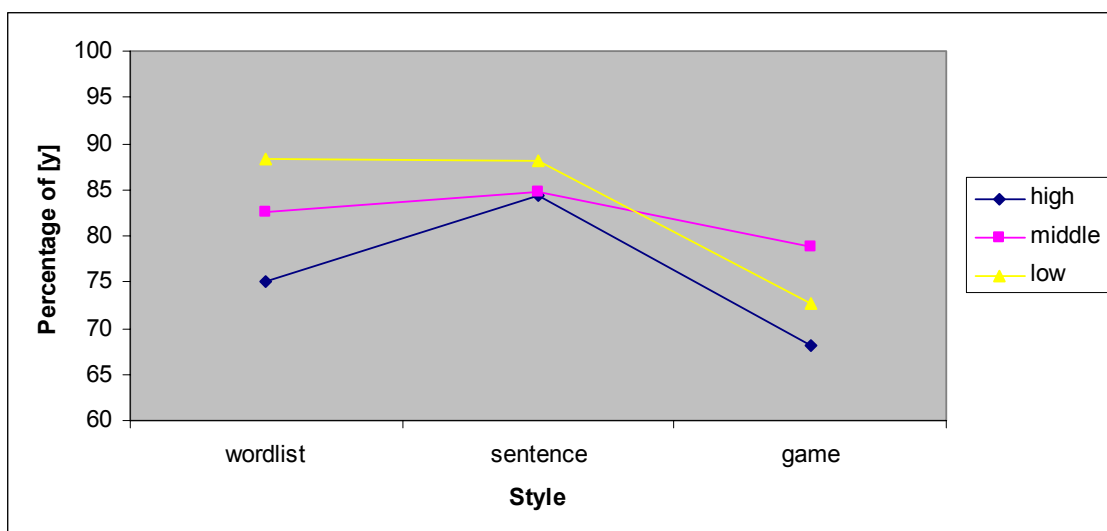


Figure 5.33 Distribution of [y] by Style*Class

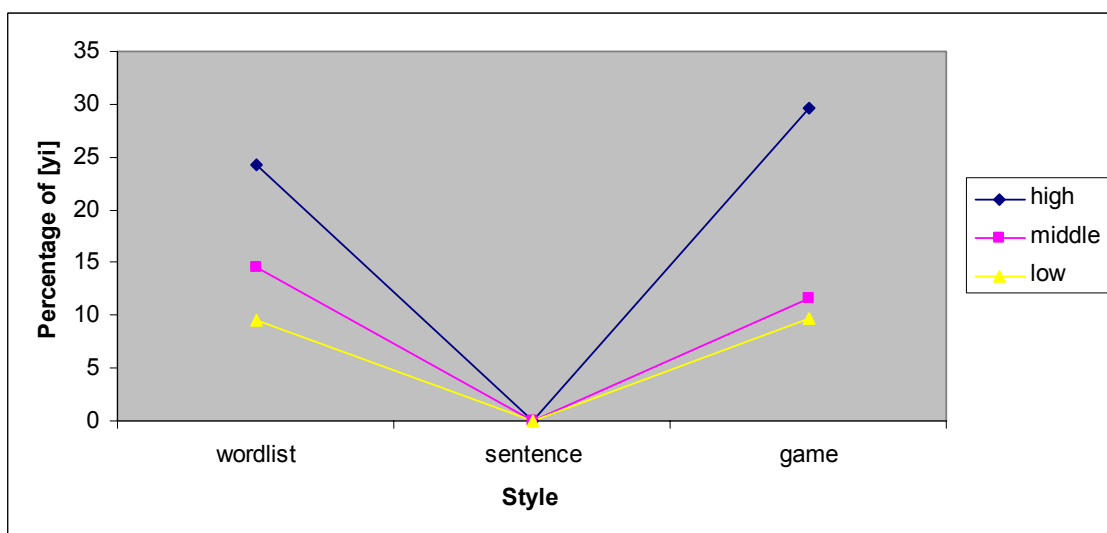


Figure 5.34 Distribution of [yi] by Style*Class

An examination of the distribution of each variant by Style*Gender showed no significant difference for any of the variants. However, we did see a tendency of such

difference between female and males subjects in the game style for both [y] ($p=0.056$) and [yi] ($p=0.082$) variants. As illustrated in Figures 5.35 and 5.36, male subjects showed a higher percentage of [y] and lower percentage of [yi] than female subjects did. In addition, we note that for the two variants, male and female subjects presented an overall opposite pattern in all the styles (except for the sentence style for [yi]): for [y], male subjects showed higher percentage than female ones, and for [yi], female subjects showed higher percentage than males.

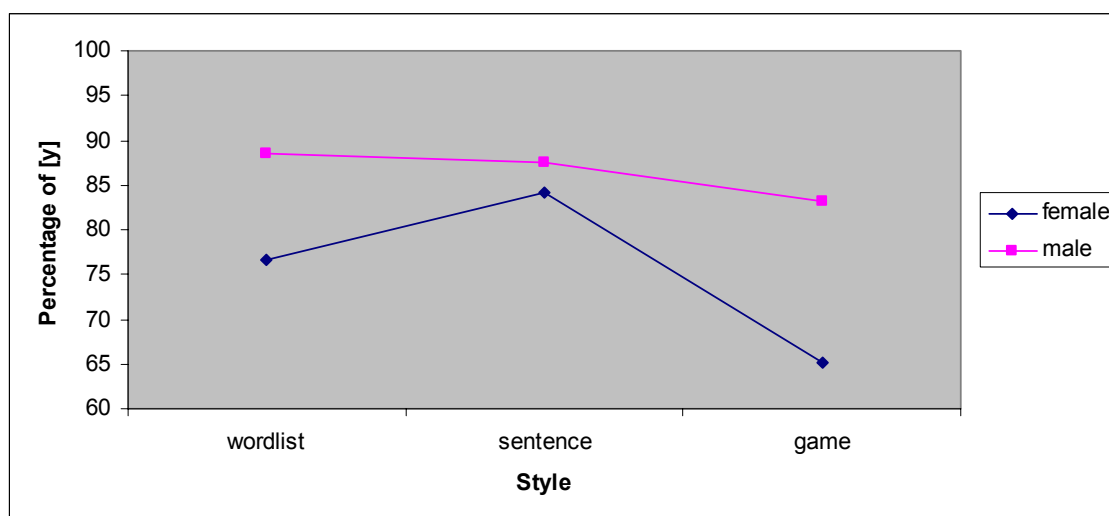


Figure 5.35 Distribution of [y] by Style*Gender



Figure 5.36 Distribution of [yi] by Style*Gender

In examining the distribution of each variant by Class*Gender, we found that variant [y] showed gender stratification in subjects of high socioeconomic status: male subjects of high socioeconomic status showed significantly higher percentage of [y] than female subjects of the same status level ($p=0.037$), though no significant difference was found in subjects of middle and low status groups. While it is true that the other three variants of [yi], [i] and [u] presented no significant difference between female and male subjects, comparison of the distribution of [y] and [yi] variants (see Figures 5.37 and 5.38) still revealed a similar opposite distribution pattern in gender as observed above: in each of the socioeconomic status groups (except middle status group for [yi]), male subjects showed a higher percentage of [y] but lower percentage of [yi] than female subjects.

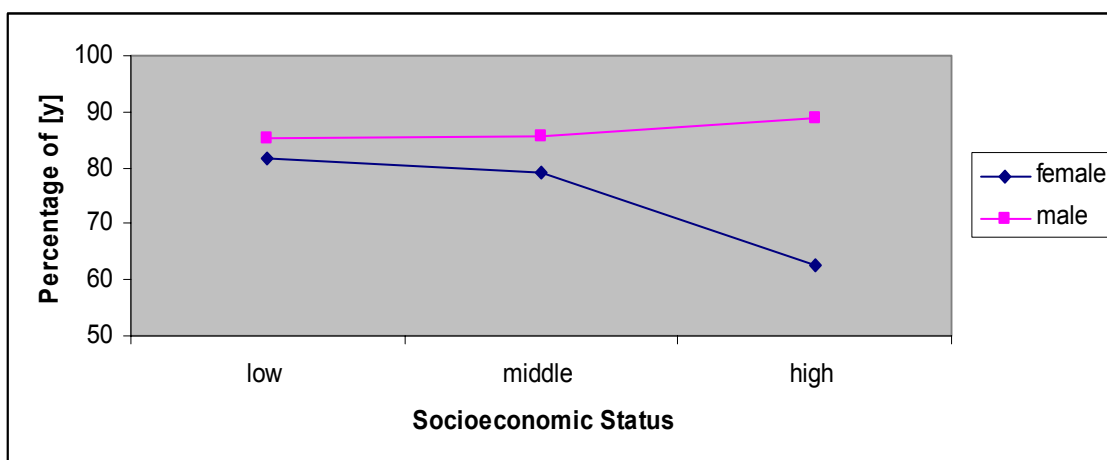


Figure 5.37 Distribution of [y] by Class*Gender

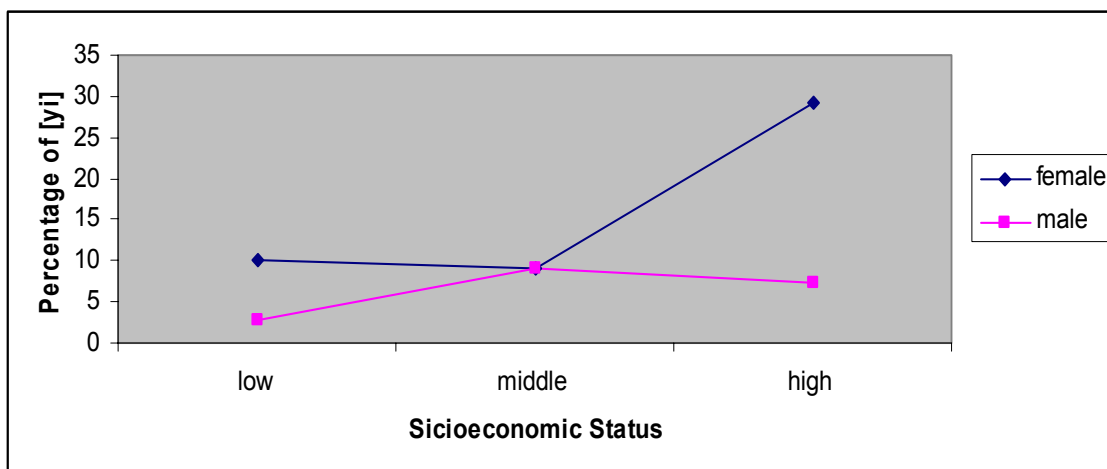


Figure 5.38 Distribution of [yi] by Class*Gender

In summary, this section has described the distribution of the four phonetic variants, i.e. [y], [yi], [i] and [u] of the phoneme /y/. [y] presented itself as the dominant variant by amounting to about 80% of the total tokens with the rest allocated to the rest three variants of [yi], [i] and [u], each with a decreased percentage. Examined in terms

of the external factors such as age, gender, style, and socioeconomic status, the four variants exhibited different patterns:

[y] variant: [y] showed style stratification in the old subject group with its percentage in sentence style tending to be significantly higher than in game style. Gender stratification was found in the old subject group with male speakers employing significantly higher percentage of [y] than female speakers; gender stratification was also found in subjects of high socioeconomic status where male subjects showed significantly higher percentage of [y] than female subjects. Overall, in terms of socioeconomic status, subjects of high group showed the lowest percentage of [y] in all styles, and those of low group showed the highest percentage of [y], and those of middle group stood in between. In addition, male subjects showed higher percentage of [y] than female ones in all the styles.

[yi] variant: the diphthong [yi] showed style stratification among old subjects with significantly lower percentage in sentence style than in both game and wordlist styles. While young subjects showed no style stratification at all forming a contrast to the old group, middle- aged group stood in between with [yi] in sentence style tending to be significantly lower than in both of the other two styles; in terms of gender, male speakers tended to use significantly lower percentage of [yi] than female speakers; subjects of high socioeconomic status showed highest percentage of [yi] in both styles of wordlist and game, and those of low status showed lowest percentage, with those of middle status standing in between.

[i] variant: High front unrounded [i] showed clear style stratification among old subjects with significantly higher percentage in sentence style than in both game and wordlist styles; middle aged group showed significantly higher percentage in sentence style than in wordlist style and a similar tendency in comparison to game style; young subjects manifested a tendency of significant difference between sentence style and the other two styles.

[u] variant: High back rounded [u], the rarest variant, was examined in just one dimension of external factor, middle-aged subjects produced significantly higher percentage of [u] than younger subjects and its percentage in game style tended to be significantly higher than those in more formal wordlist and sentence styles; when a second dimension was added, it showed style stratification among old people with significantly higher percentage in game style than in both of the other two styles. Also, while young subjects showed no style stratification at all forming a contrast to the old group, middle aged group stood in between with [u] in game style tended to be significantly lower than in wordlist style. Subjects of low socioeconomic status produced significantly higher percentage of [u] in game style than both high and middle status groups.

Now the question is: what are the language internal and external factors that lead to such patterns of stratification? The following section discusses a variable rule analysis on the realization of the four different variants.

5.3.3 Variable Rule Analysis of /y/

5.3.3.1 Introduction

This section discusses the variable rule analysis of /y/. In a typical variable rule analysis, the dependent variable usually has binary values, i.e. two variants. In this study, as we have seen in last section, the dependent variable /y/ is a multinomial variable, manifesting four different variants: [yi], [y], [i] and [u]. One possible way to approach the multinomial variable is to treat them in terms of structured levels, where each level corresponds to one binomial analysis as illustrated in the following figure:

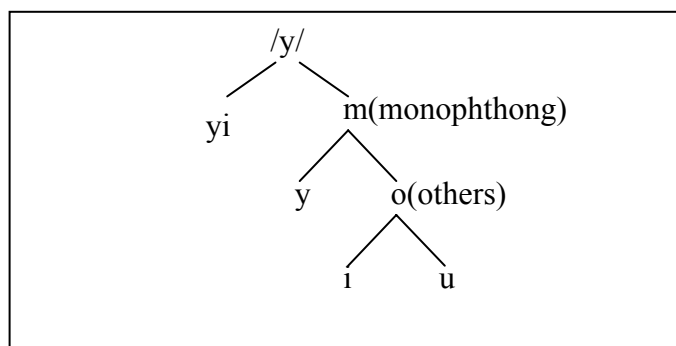


Figure 5.39 Structured levels for multinomial variable /y/

The first level has binary values of diphthong [yi] and monophthong; the second level has binary values of faithful variant [y] and non-faithful variant; the third level has binary values of [i] and [u]. Following this analysis schema, the first level includes all the data, treating [yi] as the application value, and all the rest the non-application value. In the second level, however, the data will be recoded to exclude [yi] from the analysis, and treat [y] as the application value and all the other monophthongs as non-application

value. In the third level, again the data will be recoded to further exclude [y], and treat [i] as the application value, with [u] serving as non-application value. Thus, although this approach makes statistical sense, it falls short in the linguistic interpretation by excluding a subset of data from the next level of analysis.

Alternatively, we could adopt a parallel approach that consists of four different but paralleling models:

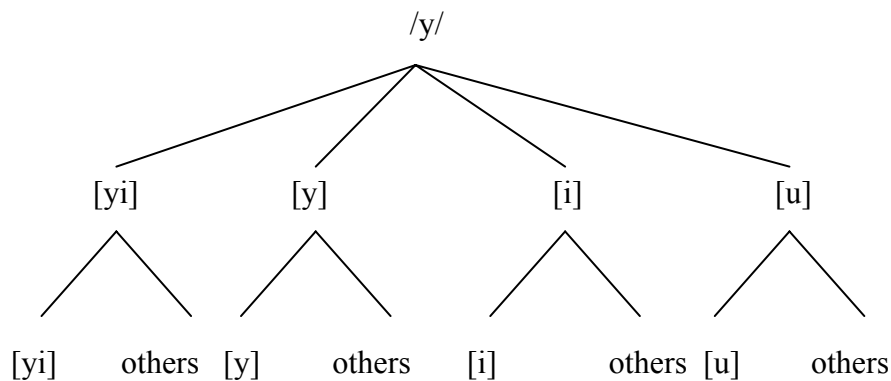


Figure 5.40 Parallel models for multinomial variable /y/

In this alternative schema, we see four different binary models on the same level. In the first one, diphthong [yi] is the application value, and all the others will be the non-application value. Similarly, the remaining three models treat [y], [i] and [u] as the application value respectively and the others as the non-application value; no data exclusion is made as they are all on the same level. Statistically, this approach entails a more lengthy and complicated analysis; however, it better serves the linguistic purposes of this current study. More specifically, it answers the following four questions:

1. To what extent is /y/ realized as [yi]? What would favor the diphthong variant [yi]?
2. To what extent is /y/ faithfully respected? What are the favoring factors?
3. What would most favor the unrounding variant [i]?
4. What would favor the retracting variant [u]?

Thus, for this current study, this alternative parallel approach was adopted. The following section presents the variable rule analysis of /y/ in this approach.

5.3.3.2 Factor Groups Considered in the Study

As independent variables, a total of eight factor groups were considered, including four language external factor groups -- age, gender, socioeconomic status, and style -- four language internal factor groups -- preceding segment, syllable context, syllable onset, and detailed linguistic context (see below). Following is a list of the factors in each of the factor groups (FG):

FG#1 Age

Y: young group
M: middle group
O: old group

FG#2 Gender

m: male
f: female

FG#3 Socioeconomic status

H: high class
M: middle class
L: low class

FG#4 Style

W: wordlist
G: game
S: sentence reading

FG#5 Preceding segment⁸

o: null, no preceding segment
v: vowel
d: ㄷ /t/
n: ㄴ /n/
s: ㅅ /s/
j: ㅈ /tʃ/
c: ㅊ /tʃ^h/
g: ㄱ /k/
k: ㅋ /k^h/
h: ㅎ /h/

FG#6 Syllable context

	E.g.	English
1: one syllable	/ky/	ear
2: first syllable of two-syllable word	/y.həm/	danger
S: second syllable of two-syllable word	/pa.k ^h y/	wheel
3: first syllable of three-syllable word	/hy.p ^h a.lam/	whistle
L: last syllable of three-syllable word	/ta.lam.tʃy/	squirrel

FG#7 Syllable onset

	E.g.	English
Y: with onset	/ky/	ear
N: without onset	/y/	stomach

FG#8 Detailed linguistic context

This factor group consists of 16 factors, letters from A to P, each representing the unique linguistic environment of the elicited word, including the preceding segment(s), word boundary, and the number of syllables of the word. Note that in here g stands for /k/, k for /k^h/, j for /tʃ/, c for tʃ^h, V for vowel, and # for word boundary.

⁸ Since no labial consonant precedes /y/ in Korean, labials were not coded here.

Factor	Environment	E.g.	English
A	#g_1	/ky/	ear
B	#n_1	/ny/	elder sister
C	#d_1	/ty/	back
D	#j_1	/tʃy/	mouse
E	#s_1	/syn/	fifty
F	#c_3	/tʃ ^h y.na.mul/	wild vegetable
G	#_1	/y/	stomach
H	V_2	/pa.y/	rock
I	Vg_3	/taŋ.na.ky/	donkey
J	Vk_2	/pa.k ^h y/	wheel
K	#_2	/y.həm/	danger
L	#h_3	/hy.p ^h a.lam/	whistle
M	#h_2	/hy.tʃaŋ/	badge
N	#s_3	/sy.p ^h a.li/	giant fly
O	mj_3	/ta.lam.tʃy/	squirrel
P	#s_2	/sy.ta/	rest

Originally, factor groups seven and eight were not considered in the model design. The cross-tabulation of factor groups five and six, i.e. preceding segment and syllable context factor groups, produced many structural and sampling zeros (i.e. empty cells in the Chi-squared analysis), thus running them together in a model would be procedurally and statistically problematic. To avoid the zero cells, factor group seven was added into the model so that running it with syllable context factor group may reveal some generalizations that would otherwise be unavailable due to the impossibility of running factor groups five and six together. Factor group eight, as we can see, coded the entire detailed linguistic context where the dependent variable /y/ occurred, thus it cannot be run together with any other internal factor groups to avoid

the interaction problem. Still, it was coded so that some general tendencies may be detected from running it with other external factor groups.

5.3.3.3 VARBRUL Analysis: [yi]

In this section, we consider the variable rule of: /y/→[yi]/____, where the application value was [yi], and all the other variants were considered as non-application value.

The first step in the analysis was to figure out a model that could best account for the data. As mentioned above, factor group eight coded the entire detailed linguistic context of the word, including preceding segment, syllable, onset, etc. Everything being equal, a model that incorporates this factor group would then give better account of the data than a model that incorporates factor group(s) that corresponds to part(s) of this detailed context. Thus a preliminary model (model A1) that included this detailed linguistic context factor group and the four external factor groups of age, gender, socioeconomic status, and style was first tested to detect any potential general pattern.

Examination of the results of the stepwise regression analysis of this model revealed a pattern that could lead to further simplification of the detailed linguistic context factor group through combination of the factors. More specifically, all words with /y/ in word initial syllable were knockouts (one-syllable words were considered as word final position), meaning they manifested zero application of this /y/→[yi] rule. Among the words where /y/ was in non-word-initial syllable positions, one-syllable words favored the rule application, three-syllable words disfavored the rule application, and two-syllable words stood in between. Also, among the two-syllable words, those

without an onset favored the rule application and those with an onset disfavored. Thus, the detailed context factor group could be modified into a simpler one that included only four factors: i, words with /y/ in initial syllable; 1, one-syllable words; 2, non-initial two-syllable words; 3, non-initial three-syllable words. The result of this re-categorization was the same as the syllable context factor group, except that it combined the factors 2 and 3 from the syllable context factor group into one factor i. Given that factor i (i.e. factors 2 and 3 of syllable context factor group) was a knockout with zero application of the rule, the modified detailed linguistic context factor group had exactly the same effect on the rule application as did the syllable context factor group. Rerunning of the model A1, now with the detailed context factor group replaced with the modified one, produced a new set of values, which was compared with that of Model A1 through the log likelihood ratio: $G^2 = 2 [L_{\text{model B}} - L_{\text{model A}}]$ (Paolillo 2002).

Model A2: Log likelihood=-318.309, factor groups=4, factors=11

Model A1: Log likelihood = -300.605, factor groups=4, factors=16

$G^2 = 35.408 > 11.07$ (critical value at $p=0.05$)

Thus, the two models were significantly different, and Model A1 with higher log likelihood was still statistically better than this modified Model A2, though the latter exhibited more explanatory power and generalizability.

However, a third model (A3), that included syllable context factor group and syllable onset factor group, together with all the external factor groups, and with equal explanatory power and generalizability, proved to be statistically better than model A2 with Log likelihood of -312.253, factor groups of 5 and factors of 13. Although this

model A3 still showed a bit lower Log likelihood than model A1, its strong explanatory power and generalizability vs. the almost zero generalizability of the unique detailed context of model A1 made it linguistically meaningful and significant. Indeed, as Paolillo (2002) suggests, each different strategy has its advantages and disadvantages, so it is not really possible to answer definitively which one is best. For our problem, as a result of a compromise needed in many studies of similar nature, model A3 was accepted as the best model.

The next step was to detect any interaction among the factor groups in this model. Cross tabulation of the factor groups indicated a potential interaction between the following factor groups: age and socioeconomic status, age and gender, age and syllable context, age and syllable onset, gender and socioeconomic status. No interaction was found in the remaining pairs of factor groups. To solve the interaction problem, cross-products of each pair of the interaction factor groups were coded, forming additional five factor groups (FG) as listed below, and the original five factor groups, i.e. age, gender, socioeconomic status, syllable context and syllable onset were replaced with the five cross-product factor groups (model A4).

FG#11: Age+Socioeconomic status: $3*3=9$ factors

Age: Y, M, O

Class: H, M, L

YH→a; YM→b; YL→c; MH→d; MM→e; ML→f; OH→g; OM→h; OL→i

FG#12: Age+Gender: $3*2=6$ factors

Age: Y, O, M

Gender: m, f

Ym→1; Yf→2; Mm→3; Mf→4; Om→5; Of→6

FG#13: Gender+ Socioeconomic status: $2*3=6$ factors

Gender: m, f

Socioeconomic status: H, M, L

mH→A; mM→B; mL→C; fH→D; fM→E; fL→F

FG#14: Age+Syllable Context: $3*5=15$ factors

Age: Y, M, O

Syllable Context: 1, 2, S, 3, L

Y1→a; Y2→b; YS→c; Y3→d; YL→e; M1→f; M2→g; MS→h; M3→I;

ML→j; O1→k; O2→l; OS→m; O3→n; OL→o

FG#15: Age+Syllable Onset: $3*2=6$ factors

Age: Y, M, O

Syllable Onset: Y, N

YY→1; YN→2; MY→3; MN→4; OY→5; ON→6

Thus, the factor groups considered in model A4 were as follows:

Table 5.5 Factor groups and factors considered in model A4
(* indicates significant factor group)

<u>Factor groups</u>	<u>Factors</u>
1* Age+Socioeconomic status	a, b, c, d, e, f, g, h, i
2 Age+Gender	1, 2, 3, 4, 5, 6
3* Gender+ Socioeconomic status	A, B, C, D, E, F
4* Age+Syllable Context	a, b, c, d, e, f, g, h, i, j, k, l, m, n, o
5* Age+Syllable Onset	1, 2, 3, 4, 5, 6
6. Style	W, S, G

Table 5.6 below presents the results for the varbrual analysis of [yi]. The analysis reveals that two factor groups, i.e. Style and Age+Gender, are not significant, and only those significant factor groups are listed here. To facilitate interpretation, the

codes for the cross-product factor groups have been given as the corresponding codes of the two original factor groups in the tables and figures hereafter.

Table 5.6 Goldvarb probabilities for significant factor groups in model A4

<u>Factor groups</u>	<u>Factors</u>	<u>Weight</u>	<u>% Application</u>	<u>Total N</u>
1. Age+ Socioeconomic Status	YM	0.186	21	19
	YL	0.808	31	19
	MH	0.868	60	100
	MM	0.143	9	94
	OH	0.259	17	100
	OM	0.745	38	99
	OL	0.480	27	96
2. Gender+ Socioeconomic Status	mH	0.119	15	100
	mM	0.457	19	117
	mL	0.095	10	66
	fH	0.884	62	100
	fM	0.621	29	95
	fL	0.871	51	49
3. Age+ Syllable Context	Y1	0.972	38	18
	M1	0.716	38	72
	O1	0.606	40	108
	YS	0.152	5	20
	MS	0.497	41	74
	OS	0.227	22	115
	ML	0.293	20	48
	OL	0.256	15	72
4. Age+ Syllable Onset	YY	0.069	16	18
	MY	0.301	27	120
	OY	0.387	25	180
	YN	0.926	35	20
	MN	0.729	48	74
	ON	0.595	30	115

Input=0.257; Log likelihood=-204.296; total chi-square=78.83; Chi-square/cell=0.68

As we could see, Chi-square/cell=0.68 and was lower than 1.0, suggesting that we were looking at the correct factors to explain the variation under study (Preston 2007). The input value was 0.257, indicating that the rule applied approximately one fourth of the time. Examination of the weight of each factor in the factor groups revealed three general patterns about gender, syllable context, and syllable onset in their effects on the realization of /y/ as the diphthong [yi], as illustrated in the following figures. Recall that weights higher than 0.5 indicate a favor for the application of the variable rule; those lower than 0.5 suggest a disfavor for the rule application; and weight of 0.5 indicates neither favor nor disfavor for the rule application.

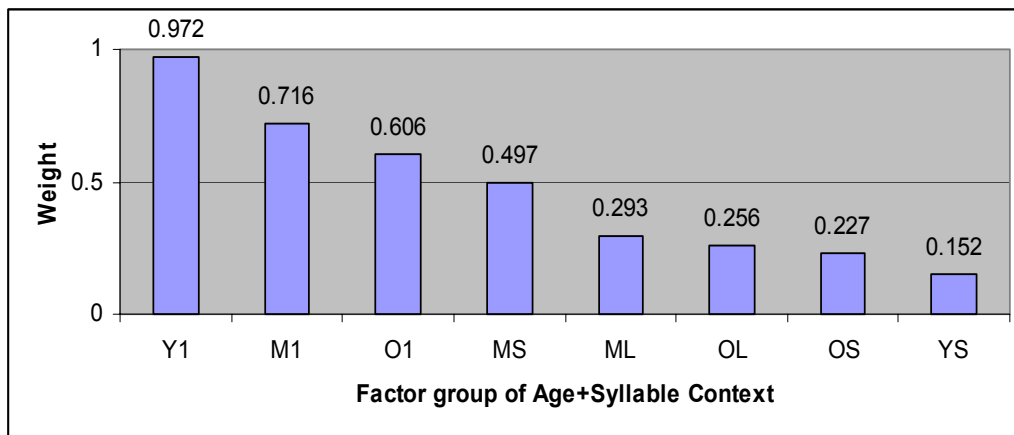


Figure 5.41 Effect of Age+Syllable Context on the realization of [yi]

Figure 5.41 illustrates the effect of the cross-product factor group of Age+Syllable Context on the realization of /y/ as [yi]. Factors of Y2, M2, O2, Y3, M3, O3, and YL were knockouts with zero application of [yi], hence not presented in the

figure. We can see that regardless of age difference, all of the factors with one syllable words favored the [yi] application, and all the remaining factors disfavored [yi] application.

The favor for [yi] application in one syllable words may be explained in terms of the feature of Korean lexicon. Given the fact that a significant portion of the Korean lexicon is two syllable words (Kang 1997), one syllable words may tend to pick up an additional mora, functioning like a second syllable, thus [ky] ('ear') becomes [kyi]. A similar kind of syllable addition has also been reported in Chinese (Yao and Liu 2005). There is a tendency in modern Chinese to compound a monosyllabic adjective with [hən] 'very'. For example, instead of saying [maŋ] 'busy', people often say [həm.maŋ], which is simply closer to 'busy' rather than 'very busy'.

The zero application of [yi] in word initial syllable regardless of the total number of syllables in the word may be explained in terms of the different phonological strength related to different position in the word. Word initial position is a strong position where phonological reduction does not typically take place, while word medial and final positions are weak positions where the reduction may occur (Hyman 1975), and Korean follows the same general tendency (Kim-Renaud 1986). A corollary of this may mean that changes are less likely to occur in word initial position than in word medial and final positions. Thus in our data, while /y/ was maintained in the initial syllable, it was more susceptible to change in other places.

One factor group needed mentioning here is Style with three factors, wordlist, sentence and game. Sentence factor was a knockout with zero application of /y/→[yi],

and the remaining two factors showed no significant effect on [yi] realization. The zero application in sentence style is relevant to the syllable pattern observed above. In sentence style, one syllable words that favored /y/→[yi] application in isolated styles were actually put into a quasi word-initial position due to the immediately following topic marker or other particles in the sentence, exhibiting thus zero application of /y/→[yi] as did all the real word-initial ones. Along similar lines, those originally categorized as word-final in isolated styles were no longer in real final syllable as they were followed by other items in the sentence, making the /y/→[yi] application otherwise possible in real final-syllable words impossible.

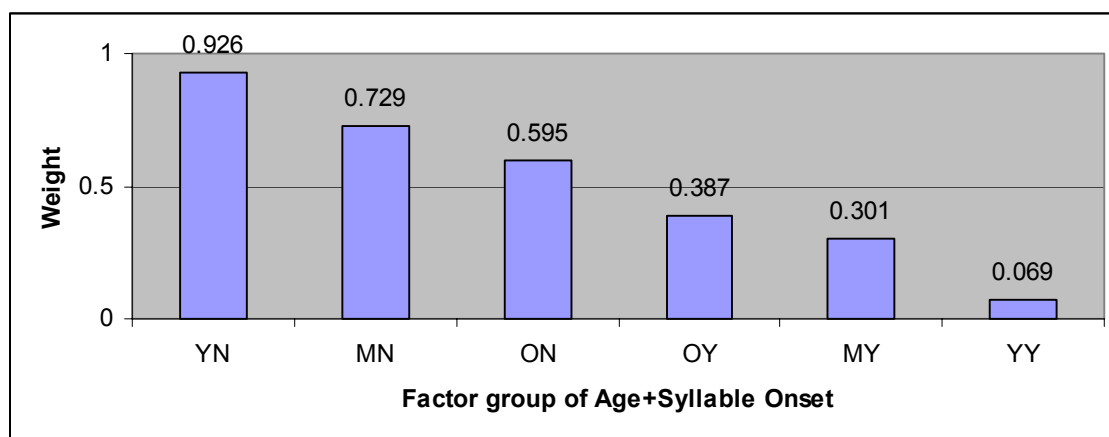


Figure 5.42 Effect of Age+Syllable Onset on the realization of [yi]

Figure 5.42 illustrates the effect of the cross-product factor group of Age+Syllable Onset on the realization of /y/ as [yi]. We could see from this figure that regardless of age difference, factors without an onset all favored [yi] application, while

those with an onset all disfavored the rule application. Thus, for example, /y/ ‘stomach’ without an onset more often surfaced as [yi], while /ky/ ‘ear’ with an onset more often remained as [ky]. A tentative explanation suggested here is that speakers may be aiming for the optimal CV syllable structure: by adding a nucleus vowel [i], the original vowel [y] would then be turned into a semi-vowel, glide-like status, functioning like an onset as illustrated in the following example word /y/ ‘stomach’ in Figure 5.43.

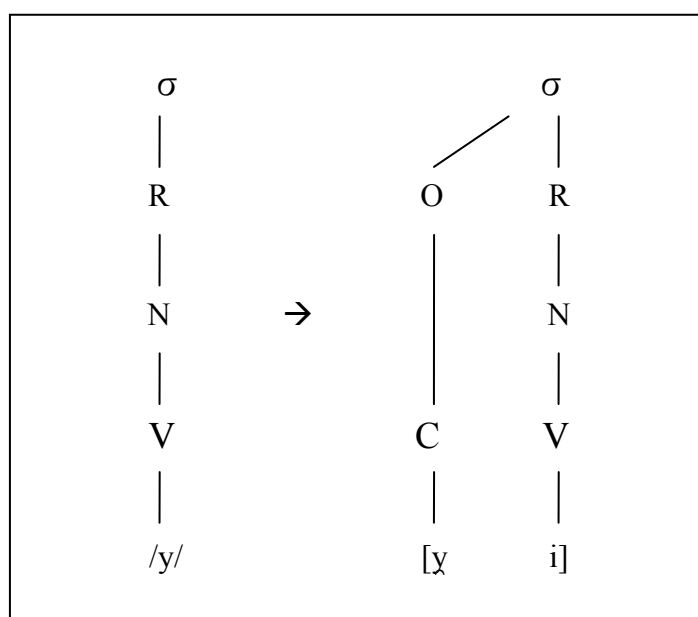


Figure 5.43 Realization of /y/ as [yi] ‘stomach’

However, examination of the spectrogram did often show that the [y] part, rather than the [i] part was more robust in energy, suggesting its status as the main vowel, rather than the onset. Certainly, these fuzzy facts invite multitude explanations, which are left here as topics for future research.

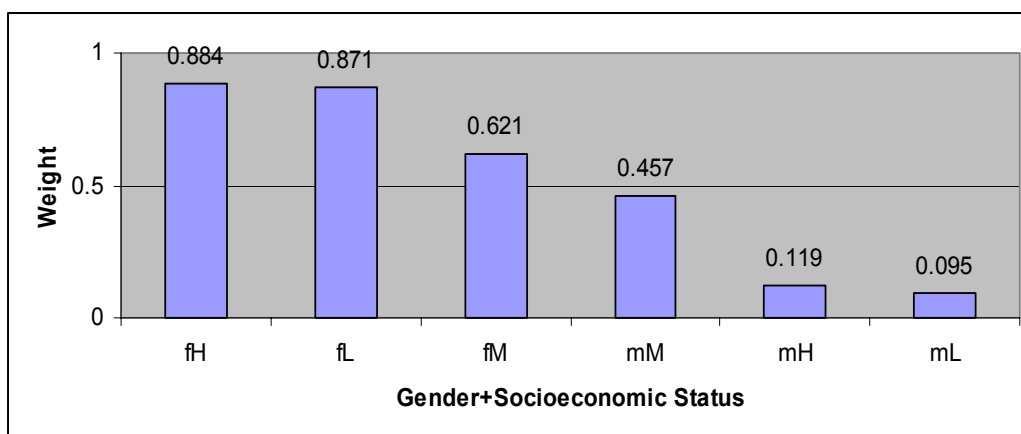


Figure 5.44 Effect of Gender+Socioeconomic Status on the realization of [yi]

This figure illustrates the effect of the cross-product factor group of Gender+Socioeconomic Status on the realization of /y/ as [yi]. A clear pattern emerging from this figure was that regardless of socioeconomic status, female subjects favor the /y/→[yi] application as indicated by all the weights higher than the critical value of 0.5, while male subjects disfavor the /y/→[yi] application as they all exhibited a weight lower than the critical value, thus female speakers showed more sensitivity to this diphthong form than male speakers. Among the females, those of high socioeconomic status group were in the leading position in the application of /y/→[yi], i.e. they favored diphthong [yi] more than any other group, which was then followed by females of low status group, who interestingly show more favor for the application of /y/→[yi] than the middle status group. A similar kind of cross-over pattern in class was reported by studies in a western context. Labov's (1972) study of the New York (r), for example, found that the lower middle class surpassed the upper middle class in the use of the

prestigious form of post-vocalic (r). The fact that in this current study, lower class females surpass the middle class females in the use of [yi] form, coupled with the finding that female speakers are more sensitive than male speakers (Labov 1982) to the use of [yi] suggests that the diphthong form [yi] is a prestigious innovative variant. This finding is further supported by the positive response that all the female speakers provided towards the pronunciation of Standard Seoul Korean, where /y/ has undergone a complete diphthongization (Kim-Renaud 1986, Kang 1997).

As to the cross-product factor group of Age+Socioeconomic Status, no consistent pattern was found in terms of age or socioeconomic status of the subjects.

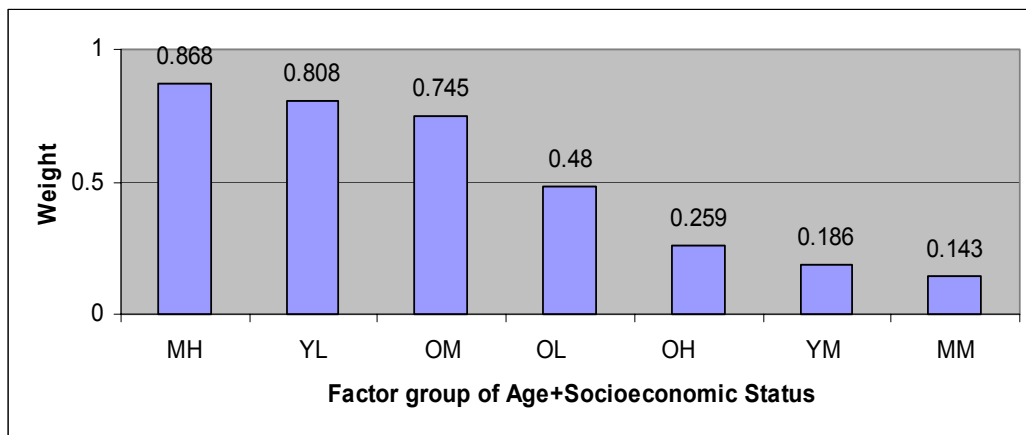


Figure 5.45 Effect of Age+Socioeconomic Status on the realization of [yi]

However, we see that factors of MH, YL and OM all favor /y/→[yi] application, while the rest all disfavor the rule. The missing two factors were ML and YH: the

former was a knockout with zero [yi] application and the latter was a sample zero due to the lack of subjects in this category.

Given the situation of this speech community, the greatest extent of favor for [yi] manifested by the middle-aged, high socioeconomic status subjects is not surprising. As middle-aged group, they are the people who serve as the pivot of this speech community, hence they have the strongest need to adhere to the norms of the social speech (Homes 1992), especially prestigious ones. In addition, this middle-aged, high socioeconomic status group was the one in the community that has built up a social network with speakers of Seoul Korean through various exchanges in the areas of education and culture, and international business, which may have channeled the diffusion of the prestigious diphthong variant from Seoul Korean speech community into this Korean community in China. Older, high status speakers are less likely to participate in the innovation because of their age. We will leave further proof of this claim to future studies that incorporate the younger, high status group.

Young, lower status speakers also manifest a favor for /y/→[yi] application. This group of subjects often works in China-Korea joint factories or in the service area. As mentioned in chapter 1, with the boom of international business between China and Korea, more and more joint enterprises have been built in the Korean community in China, providing thereby lots of job opportunities for young people. These younger, lower status and less affluent speakers may be attaching value to the behaviors of the middle-aged, high status pattern to look for a way to acquire some sort of linguistic

prestige by adopting the innovation. Older and middle-aged speakers of the low status might not have any need or desire for this sort of status.

Now the question is: among all the four significant factor groups, which is more important? To answer the question, we need to check back on the result list for the stepwise regression analysis of the model. The sequence by which each factor group is chosen indicates the order of the relative importance of each factor group. In our case, it was:

Gender+Socioeconomic Status > Age+ Socioeconomic Status > Age+ Syllable Context > Age+Syllable Onset. Thus, among these significant factor groups that cumulatively accounted for the variation, Gender+Socioeconomic Status was the factor group that accounted for the greatest percentage of variation, and Age+Syllable Onset, the least.

Based on the above analysis, we conclude that the rule of /y/→[yi] applied approximately one fourth of the time. The diphthong [yi] functions as the prestigious innovative variant of /y/, and the most important factors that affect [yi] realization were subjects' Gender and Socioeconomic Status.

5.3.3.4 VARBRUL Analysis: [y]

In this section, we consider the variable rule of: /y/→[y]/____, where the application value is [y], and all the other variants are considered non-application values.

The first step in the analysis was to figure out a model that could best account for the data. Again, a preliminary model (Model B1) was run first that included the four external factor groups of age, gender, socioeconomic status, style and one internal factor group of detailed linguistic context to detect any possible generalization.

Analysis on the results of this model running revealed that those words with /y/ in non-final syllable favored [y] application, while those with /y/ in final syllable disfavored [y] application (one syllable words were treated as /y/ in final syllable), making two categorical groups. Thus, recoding of the detailed linguistic context group into a new one, called Target Syllable Position, became reasonable and necessary. Following the pattern found, all the factors of this factor group were recoded as one of the two factors: words with /y/ in final syllable as (f), the others with /y/ in non-final syllable as (n). Thus in the new modified detailed linguistic context factor group there were just two factors of (f) and (n). In addition, the immediately preceding segment also seemed to affect the rule application, as those preceded by (s) did not apply the rule at all, and those preceded by (c) favored the rule most, with the rest standing in between. Hence, the preceding segment needed to be considered here. Ideally, we could just add this factor group, but this would lead to a lot of zero cells. Further combination of the factors into larger category was not possible due to the lack of a pattern. Thus, a compromise was made here by adding the Syllable Onset factor group.

A new model (Model B2) was tested which included the same four external factor groups as in Model B1 together with the target syllable position and syllable onset. The results of Model B1 and Model B2 were as follows:

Model B1: Log likelihood = -595.816, factor group = 4, factors = 21

Model B2: Log likelihood = -604.556, factor group = 4, factors = 10

Comparison of the two models through the log likelihood ratio as mentioned in last section revealed that $G^2 = 17.48$ which was less than the critical value of 19.67 (at

$p=0.05$), so statistically there was no significant difference between the model. Thus, the simpler model, in this case Model B2, with smaller number of factors was chosen as the better model. Fortunately, this was the model that also exhibited better generalizability and stronger explanatory power.

The next step was to detect any interaction among the factor groups in this Model B2. Cross tabulation of the factor groups indicated potential interaction only between the factor groups of age and gender, thus a new cross-product factor group of Age+Gender was added into Model B2, replacing the original two factor groups of age and gender (Model B3). The results of this new model were:

Log likelihood = -585.300, group = 3, factors = 11

Comparison of Model B2 with Model B3, again through the Log likelihood ratio, showed that $G^2 = 38.512$, larger than the critical value of 5.991 (at $p=0.05$), so the two models were significantly different. Thus, Model B3 with higher log likelihood value was chosen as the better model. Table 5.7 summarizes the factor groups considered in Model B3.

Table 5.7 Factor groups and factors considered in Model B3
(* indicates significant factor group)

<u>Factor groups</u>	<u>Factors</u>
1* Target Syllable Position	f, n
2* Age+Gender	1, 2, 3, 4, 5, 6
3 Socioeconomic Status	H, M, L
4* Style	W, S, G
5 Syllable Onset	Y, N

Table 5.8 presents the results for the varbrual analysis of [y]. The analysis revealed that factor groups of Socioeconomic Status and Syllable Onset were not significant, and only those significant factor groups were listed here.

Table 5.8 Goldvarb probabilities for significant factor groups in Model B3

<u>Factor groups</u> <u>N</u>	<u>Factors</u>	<u>Weight</u>	<u>% Application</u>	<u>Total</u>
1. Target-Syllable-Position	f	0.264	73	958
	n	0.736	94	498
2. Age+Gender	Ym	0.484	86	102
	Yf	0.925	98	156
	Mm	0.495	86	297
	Mf	0.266	72	293
	Om	0.490	86	298
	Of	0.201	65	310
3. Style	W	0.517	82	538
	S	0.587	85	449
	G	0.397	73	469

Input=0.928; Log likelihood=-585.300
Total chi-square=345.784; Chi-square/cell= 1.801

The input value as listed at the bottom of the table was 0.928, indicating that the rule applied approximately in nine out of ten cases. Below, I examined each of the significant factor groups in their effects on the realization of /y/ as [y].

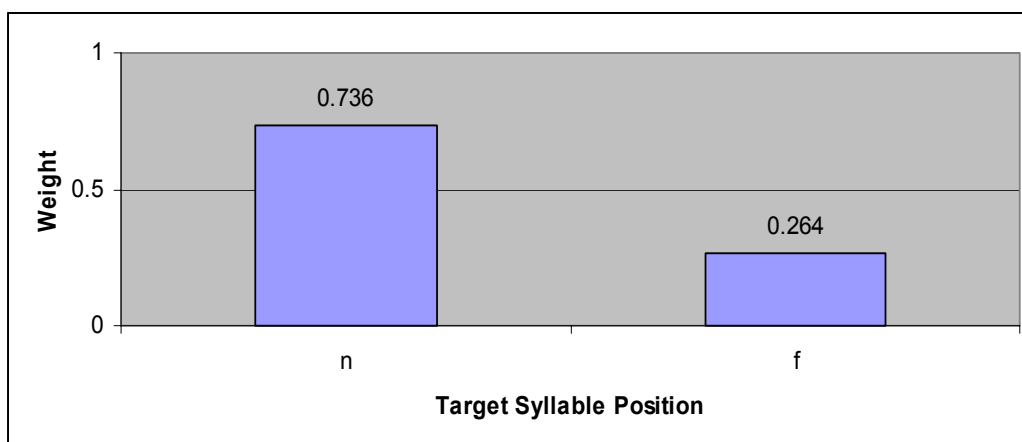


Figure 5.46 Effect of Target Syllable Position on the realization of [y]

As illustrated in Figure 5.46, words with /y/ in non-final syllable (n) favored [y] application, while those with /y/ in final syllable (f) disfavored this rule application. Since in the data there was no /y/ occurrence in the internal syllable of the multi-syllable words, words of the non-final syllable category were actually words with /y/ in initial syllable. The result would mean then that words with /y/ in initial syllable favored [y] application, while /y/ in final syllable (including those one syllable words) disfavored [y] application. This constituted, to a great extent, a complementary pattern with [yi] application addressed above. Recall that [yi] was disfavored by words with /y/ in initial syllable and favored by one syllable words. Thus, the [y] application pattern may also be explained in terms of the different phonological strengths of different word positions. More specifically, initial syllable position is a strong position (Kim-Renaud 1986) where the underlying forms tend to be faithfully represented, while final syllable position is a weak position, where changes tend to occur more frequently. In this data,

one syllable words seemed to fall into the word category of final syllable. In addition, the fact that a significant portion of Korean lexical items consist of two syllable words may again played a role in this disfavor for [y] in one syllable words, as it did in the favor for [yi] in one syllable words.

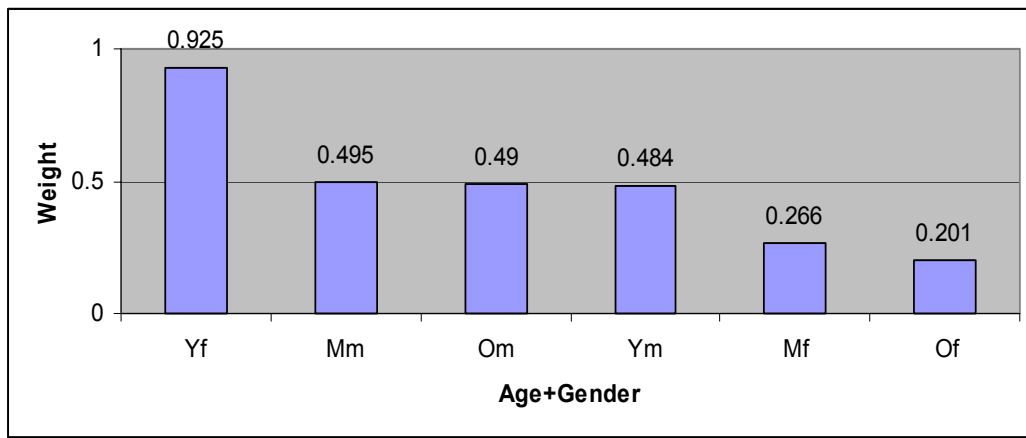


Figure 5.47 Effect of Age+Gender on the realization of [y]

Figure 5.47 illustrates the effect of the factor group of Age+Gender on the realization of /y/ as [y]. While male speakers tend to show neither favor nor disfavor for [y] variant, female speakers are divided into groups: young females show great favor for [y] application, while middle aged and old females show disfavor for [y] application. This forms a contrast with what we saw in Figures 5.29 where middle aged and old female speakers showed higher percentage of [yi] use than did younger female speakers. Given the understanding that [y] is the prescriptive traditional form, while [yi] is the in-coming prestigious variant, the observed patterns may suggest that in face of

the new situation, male speakers show less sensitiveness than female speakers by showing neutral attitude to [y], while middle aged and old female speakers show more sensitiveness by disfavoring the traditional variant [y] and a higher percentage of use of the prestigious variant [yi]. The reason why younger female speakers would not manifest the similar favor for [yi], but a strong preference for [y], may be related to the fact that it had not been long since they graduated from their schools, where the prescriptive traditional system is emphasized.

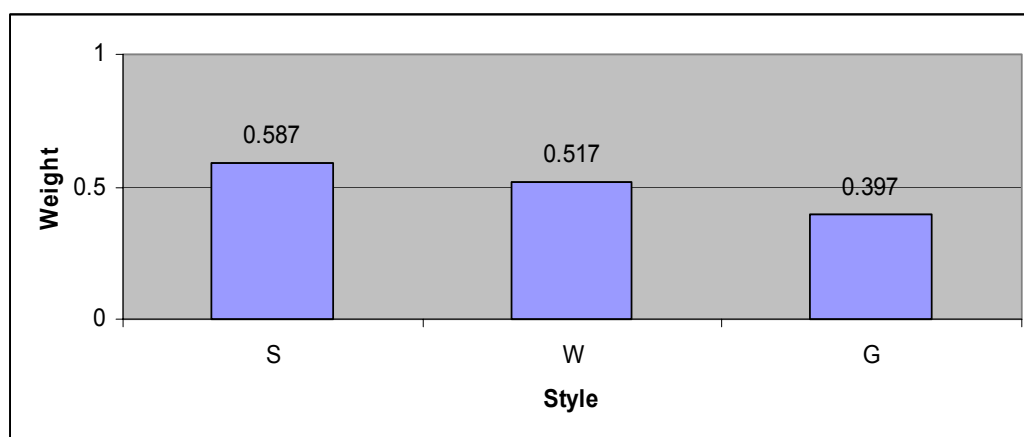


Figure 5.48 Effect of Style on the realization of [y]

From this figure we see that while in the more formal sentence and wordlist reading styles speaker favored [y] variant, they disfavored [y] application in more casual game style. This suggests that [y] as the prescriptive traditional form was still honored in more formal settings.

To discern the relative importance of these significant factor groups, the stepwise regression analysis result was examined, which showed the following order of choice (left side indicates earlier choice):

Target Syllable Position > Age+Gender > Style

Thus, among these significant factor groups that cumulatively accounted for the variation, Target Syllable Position was the factor group that accounted for the greatest percentage of variation, and Style, the least percentage of the variation.

Based on the above analysis, we conclude that as the prescriptive traditional variant of /y/, [y] still holds the dominant position with overall application of approximately nine tenths of the time, and is still favored in more formal settings. Among the significant factor groups that affect [y] realization, the position of the target syllable where the /y/ is embedded plays the most important role.

5.3.3.5 VARBRUL Analysis: [i]

In this section, we consider the variable rule of: /y/→[i]/____, where the application value is [i], and all the other variants are non-application values.

The first problem was to decide on a model that could best account for the data. A preliminary model (Model C1) was tested that included the four external factor groups of age, gender, socioeconomic status, style and one comprehensive internal factor group of detailed linguistic context to detect any possible patterns. Analysis on the results of this model revealed that words with /y/ in initial syllable (including one syllable words) disfavored [i] application, and those with /y/ in final syllable favored [i] application. Three syllable words with [h] being the immediately preceding segment to

/y/ constituted an exception in that they favored [i] application even though /y/ was in initial syllable position. Given the fact that /h/ is the only laryngeal consonant in Korean phoneme system, it is possible that it may exhibit different behavioral patterns from the rest of the consonants. Thus the original factors of the detailed linguistic context group were recoded into three factors based on whether /y/ was in initial or final syllable and whether the immediately preceding segment was [h]: non-laryngeal initial syllable (i), non-laryngeal final syllable (f), and laryngeal initial syllable (h). The category of laryngeal final was missing due to the absence of such words.

A new Model C2 was tested that included the original four external factor groups and the new modified detailed linguistic context factor group. Again, we needed to compare this result with that of Model C1:

Model C1: Log likelihood = -269.358, factor group = 3, factors = 16

Model C2: Log likelihood = -277.290, factor group = 3, factors = 9

$G^2=15.864$, larger than the critical value 14.067 (at $p=0.05$), which means there was significant difference between the two models, so Model C1 with a bit higher log likelihood was still statistically slightly better than Model C2. However, given the generalizability and explanatory power inherent in Model C2, which was missing in Model C1 due to the uniqueness of each factor in the detailed linguistic factor group, it was believed that Model C2 was a better choice over Model C1 as a result of the compromise made between statistical accuracy and linguistic prediction.

Examination of cross-tabulation of the factor groups of Model C2 revealed a potential interaction between factor groups of Style and the Modified Detailed Context,

thus these two factor groups needed to be replaced with a new cross-product factor group of the two interacting groups (Model C3). Result of this Model running, however, proved that this Model C3 was not as good as Model C4 that included the four external factor groups of Age, Gender, Socioeconomic Status, and Style, and internal factor groups of Syllable Context and Syllable Onset.

Model C3: Log likelihood = -283.801, factor group = 2, factors = 12

Model C4: Log likelihood = -282.436, factor group = 3, factors = 11

First, $G^2=2.73$, less than the critical value 5.991 (at $p=0.05$), which means there was no significant difference between the two models, so the simpler model should be better. As we know, Degrees of Freedom (df) measures the economy of a model. Here we noticed that Model C4 had lower df value than Model C3. In addition, the log likelihood of Model C4 was also higher than that of Model C3. Statistically then, Model C4 won over Model C3. Secondly, with one factor group being a cross-product of two original factor groups, Model C3 was less transparent than Model C4 in linguistic interpretation. Thus, we concluded that Model C4 was the best model to account for the variable [i] application in the data. Table 5.9 below presented the factor groups considered in Model C4.

Table 5.10 summarizes the results for the varbrual analysis of /y/→[i]. The analysis reveals that factor groups of Gender, Socioeconomic Status and Syllable Onset are not significant, and only those significant factor groups are listed here.

Table 5.9 Factor groups and factors considered in Model C4
(* indicates significant factor group)

<u>Factor groups</u>	<u>Factors</u>
1* Age	O, M, Y
2 Gender	f, m
3 Socioeconomic Status	H, M, L
4* Style	W, S, G
5* Syllable Context	1, 2, S, 3, L
6 Syllable Onset	Y, N

Table 5.10 Goldvarb probabilities for significant factor groups in Model C4

<u>Factor groups</u> <u>N</u>	<u>Factors</u>	<u>Weight</u>	<u>% Application</u>	<u>Total</u>
1. Style	W	0.250	1	538
	S	0.776	13	477
	G	0.464	4	469
1. Syllable- Context	1	0.208	1	375
	2	0.286	2	201
	S	0.664	9	410
	3	0.621	7	268
	L	0.747	10	230
2. Age	O	0.666	8	620
	M	0.529	5	601
	Y	0.308	2	263

Input=0.026; Log likelihood=-282.436
Total chi-square=468.652; Chi-square/cell= 1.331

The input value as listed at the bottom of the table was 0.026, indicating that the overall probability of rule application is very low, approximately one fortieth of the time. Below, I examine each of the significant factor groups in their effects on the realization of /y/ as [i].

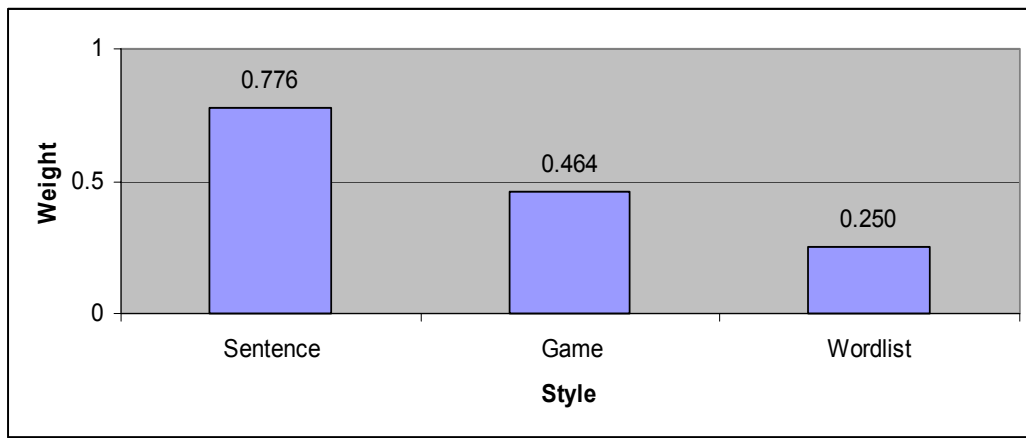


Figure 5.49 Effect of Style on the realization of [i]

This figure shows that [i] application was favored by the Sentence style, but disfavored by Game and Wordlist styles. The different extent of preference for the simplification of /y/ into [i] exhibited by different styles is understandable if we take into consideration the fact that words in both Game and Wordlist styles were in isolated forms, while in Sentence style the carrier words were embedded into the sentences where certain context was provided. Thus, while simplification of /y/ into [i] in isolated words, hence ease in articulation, may easily cause misunderstanding (e.g. [ky] ‘ear’, but [ki] ‘flag’), it may not be a problem in sentence style where the context provides the

necessary disambiguating information. For example, for the sentence [ki ga a p^ha jo.] ‘The ear hurts’, no one would take this [ki] as ‘flag’ here. Therefore, we can say that the favor for [i] showed in Sentence style and the disfavor for [i] exhibited in the Game and Wordlist styles were the result of the two conflicting forces of “ease of perception” and “ease of articulation”: in the former style, “ease of articulation” won over “ease of perception”, while in the latter two styles, just the opposite.

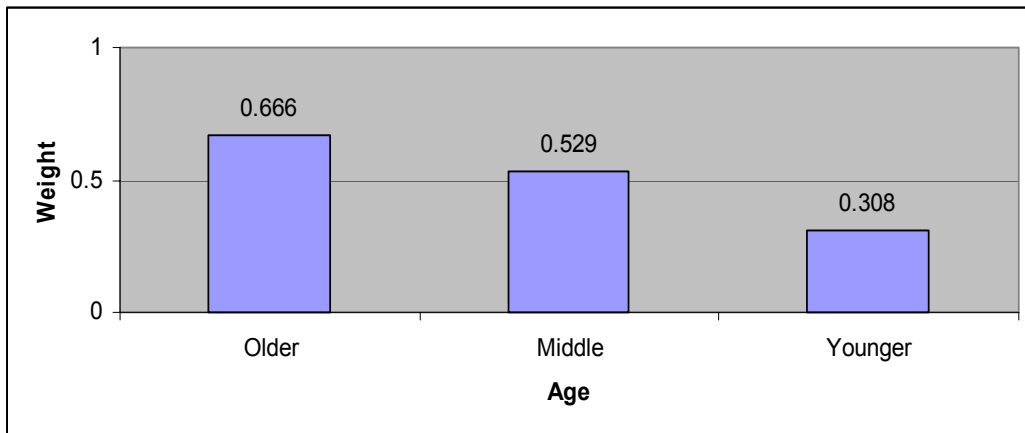


Figure 5.50 Effect of Age on the realization of [i]

As illustrated in this figure, older and middle aged speakers favor /y/→[i] application, while younger speakers disfavored this application. Among the former two, the older group showed greater extent of favor for [i]. This may be understood as an age-grading phenomenon, where younger speakers being recent leavers of schools use the non-prescriptive variant less frequently than elder ones, but as they get older and older, the adherence to the principle once held at school become less and less firm, thus

the simplified variant may sneak in, and the same pattern will be repeated in next generation.

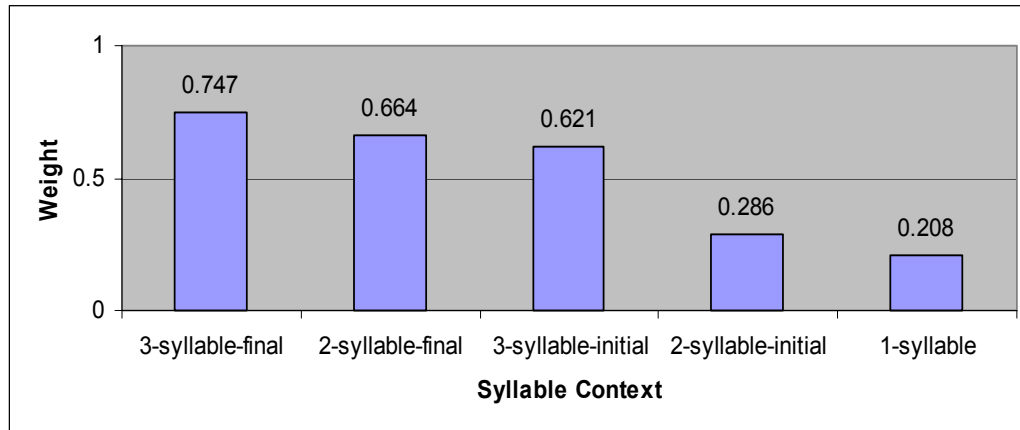


Figure 5.51 Effect of Syllable Context on the realization of [i]

Figure 5.51 illustrates the effect of syllable context on the realization of /y/ as [i]. If we treat one syllable words as belonging to initial syllable category, then a clear pattern we can generalize from this figure is that words with /y/ in final syllable favor [i] application regardless of the difference in the number of syllables in the words. This is understandable since, as we discussed above, word final position is a weaker position, thus more vulnerable to changes. Word initial is a strong position, where changes are less likely to occur, and we do see here that one syllable words and two syllable words with /y/ in initial syllable disfavored [i] application. However, three syllable words with /y/ in initial syllable presents a counterexample by favoring the [i] variant. Further examination of all the tokens of this 3-syllable-initial category revealed that this favor

for [i] was basically due to the great extent of favor for [i] by just one lexical item /hypalju/ ‘gasoline’, while all the rest words of this same category disfavored [i] application, with some showing even zero application of [i]. Thus, it is argued that the phonological strength analysis still holds true with the patterns exhibited in this factor group. The reason why this specific lexical item ‘gasoline’ would favor for [i] application remains to be answered.

To discern the relative importance of these significant factor groups, the stepwise regression analysis result was examined, which showed the following order of choice (left side indicates earlier choice):

Style > Syllable Context > Age

Thus, among these significant factor groups that cumulatively account for the variation, Style was the factor group that accounted for the greatest percentage of variation, and Age, the least percentage of the variation.

Based on the above analysis, I conclude that the overall probability of [i] application is very low. Among the significant factor groups that affected [i] realization, Style played the most important role, and as the simplified variant of /y/, [i] was basically a sentence style marker.

5.3.3.6 VARBRUL Analysis: [u]

In this section, I consider the variable rule of: /y/→[u]/____, where the application value is [u], and all the other variants are considered non-application values.

Again, the first problem was to find the best model to explain the data. A preliminary model (Model D1) was tested that included the four external factor groups

of age, gender, socioeconomic status, style and one comprehensive internal factor group of detailed linguistic context to detect any possible patterns. Examination of results of the Detailed Linguistic Context factor group revealed two points: first, all the words with /y/ in initial syllable disfavored [u] application. While most words with /y/ in final syllable favored [u] application, those where /y/ was immediately preceded by [tʃ] disfavored this rule application, which led to the finding of the second point: for all the words that favored [u] application, the immediately preceding segment to /y/ was one of the following: [u], [o], [a], [k] and [k^h], all of which share the feature of [+back] (Kim-Renaud 1974). Based on these linguistic observations, the factors in the original Detailed Linguistic Context was recoded into five factors as shown in the following table.

Table 5.11 Factors in the modified linguistic context factor group
(words with /y/ in initial syllable and without a preceding segment was recoded as “0”)

Preceding Feature Syllable Position	[+back]	[-back]
initial	1	3
final	2	4

This new model (Model D2), including four external factor groups and a Modified Linguistic Context group was then tested, and the results were compared with those of Model D1.

Model D1: Log likelihood = -81.411, factor group = 4, factors = 12

Model D2: Log likelihood = -83.373, factor group = 4, factors = 10

$G^2 = -3.924$, less than the critical value 5.991 (at $p=0.05$), which means there was no significant difference between the two models and the simpler one, Model D2, was better than Model D1. Table 5.12 below presented the factor groups considered in Model D2.

Table 5.12 Factor groups and factors considered in Model D2
(* indicates significant factor group)

<u>Factor groups</u>	<u>Factors</u>
1* Age	O, M, Y
2 Gender	f, m
3* Socioeconomic Status	H, M, L
4* Style	W, S, G
5* Modified Linguistic Context	0, 1, 2, 3, 4

Table 5.13 below summarizes the results for the varbrual analysis of [u]. The analysis reveals that factor group Gender is not significant, and only those significant groups and factors are listed here.

The input value as listed at the bottom of the table was 0.005, indicating that the overall probability of rule application was extremely low. Below, I examined each of the significant factor groups in their effects on the realization of /y/ as [u].

Table 5.13 Goldvarb probabilities for significant factor groups in Model D2

<u>Factor groups</u>	<u>Factors</u>	<u>Weight</u>	<u>% Application</u>	<u>Total N</u>
1. Age	O	0.632	5	219
	M	0.767	9	205
	Y	0.151	0	138
2. Socioeconomic- Status	M	0.313	2	300
	L	0.687	9	262
3. Style	W	0.210	0	204
	S	0.383	2	164
	G	0.858	13	194
4. Modified- Linguistic- Context	0	0.172	0	167
	2	0.828	8	395

Input=0.005; Log likelihood= -83.373;
Total chi-square=72.126; Chi-square/cell= 1.002

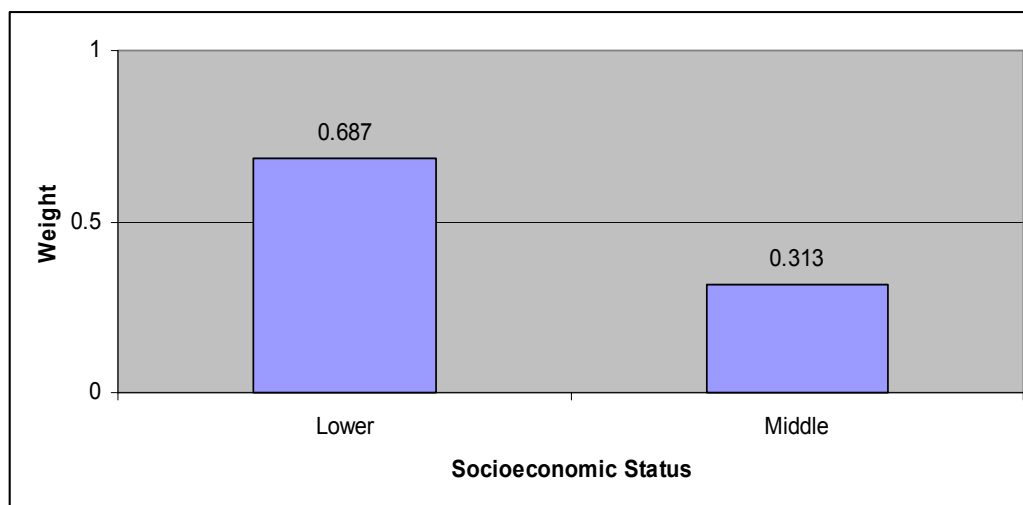


Figure 5.52 Effect of Socioeconomic Status on the realization of [u]

Figure 5.52 presents the effect of socioeconomic status on the realization of /y/ as [u]. We can see that lower class speakers favored /y/→[u] application, while middle class speakers disfavor the [u] variant. This, coupled with the fact that higher class group was a knockout factor with zero application of [u], suggests that [u] is a stigmatized variant of /y/, often related to lower class, poorly educated speakers of the community.

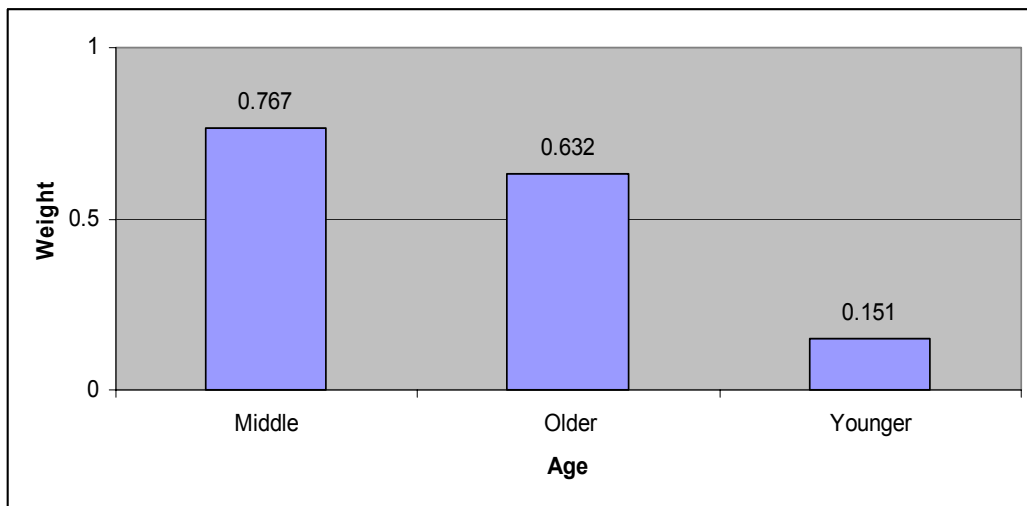


Figure 5.53 Effect of Age on the realization of [u]

As illustrated in Figure 5.53, older and middle aged speakers favor /y/→[u] application, while younger speakers disfavor this application. This may be because younger speakers, being recent leavers of schools, adhered more strictly to the prescriptive form of /y/ that was advocated at school. The fact that middle aged speakers shower greater extent of favor for [u] than did older speakers turned out to be unexpected, given the understanding that [u] is the stigmatized variant of /y/ and middle

aged speakers have been reported to have stronger need than other age groups to adhere to the speech norms of a community (Holmes 1992). Whether a kind of covert prestige is encoded in this [u] variant or not, which may have caused the preference by the middle aged speakers, remains to be explored.

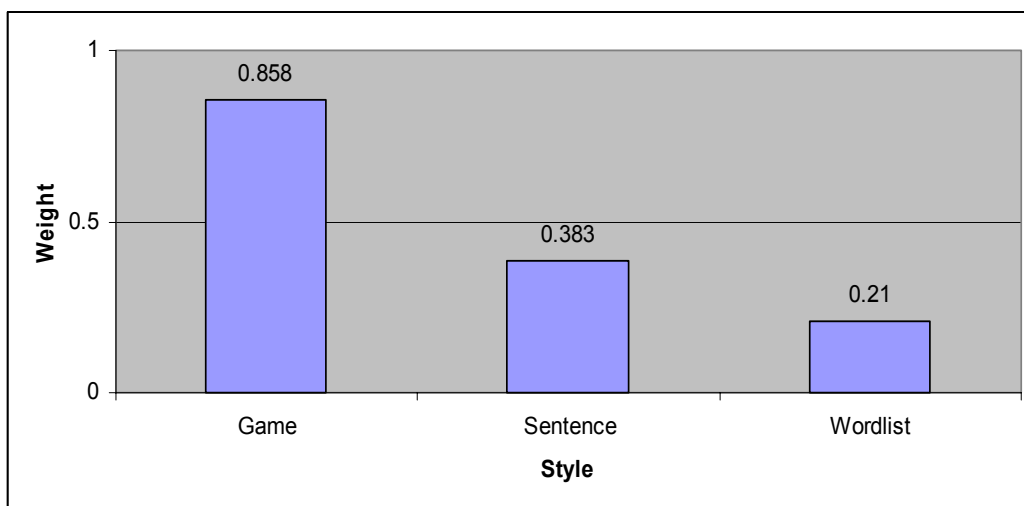


Figure 5.54 Effect of Style on the realization of [u]

This figure shows that [u] application was favored by the casual Game style, but disfavored by more formal Sentence and Wordlist reading styles. This was consistent with the understanding that [u] is the stigmatized variant: while it occurred more frequently in casual settings, its low frequency in formal settings was expected.

The following figure illustrated the effect of modified linguistic context on the realization of /y/ as [u]. To facilitate interpretation, factors of the Modified Linguistic Context group were replaced with the following codes:

0= Initial-None (/y/ in initial syllable and no preceding segment)

1= Initial+Back (words with /y/ in initial syllable and preceding feature of [+back])

2= Final+Back (/y/ in final syllable and the immediately preceding feature was [+back])

3= Initial-Back (words with /y/ in initial syllable and the preceding feature of [-back])

4=Final-Back (words with /y/ in final syllable and the preceding feature of [-back])

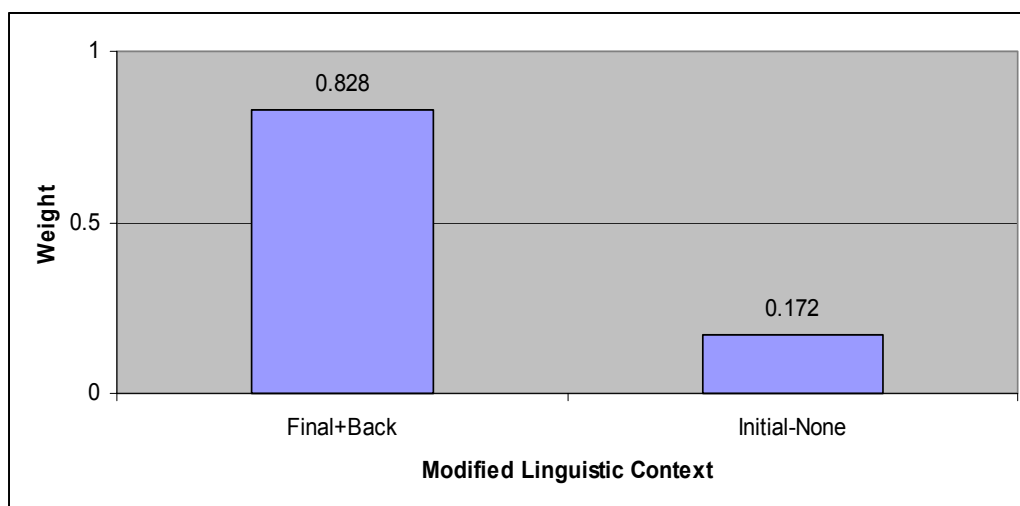


Figure 5.55 Effect of Modified Linguistic Context on the realization of [u]

We can see words with /y/ in final syllable and the immediately preceding feature of [+back] favored [u] application, while those with /y/ in initial syllable and no preceding segment disfavored this rule application. All the rest of the factors not

presented here, i.e. factors 1, 3, and 4, corresponding respectively to words with /y/ in initial syllable and the preceding feature of [+back], words with /y/ in initial syllable and the preceding feature of [-back], and words with /y/ in final syllable and the preceding feature of [-back], were knockout factors with zero application of [u].

These patterns may be explained in terms of syllable position and the [back] feature of the immediately preceding segment. As discussed above, initial syllable position is a phonologically strong position, hence tends to prohibit changes that may occur in phonologically weaker word final syllable position. As to the feature of the immediately preceding segment, we know that adjacent segments could affect each other through phonological assimilation process. In underspecification theory of feature, the default value for a segment in [back] is [-back] (Kenstowicz 1994). Thus, when a [+back] segment immediately precedes a [-back] segment, the former may trigger feature spreading process, leading to the latter segment's assimilation of the [+back] feature of the former. This is exactly what is going on here. Final+Back factor favors /y/→[u] application, because /y/ is in final syllable where changes are more likely to occur and is immediately preceded by [+back] feature that triggers assimilation. Initial-None factor disfavor /y/→[u] application as /y/ is in the strong initial syllable where changes are less likely to take place, and there is no triggering feature [+back] before /y/. Initial+Back factor showed no /y/→[u] application because although there is [+back] feature as a potential trigger of assimilation process, the initial syllable position is so strong that it overrides the triggering capacity of the [+back] feature, making assimilation impossible, so we can say that [+back] feature is a necessary but not

sufficient factor for [u] realization. Final-Back shows no /y/→[u] application because of the absence of a triggering [+back] feature. Initial-Back shows no /y/→[u] application because these words are double locked, i.e. they are in a strong initial syllable and also not preceded by [+back] feature. Thus, linguistically, [u] realization is determined by both syllable position and the presence/absence of [+back] feature.

To discern the relative importance of these significant factor groups, the stepwise regression analysis result was examined, which showed the following order of choice:

Style > Modified Detail Context > Socioeconomic Status > Age

Among the significant factor groups that cumulatively accounted for the variation, Style was the factor group that accounted for the greatest percentage of variation, and Age, the least percentage.

Based on the above analysis, we conclude that the overall probability of [u] application is extremely low. Different from other variants, as a stigmatized variant of /y/, [u] is favored by lower social status group. /y/→[u] application, however, is determined under the matrix of linguistic and social factors.

5.3.4 Discussion

In the above analysis on the status of /y/, we detected in the data four different phonetic variants of /y/, i.e. [y], [i], [u] and [yi]. We claimed that in Chinese Korean, /y/ will remain as an underlying simple vowel /y/, rather than undergoing diphthongization as in the case of Seoul Korean. In the meantime, we did see cases of [yi] as a diphthong variant of /y/, which I claimed to be the prestigious innovative variant. More

specifically, as illustrated in Figures 5.21 and 5.22, we found that female speakers manifested higher percentage of [yi] use than did male speakers, and speakers of higher socioeconomic status showed higher percentage of [yi] use than those of middle socioeconomic status, who in turn showed higher percentage than those of lower socioeconomic status.

To understand these phenomena in Chinese Korean, as a branch of the Korean language in general, one has to integrate the two models of language change, i.e. family tree and wave model. As mentioned in previous chapters, besides the two Korean varieties as represented by Phyengyang Korean and Seoul Korean, the Korean varieties spoken in China and Russia, among many other geographical locations where Korean is also spoken, have developed into independent varieties different from the rest.

In the case of the phoneme /y/, we know that it is completely lost in the branch of Seoul Korean, but in the branch of Chinese Korean, monophthong /y/ is well preserved⁹, and depending on different linguistic and social settings, it also exhibited two other monophthong variants [i] and [u], not reported in other Korean varieties. Thus, family tree model explains the linguistic diversity created and maintained between Chinese Korean and other different branch members of the Korean language.

On the other hand, however, Korean dialect geography also focuses our attention on potential diffusion (Labov 2007) of some features in a wave-like process (Bailey et al 1993) between contacting regional Korean varieties as illustrated in Figure 5.56.

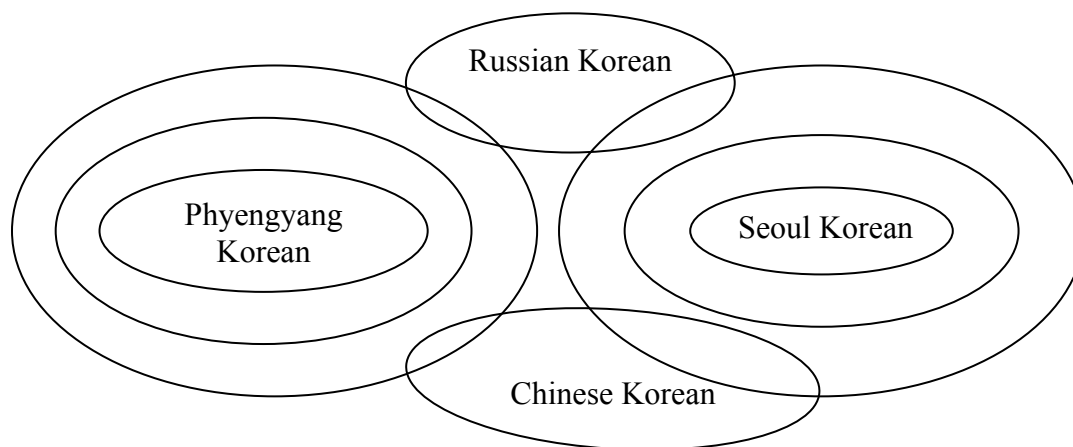


Figure 5.56 Wave model of diffusion between Korean varieties

Since the implementation of the opening-up policy in China in the 1980s, and especially since the establishment of foreign diplomatic relationship between China and Korea, Korean Chinese started to have wider contact with speakers of Seoul Korean via various channels: visiting relative, labor export, international business, cultural exchange, etc. In addition, as evidenced in the subjects' responses in the fieldwork for this study, Seoul Korean is believed by most Chinese Korean speakers to be more beautiful and modern. Thus, it is possible that certain features of Seoul Korean may diffuse into Chinese Korean through the daily contact between the speakers from the two camps. And this is what we think the underlying mechanism for the occurrence of the diphthong variant for /y/ in Chinese Korean.

⁹ The status of /y/ in other branch Korean varieties is not clear due to the lack of relevant study or impossibility to get access to the studies if they exist.

Although it is possible that the Chinese Korean diphthong variant may have occurred as a result of language internal factors, such as achieving symmetry in the simple vowel phoneme system (/y/ being the only remaining front rounded vowel), one simply cannot ignore the strong effect of external factors exerted on the realization of the diphthong variant: female speakers, who have often been reported as more sensitive to prestige form than their male counterparts (Labov 1972), manifested higher percentage of the use of the diphthong than did male speakers; speakers' socioeconomic status was mirrored proportionally in their frequency of the use of the diphthong variant. Moreover, the greatest extent of favor for the diphthong variant was manifested by the middle-aged, high socioeconomic status subjects, which was the group that served as the pivot of this speech community, had the strongest need to adhere to the norms of the social speech (Homes 1992), especially those prestigious ones, built up a social network with the Seoul Korean speakers through various exchanges in the areas of education and culture, and international business, which may have channeled the diffusion of the prestigious diphthong variant from Seoul Korean speech community into this Korean community in China.

In the meantime, this diffusion of the diphthong variant of /y/ encounters the conflicting force from two sources: one is the preservative force for the monophthong [y] because it is the prescriptive form established in the language policy (Chui and Quan 1993) and the other comes from the reinforcing effect from the Chinese language which also has /y/ in its underlying phoneme system. For example, /ny/ (tone four, 女) 'woman', /ly/ (tone four, 绿) 'green'. Since the Korean Chinese are bilingual in both

Chinese and Korean, and they use Chinese very frequently in their daily communication in the larger Chinese setting, it is understandable that the /y/ in their Chinese will reinforce the maintenance of /y/ in their Korean. Thus, in face of these opposing effects, the journey of the diffusion of the diphthong variant of /y/ from the sister dialect of Seoul Korean into the Chinese Korean community will not be a smooth one, as was manifested in the low statistic figures about the diphthong variant of /y/ reported in the study. Yet, slow and weak as it is, the wave is coming in.

Hence I believe that a sound analysis on the patterns of variation and change of the high front rounded vowel /y/ in Chinese Korean should incorporate both family tree model and wave model. Family tree model explains the linguistic diversity created and maintained, through internal mechanisms inherent in the different systems of the speech communities, between Chinese Korean and other different branch members of the Korean language, while the wave model reflects the effects of diffusion through dialect contact between contiguous Korean communities.

5.4 Conclusion

This chapter discusses the status of the two front rounded vowels /ø/ and /y/ in Chinese Korean. Results of the analysis reveal that the mid front rounded vowel /ø/ has completely undergone a sound change of diphthongization into [we] and is no longer present in the simple vowel system of current Chinese Korean. The high front rounded vowel /y/, however, presents a much more complicated picture with four different phonetic realizations, [y], [yi], [i] and [u], among which [y] dominates about 80% of the

cases. Moreover, distribution of [y] along the age dimension exhibits an increasing tendency towards the younger end, forming a contrast with the rest variants that showed a decreasing tendency. These patterns of variation suggest that instead of undergoing diphthongization as has been the case in Seoul Korean, /y/ will continue to exist in the simple vowel phoneme system of Chinese Korean.

Examination of the distribution of the four variants in terms of the external factors such as age, gender, style, and socioeconomic status revealed different detailed patterns. The [y] variant showed stratification in style and gender in the older subject group. Gender stratification was also found in subjects of high socioeconomic status with male subjects showing significantly higher percentage of [y] than female subjects. In terms of socioeconomic status, subjects of higher group showed lowest percentage of [y] in all styles, and those of lower group showed highest percentage of [y], and those of middle group stood in between. The second variant, [yi], showed style stratification among old subjects with significantly lower percentage in sentence style than in both game and wordlist styles. Male speakers tended to use significantly lower percentage of [yi] than female speakers. Subjects of higher socioeconomic status showed highest percentage of [yi], and those of lower status showed lowest percentage, with those of middle status standing in between. The third variant, [i], showed clear style stratification among older and middle aged subject groups, with young subjects manifesting a tendency of significant difference between sentence style and the other two styles. As to the fourth variant, [u], middle-aged subjects produced significantly higher percentage of [u] than younger subjects, and its percentage in game style tended

to be significantly higher than those in more formal wordlist and sentence styles. Also, subjects of lower socioeconomic status produced significantly higher percentage of [u] in game style than both higher and middle status groups.

Further variable rule analysis on the four variants of /y/ in Chinese Korean reveals that [y] occurrence is more favored by word-initial-syllable position; [yi] as a prestigious innovative form is more favored by female and upper class subjects; [i] is basically a sentence reading style marker; and [u] as a stigmatized form is more common among lower class subjects and in casual style. The [u] variant is also more likely to occur when the immediately preceding segment exhibits the feature of [+back].

While the patterns observed above are explicable as reflexes of language-internal variability such as aiming for a simplified symmetrical simple vowel system, one must also consider the possibility of a role played by language and dialect contact. For example, the existence of similar phonemes such as /y/ in Chinese may be a reinforcing factor for the maintenance of /y/ in Chinese Korean. In a similar vein, there appears to be influence from contact between speakers of Chinese Korean and Seoul Korean, which may have introduced diphthongization of the front rounded vowel among Korean speakers living in Shenyang. Hence it is hereby suggested that a sound analysis of the current status of the two front rounded vowels has to incorporate both the family tree model that explains the linguistic diversity created and maintained between different branches of the family and the wave model that explains the linguistic similarity as a result of the diffusion process of some features from one Korean variety to another contiguous Korean variety.

CHAPTER 6

CONCLUSION

This chapter summarizes the findings of this study on Chinese Korean and discusses the implications for Korean language development and also for the study of language variation and change in general.

6.1 Summary

This study investigates the status of the sound system of contemporary Chinese Korean in terms of three variables: VOT of consonant stops, high front rounded vowel /y/ and mid front rounded vowel /ø/.

The VOT variable is addressed in Chapter Four. Findings about this variable indicate that the patterns exhibited in various acoustic dimensions in Chinese Korean are consistent with those found in the studies of Seoul Korean (e.g. Han and Weitzman 1970, Silva 1992, Cho 1996, Han 1996).

Acoustic and statistical analysis of the data reveals a diachronic shift in VOT in stops of word initial position. The range of mean VOT values has shrunk over time both in terms of place of articulation and phonation type of the stops. In terms of place of articulation, the distinction among the three categories of labial, alveolar and velar stops are maintained while in terms of phonation type, there is a three-way to two-way VOT shift over time: older speakers show clear distinction in mean VOT values between all

the three phonation categories, but younger speakers born in and after 1970 manifest a merger in VOT values between aspirated and lax stops, though they both are clearly distinct from tense stops, suggesting the insufficient role of VOT in separating the three stop categories in Chinese Korean.

Word internally, we see that stops of different phonation types manifest different features: tense and aspirated stops remain voiceless across speakers as in word initial position, but lax stops exhibit different realizations: as stops that are fully voiced, or partially voiced, or voiceless; as a fricative; and as an approximant. Accordingly, stops in word internal position then have three different VOT patterns: negative VOT, positive VOT, and VOT irrelevant cases of fricative and approximant variants. Analysis on positive VOT cases shows that mean VOT of aspirated stops is significantly longer than those of tense and lax stops, and there is a merger between the latter two. Different from word initial position, this word internal merger is not limited to younger speakers; rather it is consistent across different age groups.

Examination on the Δ VOT data suggests the observed VOT shift is a language change in apparent time. This internal change is generated by the process of incrementation in the transmission within the Chinese Korean speech community with successive generations advancing the change in the same direction beyond the level of their previous generations. Transmission of the change internal to the system of the Chinese Korean speech community further justifies its status as a branch different from others through the maintenance of the distance between them. However, it does not preclude possible convergence between paralleling branches. The different VOT change

patterns observed in different locations suggest that the three-way VOT system in Korean stops is shifting towards a simpler two-way system, albeit in different ways.

In the examination of other acoustic dimensions that may cue the phonation type of stops, we found that mean F0 onset and offset are significantly higher after aspirated and tense stops than after lax stops, but no significant difference was found between the former. Thus, I conclude that F0 and VOT complement each other in marking the distinction of three different categories of stops: F0 can separate lax stops from tense and aspirated stops, but not between the latter, while VOT can separate tense stops from lax and aspirated stops but not between the latter.

The length of the vowel immediately after the stop, however, has been found to be able to mark the stop categories independently. Across subject age groups, vowel length consistently patterns with the phonation type of the preceding stop: longest after tense stop, shortest after aspirated stops, and intermediate after lax stops. These findings corroborate those of Cho (1996).

Intensity build-up takes a longer time after lax stops than after tense and aspirated stops, and this pattern is true across speakers of different generations. However, this difference is not statistically significant for the younger group of speakers though it is for the older group. This inconsistency suggests that intensity build-up may only function as a secondary cue for stop distinction.

Word internally, the only other acoustic measure that contributes to stop distinction is stop closure duration. Closure period of lax stops were significantly shorter than those of both tense and aspirated stops, but no significant difference

between the latter, revealing a complementary functions played by stop closure and VOT in the distinction of different types of stops.

The status of the two front rounded vowels /ø/ and /y/ in Chinese Korean is discussed in chapter Five. We see that the mid front rounded vowel /ø/ has completely undergone diphthongization into [we] and is no longer present in the simple vowel system of current Chinese Korean. As to the high front rounded vowel /y/, we conclude that instead of undergoing diphthongization as has been the case in Seoul Korean, /y/ will continue to exist in the simple vowel phoneme system of Chinese Korean. This conclusion is based on the following facts: /y/ manifests four different phonetic realizations of [y], [yi], [i] and [u], among which [y] dominates about 81% of the cases, [yi] about 11%, [i] and [u] about 6% and 2% respectively. In addition, the distribution of [y] along the age dimension exhibits an increasing tendency towards the younger end, forming a contrast with the rest variants that showed a decreasing tendency.

Examination of the distribution of the four variants in terms of all the external factors such as age, gender, style, and socioeconomic status revealed different detailed patterns. Variant [y] showed stratification in style in the older subject group with higher percentage of [y] showing in the formal sentence and word reading styles than in casual game style. Gender stratification of [y] was found in the older subject group and higher socioeconomic status group with male subjects showing significantly higher percentage of [y] than female subjects. In terms of socioeconomic status, subjects of higher group

showed lowest percentage of [y] in all styles, and those of lower group showed highest percentage of [y], and those of middle group stood in between.

The second variant [yi] showed style stratification among older speakers with significantly lower percentage in sentence style than in both game and wordlist styles. Male speakers tended to use significantly lower percentage of [yi] than female speakers. Speakers of higher socioeconomic status showed highest percentage of [yi], and those of lower status showed lowest percentage, with those of middle status standing in between.

The third variant [i] showed clear style stratification among older and middle aged subject groups with a significantly higher percentage in sentence style than in game and wordlist styles where isolated words were elicited. Younger speakers manifest a tendency of such significant difference between sentence style and the other two styles.

As to the fourth variant [u], middle-aged subjects produced significantly higher percentage of [u] than younger subjects, and its percentage in game style tended to be significantly higher than those in more formal word and sentence reading styles. Also, subjects of lower socioeconomic status produced significantly higher percentage of [u] in game style than both higher and middle status groups.

Further variable rule analysis on the four variants of /y/ in Chinese Korean reveals that [y] occurrence is more favored by word-initial-syllable position; [yi] as a prestigious innovative form is more favored by female and upper class speakers; [i] is basically a sentence reading style marker; and [u] as a stigmatized form is more

common among lower class speakers and in casual style. The [u] variant is also more likely to occur when the immediately preceding segment exhibits the feature of [+back].

While the patterns observed above are explicable as reflexes of language variability embedded in the matrix of various linguistic and social factors, one must also consider the possibility of a role played by language and dialect contact. The existence of similar phoneme, /y/, in Chinese is a reinforcing factor for the maintenance of /y/ in Chinese Korean, which has undergone diphthongization outside China in Seoul Korean. This preservation of native material in a language due to language contact has also been reported in the studies of languages other than Korean. For example, in Andean Spanish /ɣ/ is contrastive to /y/, while in the rest of Latin American Spanish /ɣ/ has merged with /y/. This preservation of the contrast in Andean Spanish has been attributed to contact with Quechua and Aymara, native languages which also contain /ɣ/ (Campbell 1985:38).

On the other hand, there also appears to be the influence from the dialect contact between speakers of Chinese Korean and Seoul Korean, which is believed to have channeled the diffusion of diphthongization of the high front rounded vowel into Korean speakers living in Shenyang. As mentioned previously in chapter one, since the establishment of foreign diplomatic relationship between China and Korea, a strong “Korean Wind” has started to blow into the Chinese Korean community. With it come not only Seoul fashions, entertainments, products, etc., but also the dialect influence from South Korea, as commented by the two representative subjects in this study:

“...예 텔레비 많이 보죠. 한국제목에는 제가 우리 집 사람들이 한국 드라마라든가 그 한국 KBS 라든가 이런것을 많이 보거든요. 저같은 경우에는 한국에 대한 그 뉴스분석이라든가 이런걸 많이 보고...한국 드라마라든가 보게 되면 지금 새로 나오는 그 명사라든가 혹은 그 사회적으로 이런 어떤 새로 나오는 현상들에 대하여 가지고 간명하고 간단명료하게 표현할 때는 그 영향도 많이 받게 되더라고요...” (...Yeah, we watch TV a lot. Of the South Korean TV programs, my family often watches South Korean drama, KBS, etc. As to myself, I often watch such program as news analysis of South Korea... Since we watch programs such as South Korean drama, it has influenced us a lot in the use of new nouns, and when we simply comment on certain newly occurring phenomena in the society...) --- My translation

“... 학교 다닐때도 거의 많은 선생님들이 가르치는것이 다 뭐 북한 말씨로 많이 가르치잖아요. 그래서 저도 처음에는 그런 말을 많이 했었는데 후에 일하면서 한국분들이랑 계속 얘기하면서 말도 좀 바뀐것 같아요...” (...When I was in school, the majority of the teachers instructed in northern accent, so at the beginning I spoke a lot in that dialect, too. But later during my work, I have constant talks with people from South Korea. It seems as if my speech has somewhat changed ...) --- My translation

As we see from these representative comments, the influence from South Korea where the Seoul Korean is the standard is obviously there in the Chinese Korean speech community in Shenyang. In addition, the positive attitude that most Korean Chinese have towards Seoul Korean makes it possible for their speech accommodation to occur during the dialect contact. As I found in this study, about 90% of the Korean Chinese subjects considered Seoul Korean to be beautiful. Thus, among other things, the current situation of Chinese Korean is a result of language contact between Chinese and Korean, and also dialect contact between Chinese Korean and Seoul Korean.

Given the observed patterns of variation and change exhibited by the three variables studied here, it is suggested that a sound analysis on the current status of the two front rounded vowels in Chinese Korean has to incorporate both the family tree model that explains the linguistic diversity created and maintained between different branches of the Korean family and the wave model that explains the linguistic similarity as a result of the diffusion process of some features from Seoul Korean variety to Chinese Korean variety.

6.2 Implications

The implications of this study are two-fold: implication for the study of Korean language maintenance, change and development and implication for the study of language variation and change in general.

6.2.1 For the Study of Korean Language Maintenance and Development

As one of the first systematic studies on the sound system of Chinese Korean, an understudied variety of Korean, this study sheds new light on the understanding of Korean language maintenance, variation and change.

Maintenance of Korean language in a non-Korean dominant country is relevant to multiple factors in the host society. We know that outside Korean Peninsula, Korean language is best maintained by the 2 million Korean Chinese (Jin 2003). While a shift from Korean language to the dominant language, be it Spanish, English, Russian, etc. depending on the host country where Koreans immigrated to, has been reported to occur between the first and the second generation or between the second and third generation of Korean immigrants (Choi 2007, Guan 2001, Vincent 1994), no similar kind of quick

language shift is found among Korean Chinese. In the current study, all the subjects, including the third and the fourth generation Korean Chinese speak fluent Korean. Other studies conducted in China revealed that about over 90% of Korean Chinese speak Korean (Guan 2001).

This better preservation of Korean language in a host country outside Korean Peninsula is attributed to several causes, ranging from their immigration history and population, the attitude of ethnic Korean people themselves towards their language, culture, and identity, to the government policies and their implement in the host country.

As mentioned in chapter one, of the Korean people scattered around the world outside the Korean Peninsula, Korean Chinese are the highest in population with about two million people today and they also have the longest history of immigration, with the large bulk of immigration occurring after the mid 19th century (Zhao & Xuan 1986). Other ethnic Korean groups, however, are lower in population and experienced relatively shorter immigration history. For example, according to 2000 US Census, Korean American are over one million, and massive Korean family immigration into US did not emerge until 1965; Korean Paraguayan has a population less than 22,000 and the first group of Korean families arrived in Paraguay in 1965 (Choi 2007). Thus, while many ethnic Korean in other foreign countries have just settled or still in the process of settling, those in China had already had their root deeply planted in the Chinese soil. One generation after another, the majority of Korean Chinese live concentrated in large Korean autonomous regions where Korean is the official language

together with Chinese and where they can receive complete education, from kindergarten to higher education, in their ethnic language, warranting thereby the successful transmission of Korean language and culture from one generation to next. This is unseen in any other Korean community in a foreign country. In the Korean communities in US, for example, there is no Korean autonomous region or Korean ethnic school where content courses are taught in Korean, though Korean language schools are found, which are often reported as unsuccessful in the long-term maintenance of the heritage language (Huebner & Uyechi 2004, Choi 2007).

The maintenance of Korean is also related to the attitude of Korean people themselves towards their language, culture, and identity. In China, after hundreds of years of acculturation with the mainstream Han culture in China, Korean Chinese have developed double identity: Chinese nationality and Korean ethnicity (Choi 2001). On one hand, as citizens of China, they are never a target of discrimination, but are part of what constitute China and enjoy equal rights with other 55 ethnic groups including Han. They actively participate in the mainstream social-cultural life and contribute to the development of the country. In each level of the government administration and also in the army, there are Korean Chinese (Guan 2001). This status of being equal provides an environment conducive to the maintenance of Korean language in China in that Korean Chinese people, together with their language and culture, are considered to be equally important, providing thereby an “additive” linguistic environment where diversity is the goal. A different situation, however, has been reported in Korean communities in other foreign countries. Yu (1980), for example, commented that a Korean in US will be

forced to remain outside the inner social circles of the white majority in spite of his or her full assimilation to American culture. The dominance of the mainstream language and culture in US leads to “a ‘subtractive’ linguistic situation that encourages not only a shift from the minority language to English but also the loss of their heritage language” (Choi 2007: 16), hence the rapid pace of Korean to English shift between the first and second generation of Korean immigrants in US.

On the other hand, Korean Chinese cherish pride in their Korean ethnicity. Of the 55 minorities, Korean Chinese are among the most advanced in many areas including education, culture, economy, etc. Nationwide, their illiteracy rate is the lowest and college attendance rate is the highest (Choi 2001). They have established five ethnic Korean publishing companies, six Korean newspapers, sixteen Korean magazines, and four Korean TV stations (Huang 2001). In economy, the Korean Chinese have been experiencing a new period of boom since the establishment of foreign diplomatic relationship between China and South Korea in 1992. Yanbian Autonomous Prefecture, for example, reached 1.03 billion Yuan in 2002 in its international trade with South Korea, and annual income from tourism was 2.8 billion Yuan (Cui 2004). Thus, Korean Chinese have cherished a pride in their ethnic identity and maintained a strong sense of Korean ethnicity by using their own language, attending ethnic schools, observing their ethnic customs and traditions, etc. In the field work for this study, all the Korean Chinese I encountered, as represented by one subject below, believe that because they are ethnic Korean, they should speak Korean well:

“...애한테 늘 제가 이렇게 얘기하곤 해요. 앞으로는 이제 어차피 이 애들은 이제 앞으로는 어디에 가서 어떻게 생활할지 모르겠지만 지금까지는 중국땅에서 중국사람들하고 교제를 하면서 살아가야 하니까 일단은 중국말도 잘 해야 한다, 하지만 조선민족이니까 우리 조선말도 잘 해야 된다...” (...I always tell the kid this: we don't know where the kids will go and how they'd lead their lives in the future, but up to now, they need to live on in China, associating with Han people, so they need to speak good Chinese now. But since we are ethnic Korean, we should speak our Korean well, too...) ---My translation

Such a strong belief in the causal relationship between being an ethnic Korean and speaking Korean well is prevalent in China. Obviously, it has been an important contributing factor in the successful maintenance of Korean language in China.

One last but not least important factor for the Korean maintenance in a foreign country has to do with the government policy in the host country. In China, the Chinese government has been advocating and stipulating the concept of equality between the 56 ethnic groups in China regardless of their differences in population, area, level of economic development, language, religion, customs and tradition. The Constitution also stipulates that in places where the minorities live in aggregation, different levels of autonomous regions should be established, where the ethnic language is used as the official language together with Mandarin Chinese and the minorities enjoy their right to decide on their own interior affairs. It also stipulates that minorities have the right to use and develop their own languages and the freedom to maintain and change their ethnic customs, traditions and religious belief, and that the central government should help the minorities in the development of their politics, economy, culture and education (Huang 2001). Under these guidelines, the Chinese government has been taking a series of practical measures to implement the policies. For example, 159 ethnic autonomous

regions have established where 70% of the minority people now live; since 1990, the Chinese government has been allocating special funds for minority education; and minority people are allowed to have two children while the general birth control policy permits one child per family (Huang 2001, Jin 2001). Thus, the Chinese government has established a protective legal environment conducive to the maintenance of ethnic languages, including Korean, in China. However, nothing similar has been reported in any other country where Koreans immigrated to, hence their rapid pace of the loss of the Korean heritage language comes as no surprise.

Thus, we conclude that maintenance of the ethnic Korean language in a host country is related to multi-dimensions of the host society. It is better maintained when the Korean immigrants cherish positive attitude towards their own ethnic identity, when the overall linguistic environment is “additive” rather than “subtractive”, and when the legislation system in the host country provides a favorable environment for the transmission of the ethnic language.

In terms of Korean language development, this study reveals interesting patterns of variation and change. The existence of a diachronic VOT shift in this study of Chinese Korean, coupled with other two findings of VOT shift in different geographical locations, suggests that Korean language may be undergoing a general shift from a 3-way to 2-way distinction in VOT of the consonant stops, thereby achieving a change towards a universally less marked system.

In the aspect of the simple vowel system, I now present the current Chinese Korean system as the following. The current Seoul Standard Korean system is also provided below for contrast.

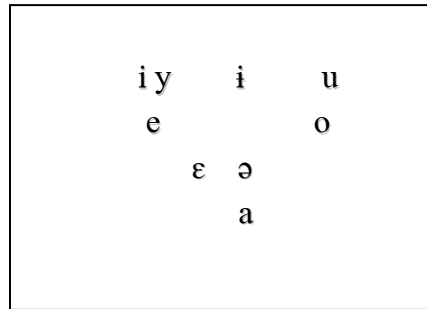


Figure 6.1 Simple vowel system of current Chinese Korean¹⁰

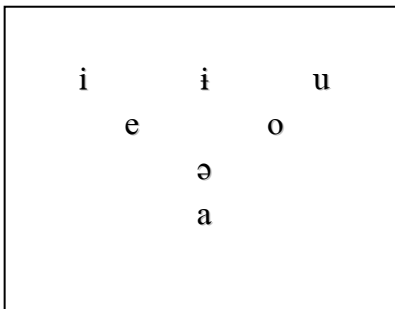


Figure 6.2 Simple vowel system of current Seoul Standard Korean
(source: Kang 1997)

Recall that in Seoul Korean, the two front rounded vowels have undergone complete diphthongization and are no longer present in the simple vowel system, resulting in a beautiful symmetrical system as shown in figure 6.2. In Chinese Korean, the mid front rounded vowel /ø/, but not the high front rounded vowel /y/, has

undergone a complete diphthongization as in Seoul Korean. So we suggest here that the internal structural pressure (with /ø/ and /y/ being the only front rounded vowels) has been a driving force for the diphthongization of the two underlying monophthongs in Korean language. The “escape” of /y/ in Chinese Korean from this general process in Korean language is a result of the two conflicting forces, i.e. the internal structural pressure that prompts diphthongization and the reinforcement of /y/ from Chinese language, obviously with the latter winning the “battle” (note that Chinese does not have /ø/, thus no similar reinforcement for this segment). The appearance of the diphthong variant [yi] for /y/ in Chinese Korean as reported above is not due to any weakening of the influence from Chinese, rather, as suggested by the VARBRUL analysis, it is the result of diffusion of the diphthong from the Seoul Korean since the dialect contact between Seoul Korean and Chinese Korean became possible starting from 1980s. Thus, /y/ in Chinese Korean is now under the influence of triple forces: the internal structural pressure, the diffusion from Seoul Korean, and the reinforcement from Chinese. While the former two foster diphthongization, the latter helps preserve the monophthong form. What we see now in the Chinese Korean data is the co-existence of monophthong and diphthong variants for /y/. It may be possible, as suggested by the implicational model, that over a long period of time the co-existence of the two variants may continue until the new innovative form becomes categorical in due time through complete acceptance by all the speakers. However, given the counter effect from the Chinese language, this

¹⁰ Note that since the status of the two middle front un-rounded vowels /e/ and /ɛ/ vowels /e/ and /ɛ/ is beyond the scope of this current study, they are presented there following Xuan et al. (1991).

process may be longer than normally needed, or may even not happen, depending on the language attitude of the speakers, and also many other socio-political factors.

Thus, we see that the relationship between Chinese Korean and its family members is two dimensional: on the one hand, as a descendant of the Korean language, Chinese Korean is different from other varieties. As reported in this study, the transmission of features such as the VOT shift and monophthong /y/ within the Chinese Korean speech community from one generation to next justifies its continuity as a branch of Korean language. On the other hand, Chinese Korean, and the rest of the family members, too, does not stand in isolation. Instead, contiguous varieties often influence each other during the mutual contact, channeling the possible diffusion of certain features from one variety to another in a wave like model, fostering thereby certain similarity between the contacting varieties of Korean language.

6.2.2 For the Study of Language Variation and Change in General

As mentioned in chapter two, studies on language variation and change in eastern context have been underrepresented in the literature (Guy 2003). Although this is a study specifically relevant to Chinese Korean, its implications extend beyond this individual case.

This study suggests basically that the eastern context, with different social settings from those of the west, does not necessarily lead to different mechanism for language variation and change, or different sociolinguistic patterns. We see that the driving forces for language variation and change could be categorized as coming from two sources: language internal, such as the structural pressure as in the case of

diphthongization of mid front rounded vowel /ø/ and universal grammar as in the case of VOT shift, and dialect contact as in the case of diffusion of the diphthong variant of /y/.

In terms of the various social factors, we found that females lead in the propagation of innovative form as in the case of the diffusion of the prestigious form [yi]; speakers of higher social status use highest percentage of prestigious form, while speakers of lower status use lowest percentage, and those of intermediate status stand in the middle; age is the primary factor in internal change as in VOT shift; as style shifts from more formal to more casual situation, non-standard forms tend to rise in frequency.

Thus, findings of this study basically confirm Labovian principles and are consistent with the patterns observed in the western context. However, one should be cautioned not to jump to the conclusion that all the patterns in eastern context would be exactly the same as in the western context. For example, while it is widely believed that language contact often lead to language change, we see here a counterexample where the contact between Chinese language and Chinese Korean leads not to a change, but to the preservation of the underlying phoneme in Chinese Korean. Moreover, when different languages and dialects come into contact, as in our case Chinese Korean contacts with both Chinese and Seoul Korean, the change, if any, would be the result of the two incoming conflicting forces. Thus, variation and change in the context of language contact deserves careful scrutinization of the interaction between different forces present in the target speech community.

A final point that this study may raise to our attention is more theoretically oriented. As discussed in this study, a sound analysis on the current status of Chinese Korean has to incorporate both the family tree model that explains the linguistic diversity created and maintained between different branches of the Korean family and the wave model that explains the linguistic similarity as a result of the diffusion process of some features from one Korean variety to another contiguous Korean variety. Thus, while the quantitative paradigm allows us to draw conclusions at the concrete level about the patterns of language variation and change based on the quantitative data, at the higher more abstract level, explanations of language variation and change also need to incorporate an integration of the family tree model and the wave model.

Chinese Korean provides a rich laboratory for the study of language variation and change. Further studies will need to systematically incorporate other Korean varieties spoken in Korea, Japan, Russia, Brazil, etc. to better understand the mechanism, direction and course of Korean language change and development.

APPENDIX A

QUESTIONNAIRE

설문지

답하여 주신 모든 내용은 연구목적으로만 사용되겠습니다.

1.이름:

2.성별:

3.출생년월:

4.출생지:

5.직업:

6.본적지:

7.심양으로 이주해 올 당시의 나이는? (신양에서 태어나지 않은 경우):

8.다른 지역에서 살아 본적이 있나요? 있다면, 어디에서 얼마나 오랫동안?

9.월수입: (학생의 경우는 아버지의 수입; 가정주부인 경우 배우자의 수입)

10.당신의 최종학력:

11.배우자의 직업:

배우자의 고향:

배우자의 최종학력:

12.아버지의 고향:

어머니의 고향:

13.아버지의 직업:

어머니의 직업:

14.아버지의 최종학력:

어머니의 최종학력:

APPENDIX B

TOPICS FOR CASUAL CONVERSATION

회화제목

이부분에서는 다음 제목에 따라 조사가원이 피험자와 회화를 할 것이다.

1. 당신 혹은 당신의 가족은 언제, 어떻게 돼서 중국으로 오게 되었나요?
2. 심양에서 산지는 얼마나 오래되었나요? 심양에 살면서 좋은 점과 나쁜 점은 무엇이라고 생각하나요? 당신의 이웃을 좋아하나요?
3. 당신은 얼마나 자주 그리고 주로 어디에서 누구하고 한국어와 중국어를 사용하나요?
4. 서울표준어에 대해서 어떻게 생각하나요? 서울표준어가 중국에서 사용되는 한국어보다 더 낮거나 고급언어라고 생각하나요?
5. 서울에 가본적이 있나요? (있다면, 느낌이 어떠했나요?) / 서울에 가 보기를 원하나요? (그렇다면, 이유는?)
6. 학교에서는 어떤 과목을 좋아했거나 좋아하나요?
7. 어드른 선생님을 제일 좋아하나요? 이유는?
8. 얼마나 자주 쇼핑을 가나요? 어디로?
9. 가장 좋아하는 영화 / TV 프로그램 / 소설은?
10. 당신의 취미는?
11. 정기적으로 운동을 하나요? 좋아하는 스포츠는?
12. 데이트비용은 누가 지불해야 한다고 생각하나요?
13. 당신은 어떤 대남자와 결혼하고 싶습니까?
14. 당신은 조부모와 함께 사는 대가족제도를 좋아합니까? 아니면 부모 혹은 자녀만 함께 사는 핵가족제도를 좋아합니까?
15. 살아오면서 잊지 못할 기억이 있어요? 생명의 위협을 느꼈던 때 혹은 이해할 수 없는 일이 일어난 적?

APPENDIX C

MATCHING GAME

대등놀이

조사원이 제공한 중국단어를 조선어로 빨리대등하세요.

- | | |
|--------------|-------------|
| 1. 钥匙 | 29. 口哨 |
| 2. 喂养间 | 30. 罪 |
| 3. 外甥女 | 31. 五十 |
| 4. 老鼠 | 32. 冷 |
| 5. 瓢 | 34. 钉子 |
| 6. 胃 | 35. 快 |
| 7. 开线了 | 36. 打字机 |
| 8. 热（名词） | 37. 车轮 |
| 9. 乌鸦 | 38. 休息 |
| 10. 草房 | 39. 女婿 |
| 11. 扁斧 | 40. 针线活 |
| 12. 血海 | 41. 马苍蝇 |
| 13. 毛驴 | 42. 独生女 |
| 15. 危险 | 43. 包裹 |
| 16. 糖精 | 44. 牙（土语） |
| 17. 焦急 | 45. 皮鞋 |
| 18. 汽油 | 46. 眼皮 |
| 19. 社会 | 47. 松鼠 |
| 20. 晒（太阳/通风） | 48. 徽章 |
| 21. 舅舅 | 49. 姐 |
| 22. 耳朵 | 50. 独生子 |
| 23. 左手 | 51. 手擀面/加拿大 |
| 24. 后 | |
| 25. 岩石 | |
| 26. 葱根 | |
| 27. 大酱 | |
| 28. 卫生 | |

APPENDIX D

SENTENCE READING

문장읽기: 다음 문장을 자연스럽게 큰 소리로 읽어 주세요.

- 1.경자의 외삼촌은 왼손으로 외양간의 쇠를 열고 바람을 쐼다.
- 2.연리가 따오기를 봤다.
- 3.윤정은 눈까풀이 부었다.
- 4.그 위험한 바위 밑에는 취나물이 없고 웬 바퀴 하나가 있다.
- 5.문협은 해파리를 좋아해요.
- 6.그 혜성을 애타게도 기다렸다.
- 7.그 로인은 칼국수를 먹었다.
- 8.량식도 없고 유리도 깨지고 휘발유도 다 흘러서 야단이 났다.
- 9.학교는 피바다가 되었다.
- 10.까만머리가 파뿌리가 되었다.
- 11.나무에는 까마귀가 있다.
- 12.병철은 조카딸을 만났다.
- 13.비행기는 빠르게도 난다.
- 14.뒤집 낚는 귀도 쏘고 위도 아파서 쉬지 못하고 병원으로 갔다.
- 15.리혼한 그 외아들은 희망이 없는 사회죄인이 됐다.
- 16.정여는 다람쥐를 봤다.
- 17.모레 그는 가족신을 산다.
- 18.길련은 이빠디가 아팠다.
- 19.그 집 사위가 휘장을 달고 휘파람을 불며 동네에 다녔다.
- 20.리영은 모다구를 박았다.
- 21.명희가 바가지를 말렸다.
- 22.그가 타자기를 고쳤다.
23. 옛날엔 할매는 힘이세여 보따리를 메고 다녔다.

APPENDIX E

WORDLIST READING

단어읽기

다음 매 단어를 큰 소리로 세번씩 읽어 주세요.

- | | |
|-----------|-------------|
| 1. 쇠 | 27. 된장 |
| 2. 외양간 | 28. 위생 |
| 3. 조카딸 | 29. 휘파람 |
| 4. 쥐 | 30. 죄 |
| 5. 바가지 | 31. 원 |
| 6. 위 | 32. 추위 |
| 7. 따진다 | 32. 취나물 |
| 8. 더위 | 34. 모다구 |
| 9. 까마귀 | 35. 빠르다 |
| 10. 초가집 | 36. 타자기 |
| 11. 자귀 | 37. 바퀴 |
| 12. 피바다 | 38. 쉬다 |
| 13. 당나귀 | 39. 사위 |
| 14. 바구니 | 40. 바느질 |
| 15. 위험 | 41. 쉬파리 |
| 16. 사카린 | 42. 외딸 |
| 17. 애타다 | 43. 보따리 |
| 18. 휘발유 | 44. 이빠디 |
| 19. 사회 | 45. 가족신 |
| 20. 찌다/썰다 | 46. 눈까풀 |
| 21. 외삼촌 | 47. 다람쥐 |
| 22. 귀 | 48. 회장 |
| 23. 왼손 | 49. 뉘 |
| 24. 뒤 | 50. 외아들 |
| 25. 바위 | 51. 칼국수/카나다 |
| 26. 파뿌리 | |

APPENDIX F

SELF-EVALUATION TEST

자기 평가 테스트

다음 발음 중에서 옳다고 생각하는 발음과 본인이 평상시에 쓰는 발음을 각각 말해 주세요. (인터뷰하는 사람이 읽어주고 표시도 한다).

1. 귀: [kwi]() [ky]()
2. 사위: 사[wi]() 사[u]() 사[y]()
3. 당나귀: 당나[kwi]() 당나[ku]() 당나[ky]()
4. 위생: [y]생() [u]생() [wi]생()
5. 휘발유: [hy]발유() [hi]발유() [hwi]발유()
6. 된장: [tøn]장() [twɛn]장() [twen]장()
7. 쇠: [sø]() [swɛ]() [swe]()
8. 외삼촌: [ø]삼촌() [wɛ]삼촌() [we]삼촌()
9. 외양간: [ø]양간() [wɛ]양간() [o]양간()

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中国沈阳韩国周组委会筹备工作办公室。2006 中国沈阳韩国周。

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BIOGRAPHICAL INFORMATION

Wenhua Jin received her BA in English Language and Literature from Liaoning University in China in 1992. She then remained at Liaoning University as Assistant Professor of English. After she received her MA in English Language and Literature from Liaoning University in 1997, she became Lecturer of English at Beijing University of Posts and Telecommunications in China. Since 2003, she has been working on Asian languages including Chinese and Korean in the Ph. D program at UTA. In 2006, she was able to conduct the fieldwork in China for her project on Chinese Korean variation and change under the auspices of AAUW. She plans to continue her teaching and research in the areas of Asian languages.