

SOCIOPHONETIC VARIATIONS
IN KOREAN CONSTITUENT FINAL *-KO* AND *-TO*

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE
UNIVERSITY OF HAWAII AT MĀNOA IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

EAST ASIAN LANGUAGES AND LITERATURES (KOREAN)

AUGUST 2015

By

So Young L. Yi

Dissertation Committee:

Ho-min Sohn, Chairperson
Mee-jeong Park
Sang Yee Cheon
Katie Drager
Victoria Anderson

Keywords: sociophonetic variation, vowel raising, speech production, speech perception,
Korean sociolinguistics

© Copyright 2015

by

So Young L. Yi

To my parents

ACKNOWLEDGEMENTS

I am highly indebted to so many people in so many ways for their support in completing this dissertation. Most of all, I would like to express the deepest appreciation to my committee members. I am blessed to have such a wonderful committee. During the whole of my academic journey, since I started a master's program in Korea, the research of Professor Ho-min Sohn has been a foundation of my academic work, and I am very honored to have him as a dissertation chair. In his Korean sociolinguistics class in 2011, he introduced me to this interesting topic, and gave me invaluable suggestions and comments on my research, which surely enriched this dissertation. I admire his generous and considerate personality as well as his wisdom as a linguist. I also thank my academic advisor, Professor Mee-jeong Park, for her support for the past six years. She not only deepened my knowledge of Korean linguistics including phonetics and prosody, and helped me organize the whole dissertation, but also guided me to be a good language teacher as a graduate assistant and a lecturer. She showed me how to apply theoretical frameworks to the practical field of language teaching and how to communicate with students. I appreciate Professor Sang Yee Cheon's support and help as well. She always welcomed my questions regarding Korean phonetics, and kindly gave me great suggestions and solutions, which helped point my dissertation in the right direction. In addition, many thanks to Professor Katie Drager, who stimulated and encouraged me, a "newbie," to get into the world of sociophonetics and statistics. In her sociolinguistics class, I conducted a pilot study for the dissertation and had the opportunity to receive tremendous feedback. Without the discussions, presentations, and lectures of that class, this dissertation would not have been completed. Our private meetings and even remote discussions via email were always very helpful, and showed me her amazing enthusiasm for sociophonetics. I am also grateful to Professor Victoria Anderson for serving as a university representative and providing feedback about the design of experiments I carried out for this dissertation. I still remember her great phonetics class in my first year, which incited my curiosity about phonetics.

Furthermore, I wish to express my sincere thanks to professors of my graduate years in Korea. Professor Yong Heo, my MA advisor, always inspired me with his

enthusiasm for phonology, and steadily encouraged me to devote myself to academic pursuits even when I had a hard time studying in Hawai‘i. In addition, Professor Ui su Kim and Professor Jae Wook Kim broadened my knowledge about syntax and pedagogy in their classes. As a University of Hawai‘i alumnus, Dr. Jong Myung Hong was also a great guide for me as I pursued my academic goals. I also thank the other graduate students in the MA program: Chunhee Han, Jooyoung Kang, Jangmi Back, Misaki Yamamoto, Eunjoo Jung, Myungsook Min, Yi Mu, Jikyung Ha, and Haesoon Cho. I truly appreciate the friendship and support that they have given me over the years.

I am also thankful to my fellow graduate students in the Departments of East Asian Languages and Literatures, Linguistics, and Second Language Studies during my academic journey at the University of Hawai‘i including Eunho Kim, Jieun Lee, Jae Rim Yoon, Seunghye Lee, Jinsun Choi, JeongYoon Kim, Hyunah Ahn, Sumi Chang, Sanghee Lee, Hyunsun Chung, Jason Sung, Dongmin Kim, Cheol Rin Park, Joungmok Lee, Min-Koo Choi, Bumyong Choi, Chae Eun Kim, On Soon Lee, Sorin Huh, Heeyeong Jung, Miyung Park, Hye Seung Lee, Yoon Hwa Choi, Na-yong Kim, Sumire Matsuyama, and Eunjung Lee. Although I cannot mention all their names due to the limited space, my deep gratitude also goes to all my classmates in sociolinguistics classes for their comments and feedback on my dissertation topic.

My appreciation is also extended to Ms. Evelyn Nakanishi at my department. Thanks to her professionalism, I have been able to finish my Ph.D. course and organize the undergraduate classes I taught without any difficulties. Also, Ms. Laurie Durand has been a big help since my first year of the Ph.D. program. She not only helped me edit my papers but also gave me critical opinions on my research as a former graduate student in the Department of Linguistics.

Finally, words cannot describe how I appreciate my family for their ceaseless support. My sister and brother, Minyoung Lee and Wonjae Lee, have been my lifelong best friends, and always show me their unconditional love. I also thank Chong Yi for all his support and patience. He is the best study buddy as well as a wonderful husband. I will never forget the times we spent together studying at coffee shops in Honolulu. In addition, whenever I struggled and was stressed out from the dissertation, my sweet son,

Andrew Yi, showed me the most beautiful smile in the world. I promise you to stand by your side all the time, Andrew!

Most importantly, my deepest gratitude goes to my parents Kang Yeol Lee and You Jeong Do. They have trusted any decisions I have made, which has filled my life with confidence. Without their support, I would not even have been able to start let alone finish this dissertation. I truly appreciate it and love you, *Emma* ‘mom’ and *Appa* ‘dad’!

ABSTRACT

The purpose of this dissertation is to examine (i) linguistic and extralinguistic factors that influence vowel raising of /o/ in constituent-final *-ko* and *-to* in Seoul Korean and (ii) listeners' perceptions of this vowel raising and social meanings of the raised variant. The analyses are based on production data collected from one-on-one sociolinguistic interviews and an elicitation task, and on perception data from a matched-guise test.

The production data demonstrate that some phonetic and prosodic environments significantly affect the vowel's height and/or frontness. In the AP-medial position, /o/ shows higher F1 values when it is in an NP particle or followed by /a/, and it shows lower F1 values when it is preceded by /t/ or followed by /i/, /u/, or alveolar, palatal, or velar consonants. Moreover, preceding /t/, following /i/, /j/-diphthongs, /e/, and alveolar, palatal, and glottal consonants lead to higher F2 values. In addition, in the prosodic final position, following /i/, /j/-diphthongs, and bilabial, velar, and glottal consonants increase the F1 values, a final Low tone decreases the F1 values, and preceding /t/ increases the F2 values. Most of the effects of the following and preceding segments can be explained as the result of coarticulation of the vowel and adjacent sounds.

Extralinguistic factors influence the vowel raising as well. The production data show that older speakers use a more raised variant than middle-aged speakers in the AP-medial position, which implies that the vowel raising of /o/ in constituent-final *-ko* and *-to* shows age-grading. In addition, stylistic variations related to the formality of the speech setting and solidarity between interactants affect the vowel, leading to vowel

raising (i) in casual speech situations and (ii) in interaction with an addressee with whom the speaker is intimate; these trends are especially salient for younger speakers.

In listeners' perceptions of the vowel raising, it had distinct social meanings in female and male voices. Listeners indexed the raised variant in female voices to (i) outgoingness, (ii) lower economic class (for younger voices), and (iii) lower economic class (by male listeners). Listeners indexed the raised variant in male voices to (i) being cute (for younger and middle-aged voices) and (ii) being masculine (for younger voices). These meanings form separate indexical fields of the raised and unraised variants for male and female voices. Furthermore, some of these perceptions are reflections of social and cultural values of Korean society, and they can be correlated with the production of the vowel variants.

The present study contributes to the understanding of vowel raising in Seoul Korean by investigating language-internal and language-external constraints on its production and how it is perceived. In addition, by explaining the (socio)linguistic background of this vowel variation, the findings of this dissertation should be useful in further studies in second language acquisition of Korean and language teaching.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	iv
ABSTRACT	vii
LIST OF TABLES	xi
LIST OF FIGURES	xiv
LIST OF ABBREVIATIONS USED IN THE INTERLINEAR GLOSSES.....	xvii
 CHAPTER 1: INTRODUCTION	 1
1.1 Scope of the study	2
1.2 Organization of the dissertation	4
 CHAPTER 2: BACKGROUND	 7
2.1 Seoul Korean	7
2.2 Vowel raising of /o/ in Korean for the past 20 years	9
2.3 Language-internal factors and phonetic variation	11
2.3.1 Prosodic and phonetic environments	11
2.3.2 Prosodic and phonetic systems of Korean	14
2.4 Language-external factors and phonetic variation	16
2.4.1 Age	18
2.4.2 Gender	20
2.4.3 Social class	26
2.4.4 Speech setting and addressee	30
2.5 Speech perception: Social meanings of vowel variation	32
2.5.1 Indexicality	32
2.5.2 Indexical field	34
2.6 Research questions	36
 CHAPTER 3: LINGUISTIC AND SOCIAL FACTORS RELATED TO VOWEL VARIATION	 38
3.1 Method: Sociolinguistic interview	38
3.1.1 Participants	38
3.1.2 Procedures	40
3.1.3 Acoustic measurements	41
3.1.4 Statistics	42
3.2 Results	44
3.2.1 Linguistic contexts and vowel variation	45
3.2.1.1 AP-medial /o/	45
3.2.1.2 Prosodic final /o/	49
3.2.2 Social factors and vowel variation: Age, gender, and social class	52
3.3 Summary	55

CHAPTER 4: SPEECH SETTING AND ADDRESSEE BACKGROUND RELATED TO VOWEL VARIATION.....	56
4.1 Method: Elicitation task.....	56
4.1.1 Participants.....	56
4.1.2 Procedures.....	56
4.1.3 Acoustic measurements and statistics.....	59
4.2 Results.....	60
4.2.1 Formality.....	61
4.2.2 Solidarity.....	62
4.2.3 Addressee age	64
4.3 Summary.....	65
CHAPTER 5: PERCEPTIONS OF SOCIAL TRAITS RELATED TO VOWEL VARIATION	66
5.1 Method: Matched-guise test.....	66
5.1.1 Stimuli.....	67
5.1.2 Procedures.....	69
5.1.3 Participants.....	71
5.1.4 Analysis.....	71
5.1.5 Statistics	74
5.2 Results.....	75
5.2.1 Female voices.....	75
5.2.1.1 Economic class.....	77
5.2.1.2 Outgoingness.....	79
5.2.2 Male voices	82
5.2.2.1 Masculinity	83
5.2.2.2 Cuteness	85
5.3 Summary	87
CHAPTER 6: DISCUSSION AND IMPLICATIONS.....	89
6.1 Vowel raising of /o/ in current Seoul Korean	89
6.2 Stylistic variation of vowel raising	94
6.3 Social meanings of vowel raising and their relation to speech production.....	95
CHAPTER 7: CONCLUSION	101
7.1 Summary of the findings.....	101
7.2 Contributions and suggestions for further studies	103

LIST OF TABLES

Table 1.1 Constituent finals with <i>-ko/-to</i> : Functions and meanings	4
Table 2.1 Categorization of dialectal zones	7
Table 2.2 Korean consonant system (Adapted from Sohn, 1999)	15
Table 2.3 Korean vowel system I: Monophthongs (Adapted from Sohn, 1999)	16
Table 2.4 Korean vowel system II: Diphthongs (Sohn, 1999)	16
Table 2.5 Relationship between variation and change in the individual and the community (Meyerhoff, 2006; Meyerhoff cites Labov, 1994, p. 83 and Sankoff, 2005 as sources for this table)	19
Table 3.1 Criteria for social class classification (Adapted from Chae, 1995)	39
Table 3.2 Distribution and number of interviewees according to age, gender, and social class	40
Table 3.3 Interviews: Number of tokens of target vowels for each group of speakers	43
Table 3.4 Interviews: Fixed effects tested in the mixed effects models	44
Table 3.5 AP-medial /o/: Coefficients of fixed effects (linguistic factors) for normalized F1 values	47
Table 3.6 AP-medial /o/: Coefficients of fixed effects (linguistic factors) for normalized F2 values	47

Table 3.7 Prosodic final /o/: Coefficients of fixed effects (linguistic factors) for normalized F1 values	51
Table 3.8 Prosodic final /o/: Coefficients of fixed effects (linguistic factors) for normalized F2 values	52
Table 3.9 AP-medial /o/: Coefficients of fixed effects (social factors) for normalized F1 values	53
Table 3.10 AP-medial /o/: Coefficients of fixed effects (social factors) for normalized F2 values	53
Table 4.1 Elicitation task: Number of tokens of target vowels for each conversation setting.....	59
Table 4.2 Elicitation task: Fixed effects tested in each mixed effects model	60
Table 4.3 Coefficients of fixed effects (formality) for normalized F1 values	61
Table 4.4 Coefficients of fixed effects (formality) for normalized F2 values	61
Table 4.5 Coefficients of fixed effects (solidarity) for normalized F1 values.....	62
Table 4.6 Coefficients of fixed effects (solidarity) for normalized F2 values.....	63
Table 4.7 Coefficients of fixed effects (addressee's age) for normalized F2 values	65
Table 5.1 Distribution and number of perception test participants according to their age, gender, and social class.....	71

Table 5.2 Comparison of two lines for binary categories for perception of female outgoingness	74
Table 5.3 Matched-guise test: Fixed effects tested	75
Table 5.4 Female voices: Coefficients of fixed effects for perception of economic class	77
Table 5.5 Female voices: Coefficients of fixed effects for perception of outgoingness....	80
Table 5.6 Male voices: Coefficients of fixed effects for perception of masculinity.....	83
Table 5.7 Male voices: Coefficients of fixed effects for perception of cuteness.....	85
Table 6.1 Age ranges and birth years of age groups in Chae, 1995 and the current study	90
Table 6.2 Relationship between variation and change in the individual and the community (Meyerhoff, 2006).....	91

LIST OF FIGURES

Figure 2.1 Map of South Korea with provincial boundaries except for Ceycwu Island (Adapted from http://www.stockmapagency.com).....	8
Figure 2.2 Intonational structure of Seoul Korean (Jun, 2005)	14
Figure 2.3 Some factors influencing language variation (Bell, 1984).....	17
Figure 2.4 A six-stage model of gender relations in linguistic change from below based on Labov's (2001) model.....	21
Figure 2.5 Expected values of nearly completed changes for (æh) (<i>a</i>), middle-range changes for (ow) (<i>b</i>), and new and vigorous changes for (aw) and (eyC) (<i>c</i>)	28
Figure 2.6 Schematic diagram of the interrelation of social class and gender in sound change	30
Figure 2.7 Style as audience and nonaudience design (Bell, 1984).....	30
Figure 2.8 Indexical field of <i>-ing</i> (based on Campbell-Kibler 2007a, 2007b, adapted from Eckert, 2008).....	35
Figure 3.1 AP-medial /o/: Normalized F2 means depending on preceding segments.....	48
Figure 3.2 Boxplot of normalized F1 means depending on speaker age group.....	54
Figure 3.3 Boxplot of normalized F2 means depending on speaker age group.....	54
Figure 4.1 Correlates between speaker gender and formality of the speech setting.....	62

Figure 4.2 Correlates between speaker age and speaker–listener solidarity.....	63
Figure 5.1 Matched-guise test questionnaire	70
Figure 5.2 Female voices: Raw data for perception of educational level for [o] and [u] guises.....	72
Figure 5.3 Female voices: Raw data for perception of outgoingness for [o] and [u] guises by middle-aged groups.....	73
Figure 5.4 Female voices: Raw data for perception of economic class for voice age.....	77
Figure 5.5 Female voices: Interrelations between voice age and voice guise in perception of economic class with confidence intervals	78
Figure 5.6 Female voices: Interrelations between listener gender and voice guise in the perception of economic class	79
Figure 5.7 Female voices: Perceived outgoingness for three age groups	81
Figure 5.8 Male voices: Raw data for perception of masculinity by voice age.....	84
Figure 5.9 Male voices: Interrelations between voice age and voice guise in perception of masculinity	84
Figure 5.10 Male voices: Raw data for perception of cuteness by voice age.....	85
Figure 5.11 Male voices: Raw data for perception of cuteness by voice guise	86
Figure 5.12 Male voices: Raw data for perception of cuteness by listener gender	86

Figure 5.13 Male voices: Interrelations between voice age and voice guise in perception of cuteness.....	87
Figure 6.1 Boxplot of normalized F1 means depending on speaker age group.....	90
Figure 6.2 Production of AP-medial /o/: Interrelations between speaker gender and social class with confidence intervals	93
Figure 6.3 Indexical field of /o/ in constituent-final <i>-ko</i> and <i>-to</i> in Seoul Korean for female voices	96
Figure 6.4 Indexical field of /o/ in constituent-final <i>-ko</i> and <i>-to</i> in Seoul Korean for male voices	98

LIST OF ABBREVIATIONS USED IN THE INTERLINEAR GLOSSES

HON Honorific

OBJ Object

POL Polite speech level

TOP Topic marker

CHAPTER 1.

INTRODUCTION

There is a phenomenon called vowel raising in spoken Seoul Korean, where a low vowel /o/ is raised and realized as [u] in constituent-finals including a clause connective –*ko* and a particle –*to*. In other words, the clause connective –*ko* and particle –*to* are frequently realized as [ku] and [tu]. (1) shows an example sentence that includes both [ku] and [tu] variation. It is extracted from the data of a younger female speaker who participated in a pilot study for this research (Yi, 2013).

- (1) *pakmwulkwan cincca manh-kwu hoswu-twu cincca yeyppe-yo*.¹
museum really many-and lake-also really pretty-POL
‘There are so many museums and the lakes are also very pretty.’

She produced [ku] instead of [ko] for the clause connective meaning ‘and’, and [tu] instead of [to] for the particle meaning ‘also’. This phenomenon was also mentioned by Sohn (1999) and Yeon (2012), who pointed out that, in colloquial Seoul Korean, the variant [u] is commonly observed in suffixes, as in *kuliko* > *kulikwu* ‘and’, *mek-eto* > *mek-etwu* ‘eat but’, *na-to* > *na-twu* ‘I also’. Moreover, Chae (1995) claimed that /o/ is pronounced as [o] or [u] or as a sound in between these two in noninitial syllables.

This dissertation will examine this phenomenon, which is a salient feature of Seoul Korean, focusing mainly on what kind of factors influence the vowel raising, how people perceive it, and what implications it has. To do so, the dissertation examines data collected in interviews, an elicitation task, and a matched-guise experiment. As a starting

¹ Because the transcriptions use the Yale romanization system, [u] in IPA is represented as *wu* in this sample sentence.

point, in this chapter, I will briefly discuss the scope of the study and describe the organization of the dissertation.

1.1. Scope of the study

This dissertation will investigate every constituent-final that ends in *-ko* and *-to* and their variations in spoken Seoul Korean. I use the term “constituent-final” because all the items of interest are located at the end of grammatical constituents. They include (1) clause connectives, (2) case and delimiter particles, (3) adverbs, (4) quotative particles, (5) sentence enders, and (6) discourse markers. First, clause connectives function to link two or more clauses, with meanings such as ‘and’, ‘because’, ‘although’, ‘as a result’, and so on. Second, particles in Korean are divided into three categories: case particles, delimiter particles, and conjunctive particles (Sohn, 1999). Case particles mark syntactic cases such as subject, object, and genitive, and delimiter particles define the meaning of the preceding element with relation to a main sentence. Conjunctive particles join two or more clauses. In this dissertation, case particles and delimiter particles are treated as members of the same category, NP (noun phrase) particles, and conjunctive particles form a separate category, quotative particles. The reason for this categorization is that the latter can only attach to a clause, while the former are more flexible about the preceding elements; they can follow a noun phrase, a clause, or a sentence. However, in my data, all case and delimiter particles are preceded by an NP; therefore, I use the term “NP particles” in order to specify their function. For example, in Table 1.1, case particles *-poko* ‘to’ and *-hako* ‘with’ and the delimiter particle *-to* ‘also’ are regarded as NP particles, and differentiated from quotative particles, which are considered conjunctive

particles. Third, the meanings of adverbs vary, such as *kuliko* ‘and’ and *kulayto* ‘nevertheless’, and they modify diverse elements: a predicate, clause, another adverb, and so on. Fourth, the quotative particle is preceded by the quoted material and followed by a quoting verb, such as those meaning ‘report’, ‘say’, ‘write’, ‘ask’, ‘suggest’, ‘order’, ‘promise’, ‘hear’, ‘think’, and ‘believe’ (Sohn, 1999). Quotative constructions express either direct or indirect quotation, each of which takes a distinct quotative particle. However, in spoken Korean, direct quotation is rarely used. The interviewees who participated in this research produced only indirect quotative particles, and this dissertation will therefore examine only the indirect quotation. Fifth, the sentence enders that occur in this study’s interview data are all grammaticalized from clause constructions (e.g., *-tako*, *-nyako*, *-ko*) or formed by deletion of the quotative construction *ko ha* ‘say that’ (e.g., *-telako*) (Sohn, 1999; Kwon, 2003; Yoo, 2003; Son & Kim, 2009), but their functions differ from those of the original forms. For instance, even though the sentence ender *-ko* shares exactly the same form as the clause connective *-ko*, their meanings and functions are not identical: While the clause connective *-ko* simply connects two clauses, and can be translated ‘and’ or ‘and then’, *-ko* as a sentence ender allows a preceding sentence to be augmented by attaching a supplementing statement. In other words, for the grammaticalized sentence ender *-ko*, unlike the clause connective *-ko*, the discourse and pragmatic context must be taken into consideration for the appropriate interpretation. Fifth, the discourse markers in the interview data occur at the beginning or end of a sentence, and are related to discourse contexts or speech situations (Sohn, 1999), as they are in many languages.

The forms with constituent-final *-ko* or *-to* that occur in the data for this study include nine clause connectives, six NP particles, nine adverbs, four quotative particles, four sentence enders, and two discourse markers, as presented in Table 1.1; the vowels in all 34 of these constituent-finals are the focus of this study.

Table 1.1. Constituent-finals with *-ko/-to*: Functions and meanings

	<i>-ko</i>		<i>-to</i>	
	constituent-final	meaning	constituent-final	meaning
Clause connective	<i>-ko</i>	‘and’	<i>-eto</i>	‘though’
	<i>-ekaciko</i>	‘because’	<i>-telato</i>	‘even though’
	<i>-(u)lyeko</i>	‘intending’	<i>-(i)lakohayto</i>	‘in spite of’
	<i>-nulako</i>	‘as a result of’	<i>-nunteyto</i>	‘though’
	<i>-tako</i>	‘because’		
NP particle	<i>-hako</i>	‘with’	<i>-to</i>	‘also’
	<i>-poko</i>	‘to’	<i>-lato</i>	‘despite’
	<i>-chiko</i>	‘for’	<i>-(man)hayto</i>	‘until, by’
Adverb	<i>kuliko</i>	‘and’	<i>kulayto</i>	‘nevertheless’
	<i>kulaykaciko</i>	‘therefore’	<i>hato</i>	‘too (much)’
	<i>ilaykaciko</i>	‘therefore’	<i>amulayto</i>	‘somehow’
	<i>kulehtako</i>	‘but, even so’	<i>kulenteyto</i>	‘nevertheless’
			<i>ceketo</i>	‘at least’
Quotative particle	<i>-tako</i>	‘said that’	N/A	N/A
	<i>-nyako</i>	‘ask that’		
	<i>-lako</i>	‘request that’		
	<i>-cako</i>	‘suggest that’		
Sentence ender	<i>-tako</i>	‘you know’	N/A	N/A
	<i>-nyako</i>	‘you know’		
	<i>-ko</i>	‘also’		
	<i>-telako</i>	‘I saw/found that’		
Discourse marker	<i>aiko</i>	‘Oh my!’	N/A	N/A
	<i>ileko</i>	‘like’		

1.2. Organization of the dissertation

Following this introductory chapter, Chapter 2 provides the background of the phenomenon of /o/-raising in Seoul Korean and reviews the existing literature relevant to the topic.

More specifically, in 2.1, I will define “Seoul Korean” in terms of dialectology. In 2.2, I will discuss the literature that has dealt with this vowel raising phenomenon in the past 20 years, most of which considered it a sound change in the Korean language. In 2.3, based on the assumption that both language-internal and language-external factors influence vowel variations, as suggested by many scholars, I review theoretical and empirical studies that deal with both types of factor. 2.4 discusses theoretical frameworks regarding speech perception and its relation to speech production. Finally, the specific research questions will be presented in 2.5.

In Chapter 3, I analyze speech production data collected in the sociolinguistic interviews. The chapter describes the method and procedure of the data collection and the process and results of the analysis in detail. This chapter focuses on the effects of age, gender, and social class of speakers as social categories.

In Chapter 4, the methods and results of the elicitation task will be addressed. This task was designed to investigate the role of stylistic variation in the vowel variation.

Chapter 5 will look at the methods and results of the matched-guise test, which was used to collect data on speech perception. This chapter centers on listeners’ perceptions of the vowel variants, discussing the social meanings of [o] and [u] for female and male voices.

Chapter 6 considers the results presented in the previous chapters, and suggests their theoretical and practical implications for Korean sociophonetics. In 6.1 and 6.2, I will show that /o/ in *-ko* and *-to* in Seoul Korean is an age-graded stable variable in AP-medial positions, and it is subject to stylistic variation. In addition, in 6.3, this chapter discusses speech perception and the social meanings of the vowel raising in terms of the

concepts of indexicality and indexical field, and how indexicality is linked with speech production. This section will address features specific to Korea and the Korean language, in addition to theoretical implications.

Finally, Chapter 7 summarizes the results and findings of the dissertation, points out the contributions and limitations of the research, and makes suggestions for further studies.

CHAPTER 2.

BACKGROUND

2.1. Seoul Korean

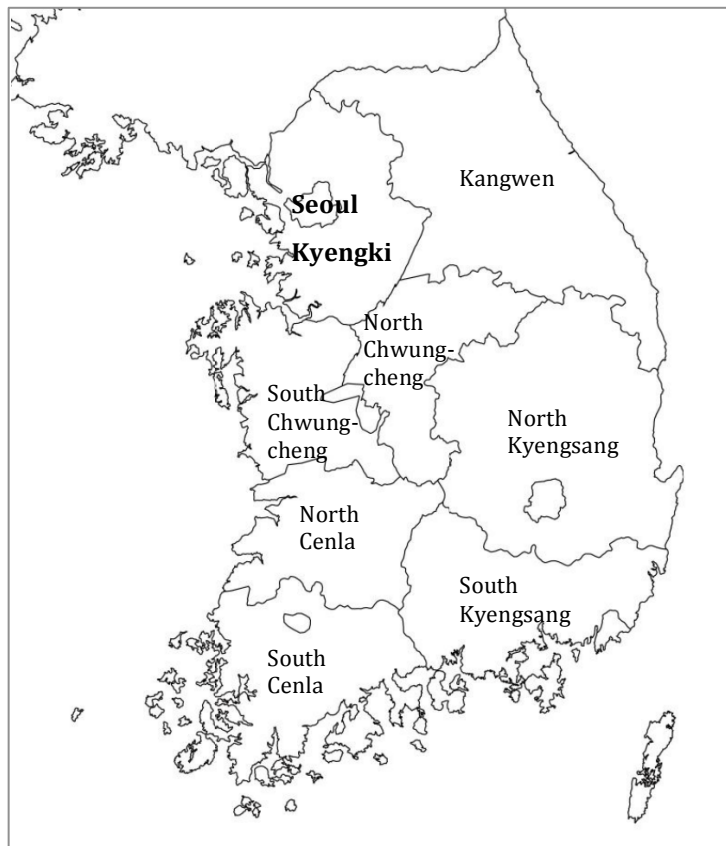
Although the Korean language is homogeneous, it can be divided into some dialectal subgroups according to geographical differences (Sohn, 1999; Yeon, 2012), although the question of how many dialectal zones the Korean language has is controversial. See Table 2.1.

Table 2.1. Categorization of dialectal zones²

Dialectal zone	Region		
	Sohn (1999)	King (2006)	Yeon (2012)
Northeast	Hamkyeng Province, extending to the north of Cengphyeng, Hwuchang in North Phyengan Province	Hamkyeng Province	Hamkyeng Province
Northwest	Phyengan Province (excluding Hwuchang)	Phyengyang Province Hwanghay	Phyengyang Province Hwanghay
Central	Kyengki Province, Kangwen Province, Hwanghay Province, South Hamkyeng Province extending to Yenghung to the North	Kyengki Province, Kangwen Province, Chwungcheng Province	Kyengki Province, Kangwen Province, Hwanghay Province, Chwungcheng Province
Southcentral	Chwungcheng Province, Kumsan and Mucwu in North Cenla Province	N/A	N/A
Southeast	Kyengsang Province	Kyengsang Province	Kyengsang Province
Southwest	Cenla Province (except for Kumsan and Mucwu)	Cenla Province	Cenla Province
Ceycwu	Ceycwu Province	Ceycwu Province	Ceycwu Province

² All names of Korean provinces follow Yale romanization for consistency within the dissertation.

Figure 2.1. Map of South Korea with provincial boundaries except for Ceycwu Island³
(Adapted from <http://www.stockmapagency.com>)



As Table 2.1 shows, Sohn (1999) classified the dialects into seven subgroups and King (2006) and Yeon (2012) divided them into six categories. In all classifications, Seoul, the capital of South Korea, is regarded as part of Kyengki Province, which surrounds the city. The central zone, which includes Seoul, is agreed to consist of Kyengki and Kangwen Provinces. And as Sohn (1999) and Yeon (2012) pointed out, a salient linguistic phenomenon shared by the central zone dialects is that /o/ in constituent-final –*ko* and –*to* is raised, which is a main focus of this dissertation. Therefore, to investigate the vowel raising of /o/ in Korean, it might be ideal to look into the language use of

³ http://www.stockmapagency.com/Outline_Map_South%20Korea_Provinces_C-SKor-2007-Out2.php

people in both Kyengki and Kangwen Provinces. Nevertheless, Kangwen Province is physically distant from Seoul, and rather adjacent to Chwungcheng and Kyengsang Provinces, which may influence linguistic behaviors such as phonetic, phonological, and lexical features used by the speakers in those areas. Hence, in the current study, Seoul Korean is regarded as the language used in Kyengki Province only.

2.2. Vowel raising of /o/ in Korean for the past 20 years

The first sociolinguistic research that explored the vowel raising of /o/ in Seoul Korean was conducted by Chae (1995). Chae investigated social variables as important factors in /o/ variation, pointing out that many social features are associated with it. She collected speech data by conducting sociolinguistic interviews with native speakers of Seoul Korean of varying age, gender, and social class. Her results suggested that social factors had a significant influence in vowel raising: She found a general tendency of younger, female, and lower social class speakers to favor the raising of /o/. Chae was a pioneer in scrutinizing social factors' influence on /o/ variation and considering language-external factors as well as language-internal factors. Without a doubt, her findings contributed to Korean sociolinguistics, as she demonstrated that sound change of /o/ to [u] existed in the 1990s, and that speakers of different genders and social classes took part in this change with varying frequency. Nevertheless, she relied on auditory analysis instead of acoustic analysis due to the limited quality of her audio files. As discussed by many scholars, vowels have a continuous nature rather than a discrete nature. Therefore, detailed acoustic analysis is necessary to better understand this vowel

change. Moreover, not all of Chae's results were statistically analyzed, and so more accurate quantitative analysis is also still needed.

Noting that the raising of /o/ is an ongoing change, approximately 20 years after Chae's (1995) study, Han and Kang (2013) examined the change based on speakers' age and gender differences and position of vowels in bisyllabic words using acoustic analysis. They had 36 native speakers of Seoul Korean read sentences that had an embedded V_1CV_2 structure, where V_1 or V_2 included one of the eight Korean monophthongs. The study measured Euclidean distances of /o/ and /u/ in vowel space using raw values of F1 and F2. The results showed that females were ahead of males in this change, and that the raising was more prominent in the unfocused second syllable position than the first syllable position. Nevertheless, as the authors themselves indicated, because their results were based on raw data, the findings do not distinguish differences resulting from differing individual vocal tract length by normalizing the F1 and F2 values. Kang and Han (2013) conducted a follow-up study to address this issue. They analyzed the same dataset used in their previous study, but normalized the formant values. The results revealed the same trends as their previous work: Female speakers appeared to lead the sound change in that they raised /o/ toward /u/ in both first and second syllable positions, whereas males participated in this phenomenon only in the second syllable position. These results support Chae's (1995) argument that /o/ raising is the most prominent in noninitial syllables. Although Kang and Han's findings show current trends of vowel raising in Seoul Korean, their study still has a limitation in that the data are not from spontaneous speech but from reading sentences embedding the target vowels.

A few other scholars have also tried to find gender differences in vowel raising of /o/ to /u/ with acoustic analysis (Seong, 2004; Moon, 2007; Igeta, Sonu, & Arai, 2014); however, none of these studies used spontaneous speech data for analysis. Seong (2004) analyzed reading passages, Moon (2007) used target vowels within carrier sentences, and Igeta et al. (2014) had participants read vowels in isolation. The importance in sociolinguistic research of spontaneous data collected from natural speech has been emphasized in several studies that have pointed out the different natures of free conversation and reading words or texts (Labov, 1966; Holmes & Bell, 1988; Starks & McRobbie-Utasi, 2001, among others). For this reason, to investigate vowel raising in the colloquial speech of Seoul Korean speakers, the present study employed one-on-one interviews to collect natural utterances.

2.3. Language-internal factors and phonetic variation

2.3.1. Prosodic and phonetic environments

Prosodic contexts are known to affect articulation. Cho (2001) pointed out that phonetic variation is conditioned by prosodic position. In addition, Fougeron and Keating (1997) argued that there are huge articulatory differences between segments at a prosodic boundary. Beckman and Edwards (1994) also agreed with the claim that different prosodic positions, such as the head or the edge of a phrase, lead to distinctive vowel duration, which indicates that there is a hierarchy in prosodic positions (Klatt, 1975; Wightman, Shattuck-Hufnagel, Ostendorf, & Price, 1992; Jun, 1993).

In regard to the strengthening or weakening of vowel quality, Edwards, Beckman, and Fletcher (1991) suggested that speakers put more effort into pronouncing a vowel in

a domain-final position than in a domain-medial position. Similarly, Fougeron and Keating (1997) found that domain-final /o/ was realized by greater opening or backing (i.e., the vowel was lowered and backed) whereas domain-medial /o/ was weakened. Bearing in mind the importance to articulation of prosodic environments, this dissertation looks into Korean prosodic phrasing as one of the crucial linguistic factors in vowel variation. Details of the Korean prosodic system will be discussed in the following section.

In addition to prosodic environments, phonetic environments including preceding and following sounds are important for vowel variation. A large body of work has proposed that phonetic contexts affect vowel quality, arguing that neighboring sounds influence the first formant (F1) and second formant (F2) of a vowel (Stevens & House, 1963; Hillenbrand, Clark, & Nearey, 2001; Hodge, Chesworth, Côté, Shaw, & William, 2004; Chen, Slifka, & Stevens, 2007; Strange et al., 2007). For example, Strange et al. (2007) compared the effects of phonetic contexts on vowel quality in North German, Parisian French, and New York English. They examined how labial versus alveolar contexts affect vowel quality, and found that, in North German, back/low short vowels became fronted and raised in alveolar contexts, and in New York English, mid to high back vowels became fronted in alveolar contexts.

Furthermore, regarding the effect of adjacent sounds, the concept of coarticulation should be reviewed as a linguistic motivation of a phonetic variation. The concept of coarticulation assumes that a phoneme cannot be pronounced in the same way all the time, but rather changes its quality depending on the surrounding sounds, as shown in the work done by Strange et al. (2007). The concept of coarticulation was first introduced by

Menzerath and De Lacerda (1933), who asserted that articulators are already prepared to transit to the following segment even at the beginning of the articulation of a preceding sound. Since then, scholars have introduced several models of articulation such as the articulatory syllable model (Kozhevnikov & Chistovich, 1965), the look-ahead model (Henke, 1966), the time-locked or frame model (Bell-Berti & Harris, 1979, 1981, 1982), the coproduction theory (Fowler, 1980, 1981; Bell-Berti & Harris, 1981, 1982), the window model (Keating, 1990), and the articulatory phonology model (Browman & Goldstein, 1986, 1989). The details of each model are beyond the scope of the current study; but they all rest on a basic assumption that “the phenomena described as coarticulation are the result of the integration of those (phonological) units in the continuously flowing activity of the vocal mechanism” (Kühnert & Nolan, 1999, p. 71).

Moreover, there are two types of coarticulation: anticipatory coarticulation and perseverative or carryover coarticulation. Anticipatory and perseverative coarticulation occur due to the following and preceding sounds respectively; both of these coarticulation types are common and occur universally.

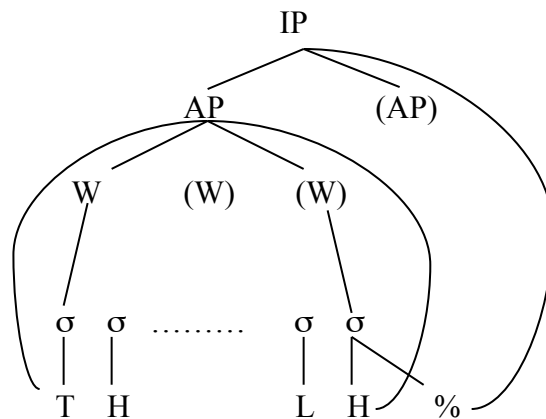
Keeping the concept of coarticulation in mind, I look into if and how adjacent segments influence the vowel in constituent-final *-ko* and *-to*. Any consonant or vowel in Korean can be followed by *-ko* or *-to*, and it is to be expected that they would have an influence on the vowel quality. In addition, the different segments, /k/ and /t/, that begin *-ko* and *-to* may be another factor that leads to differing degrees of vowel raising. This dissertation examines the influence of all the possible phonetic environments for the vowel /o/ in constituent-final *-ko* and *-to*.

2.3.2. Prosodic and phonetic systems of Korean

Korean has its own intonation structure, as other languages do. Most of the research that deals with Korean intonation incorporates Jun's (2005) K-ToBI (Korean Tones and Break Indices) conventions. See Figure 2.2 for a model of the intonational structure of Seoul Korean.

Figure 2.2. Intonational structure of Seoul Korean (Jun, 2005)

IP: Intonation Phrase AP: Accentual Phrase
w: phonological word σ: syllable
T = H, when the syllable-initial segment is aspirated/tense; otherwise, T = L
%: Intonation Phrase boundary tone



According to the model in Figure 2.2, standard Seoul Korean employs two intonationally defined prosodic units: the Intonation Phrase (IP) and the Accentual Phrase (AP). The biggest unit, IP, is marked by a boundary tone (%), and followed by a phrasal disjuncture, pause, or final lengthening. An AP has one or more words, and is followed by a minimal phrasal disjuncture. However, no pause or final lengthening is observed. Based on K-ToBI, this dissertation will examine how phonetic variation depends on prosodic phrasing.

In addition, considering that the main scope of this study is a vowel in constituent-final *-ko* and *-to*, preceding sounds are limited to /k/ and /t/ as a phonetic environment. On the other hand, following sounds can be any vowel or consonant of Korean. In Korean, there are 19 consonants and 21 vowels including nine monophthongs and 12 diphthongs.⁴ Table 2.2 presents the consonants classified by their place of articulation and manner of articulation. In terms of the manner of articulation, Korean has a three-way distinction for stops (lax, aspirated, and tensed) and a two-way distinction for fricatives (lax and tensed). The reason I use the lax–tensed distinction, rather than the lenis–fortis distinction, is that the major difference between lenis and fortis derives from voicing (i.e., the distinction is between voiced and voiceless sounds). In Korean, consonants do not have this distinction as phonemes.

Table 2.2. Korean consonant system (Adapted from Sohn, 1999)

Place of articulation → ↓ Manner of articulation		Bilabial	Alveolar	Palatal	Velar	Glottal
Stop	lax	p	t	c	k	
	aspirated	ph	th	ch	kh	
	tensed	p'	t'	c'	k'	
Fricative	aspirated		s			h
	tensed		s'			
Nasal		m	n		ŋ	
Liquid	lateral or flap		l			

The following consonants considered in this study do not include /ŋ/, which only occurs in the syllable final position. Because any segment following *-ko* or *-to* is either a syllable-onset consonant or a syllable-nuclear monophthong/diphthong, /ŋ/ never follows *-ko* or *-to*. The other 18 Korean consonants are all possible influential factors.

⁴ There are varying opinions on the categorization of Korean vowels, especially about whether /y/ and /ø/ are monophthongs or diphthongs. This dissertation basically follows Sohn's (1999) classification: /y/ and /ø/ are pronounced as diphthongs /wi/ and /we/ in some dialects, including Seoul Korean. Therefore, /y/ and /ø/ are not included in the monophthongs in Table 2.4.

I follow Sohn's (1999) classification of Korean vowels, which is presented in Table 2.3 and Table 2.4, except that the mid front vowel /e/ and the low front vowel /ɛ/ are considered one vowel, as these two vowels merge and have no phonetic difference in current Korean. Hence, for the data analysis, this dissertation looks into seven monophthongs in Korean: /i/, /e/, /i/, /ə/, /u/, /o/, /a/.

Table 2.3. Korean vowel system I: Monophthongs (Adapted from Sohn, 1999)

Place → Lips → ↓ Tongue	Front	Back	
	unround	unround	round
High	i	i	u
Mid	e	ə	o
Low	ɛ		a

Table 2.4. Korean vowel system II: Diphthongs (Sohn, 1999)

On-glide diphthongs	jV = je, jɛ, jə, ja, ju, jo
	wV = wi, we, wɛ, wə, wa
Off-glide diphthongs	Vj = ij (used only by some young speakers)

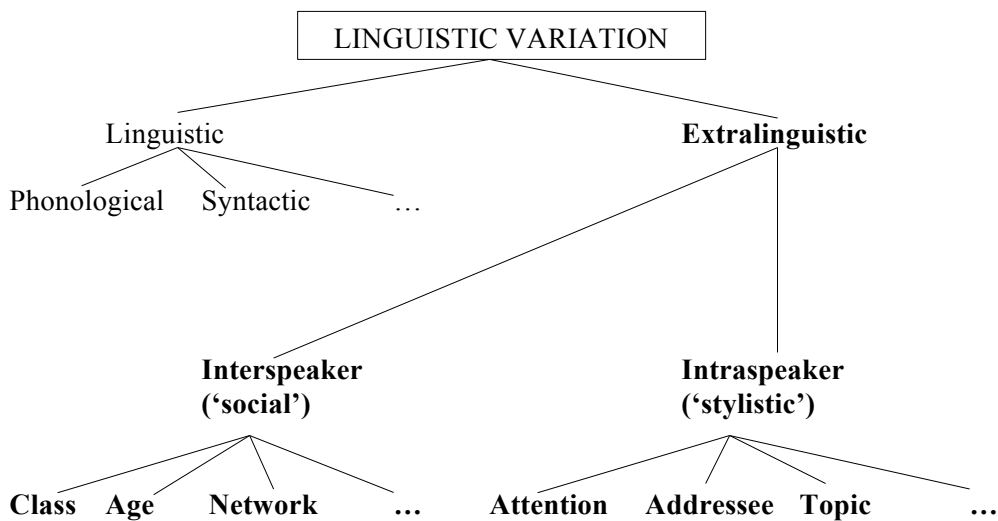
As seen in Table 2.4, there are two types of diphthongs in Korean: on-glides and off-glides. In on-glides, a semivowel /j/ or /w/ precedes a monophthong; in off-glides, one of the semivowels follows a monophthong. In Korean, there is only one off-glide diphthong, /ij/. All other diphthongs are on-glides, and they are divided into jV and wV structures. In the current study, the jV and wV structures are called /j/-diphthong and /w/-diphthong, respectively.

2.4. Language-external factors and phonetic variation

As many scholars have pointed out, linguistic variation is influenced by both language-internal and language-external factors. For language-external factors in

particular, a variety of subfactors affect linguistic variation: speakers' backgrounds, listeners' backgrounds, speech situations, topics, and so on. Bell (1984) proposed a classification of the relationships among these possible influential factors, which is presented in Figure 2.3.

Figure 2.3. Some factors influencing language variation (Bell, 1984)



While the previous section focuses on the linguistic factors that appear on the left branch in Figure 2.3, this section discusses the extralinguistic factors that appear in bold on the right side of the figure. According to Bell (1984), interspeaker variation can be influenced by any social characteristic of speakers such as class, age, and social network, and intraspeaker variation concerns a single speaker's use of stylistic shift when speaking to different addressees, in different speech settings, about different topics, and so forth.

In 2.4.1 through 2.4.3, I will introduce important concepts and relevant literature related to interspeaker—that is, social—factors influencing linguistic variation; I address stylistic factors in detail in 2.4.4.

2.4.1. Age

Two types of studies look into language change that takes place over time: (i) real time studies and (ii) apparent time studies. Real time studies examine variations at one point in time, and reinvestigate them a decade, or a generation, or a hundred years later, and so they compare the ways people speak across time (Meyerhoff, 2006; Wardhaugh, 2010). On the other hand, apparent time studies compare speakers of different age groups at a single time, which is an alternative way of looking at language change over time. In other words, if a younger generation speaks differently from an older generation, language change is considered to have occurred in that speech community (Bailey, 2002). The basic assumption of the apparent time study is that (i) people rarely change their speaking style after the critical period, and (ii) linguistic features that older people use represent what they used when they themselves were young. Nevertheless, some scholars have provided counter examples of these assumptions. For instance, Harrington et al. (2000) investigated the vowels of Queen Elizabeth II from Christmas messages broadcast from the 1950s to the 1980s, and found that her pronunciation was not fixed but moved toward vowels that were pervasively used by younger and lower social hierarchy people.

Moreover, sound change in progress over apparent time should be considered with caution as an explanation for variation, even when the linguistic usage of younger generations does differ from that of older generations, because similar patterns can be found in age-grading. The following table compares types of change, and shows major differences between generational change, which is change in progress, and age-grading.

Table 2.5. Relationship between variation and change in the individual and the community (Meyerhoff, 2006; Meyerhoff cites Labov, 1994, p. 83 and Sankoff, 2005 as sources for this table)

	Type of change	Individual	Community	Synchronic pattern
1	Stability – no change	Invariant	Invariant	Flat, no slope with age
2	Age-grading	Changes abruptly	Invariant	Steady increase / decrease with age
3	Lifespan change	Changes abruptly	Changes gradually	Steady increase / decrease with age
4	Generational change (change over ‘apparent time’)	Invariant	Changes gradually	Steady increase / decrease with age
5	Community-wide change	Changes abruptly	Changes abruptly	Flat, no slope with age

Generational change indicates that the linguistic use of individuals is stable, and the use of the innovative variant of each generation is gradually increased. On the other hand, if the variable is age-graded, it is not associated with communal change but related to individuals of differing age groups (Meyerhoff, 2006). Moreover, age-grading does not mean that one variant pushes out another variant. Rather, the same individual changes his or her way of speaking with age. The “linguistic marketplace,” a concept proposed by Sankoff and Laberge (1978), is an important notion to understand such age-related variation. They argued that individuals have an age at which the pressure on them to use a standard variant peaks, usually their early twenties, when they enter a larger linguistic marketplace because they are joining the workforce and having other socially broadening experiences. However, when they leave their workplaces upon retirement, the pressure to use the standard variant is attenuated, and they go back to the nonstandard variant.

2.4.2. Gender

In many sociolinguistic studies, scholars differentiate gender from sex (Wodak, 1997; Cameron, 2006). In general, there is a consensus that sex is biological while gender denotes socially determined concepts. As Cameron (2006, p. 724) writes:

sex is a word used in connection with the biological characteristics that mark humans and other animals as either male or female, whereas *gender* refers to the cultural traits and behaviors deemed appropriate for men or women by a particular society.

Gender can be a crucial factor that plays an important role in language change. Thorne (1993) found a significant correlation between gender and ongoing change, concluding that “where age separation is present, gender separation is more likely to occur” (p. 51). Labov’s (1990, 2001) work also demonstrates that gender effects should be taken into consideration in research focused on language change and its social factors. Labov suggested four principles relating gender and ongoing language change. The third and fourth principles, which are particularly relevant to this study, are given here.

Principle 3: *In linguistic change from above, women adopt prestige forms at a higher rate than men.* (2001, p. 274)

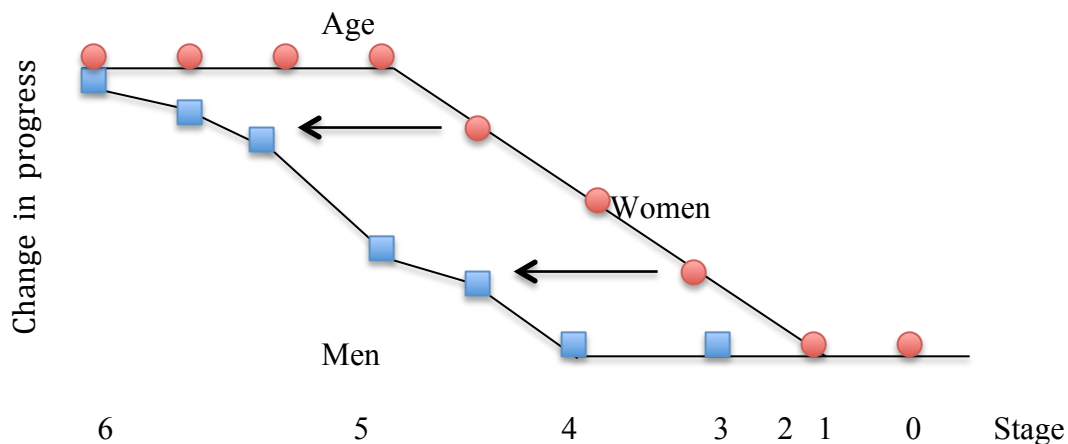
Principle 4: *In linguistic change from below, women use higher frequencies of innovative forms than men do.* (2001, p. 292)

Principle 3 has been supported by several empirical studies (Labov, 1966; Lenning, 1978; Milroy & Milroy, 1978; Clarke, 1987). For example, Labov (1966) examined variation in

(r)-pronunciation in New York City, and he found that the use of the prestigious form, with (r)-presence, was led by women.

On change from below, studies by Labov (1966) and Cedergren (1973) provide support for Principle 4. Labov found from his New York City study that women were in advance of men in the change of raising (æh) and (oh). Cedergren's (1973) research in Panama City found younger women advancing a lenition of (Č). Scholars have argued that men generally follow a change that women begin in a previous generation, which indicates that women are one generation ahead of men in changes in progress. In this view, there are six stages in a sound change's diffusion. Labov (2001) provided a schematic diagram of the stages, reproduced here as Figure 2.4.

Figure 2.4. A six-stage model of gender relations in linguistic change from below based on Labov's (2001) model



In Figure 2.4, the arrows proceed to males from females, indicating the direction of diffusion. The figure illustrates women's linear and men's step-wise development patterns in sound changes. Specifically, that men retreat from female-dominated change

is observed from stages 3 to 5. In new changes such as stage 3, the difference between men and women is large and visible, while as changes become stable heading toward stage 6, the difference grows smaller.

As demonstrated so far, in some sociolinguistic studies, how male and female speakers behave as separate groups has been a major interest, with the focus on prototypical behavior of men and women. This is a macro view of gender as a social category. In the macro view, there are binary traits of femininity and masculinity, or of women's speech and men's speech. That is, the focus is on the tendencies of all females or all males, rather than the way individual speakers speak. For example, Trudgill (1974) investigated 16 phonological variables in Norwich, England. For an (ng) variable, women strongly preferred the standard variant [ŋ] whereas most men used the nonprestige variant [n]. This finding is meaningful in terms of prototypical behaviors of males and females. Nevertheless, looking at individual speakers' patterns in a holistic way is also significant in sociolinguistics (Maclagan et al., 1999). Maclagan et al. (1999) emphasized the individual, comparing results of gender groups with those of individual speakers in each group. Basing the study on Labov's (1990) assertion that females in the second highest social class are the most conservative in stigmatized changes and the most innovative in nonstigmatized ones, they looked at New Zealand English /ɪ/, /ɛ/, and /æ/ as nonstigmatized diphthongs and /ai/ and /au/ as stigmatized diphthongs. The results of their experiment proved that Labov's claim is right in that older professional women, the second highest social class group, produced conservative pronunciations for the stigmatized forms and innovative pronunciations for the nonstigmatized forms. However, an exception to Labov's claim was also found, because younger professional women did

not show the expected pattern. Rather, younger professional men had a pattern similar to that of the older professional women, which seems to be an indication that the diphthongs are no longer considered stigmatized by younger generations. Nevertheless, looking at behaviors of individual speakers across variables resulted in a different interpretation. When comparing front vowel variables and diphthong variables for younger professional men, only a 22% rate of conservative pronunciation was observed for the nonstigmatized forms. In contrast, 55% of younger professional women produced conservative pronunciations for these forms. This study shows that it is crucial to investigate behaviors of individual speakers across variables in addition to considering averaged values for single variables.

At this point, a question arises: Why and how do individual speakers change their way of speaking so that it is different from the usual behavior of the other people in their gender group? Addressing this question, various scholars have proposed explanations based on diverse theoretical frameworks as well as on empirical research. Cameron (2005) pointed out one trend in sociolinguistics in regard to gender and sexuality, which is that the binary difference in gender (macro view) has been replaced by diversity in gendered identities and practices (micro view).

Eckert et al. (1992) placed an emphasis on intragender differences. In this micro view, gender is socially constructed. They argued that the broad categories of “women” and “men” cannot be regarded as whole, monolithic concepts. Rather, it is significant to scrutinize and analyze how individual women or men behave in their communities of practice (CofP). Eckert et al. (1998) defined the CofP as “an aggregate of people who come together around mutual engagements in some common endeavor. Ways of doing

things, ways of talking, beliefs, values, power relations—in short, practices—emerge in the course of their joint activity around that endeavor” (p. 490).

The CofP theory argues that diversity within one gender should not be regarded as interrupting noise that prevents researchers from generalizing its prototypes. Instead, it is naturally driven by a number of individuals who belong to a variety of CofPs. For example, Eckert (1989) observed that there were two main practices in a high school in Detroit, by which two groups were differentiated: jocks and burnouts. Those who actively participated in school activities, belonged to the middle class, and considered school an important place for their social activities were called “jocks.” By contrast, “burnouts” resisted school activities and took part in activities outside school. Also, they were working class-oriented, and likely to work in blue-collar jobs after graduating from high school. She found that jock girls and burnout girls used different linguistic variables in order to express their distinct identities.

In another interesting study, which investigated the individual’s differing patterns depending on distinctive CofPs, McElhinny (1993) looked into female police officers’ linguistic practices. She examined 11 linguistic features of African-American Vernacular English (AAVE). She also observed that there were two practices in the officers’ speaking styles: a street-cop style and a management-cop style. The former is described as involving emotional expression and the use of anger or impatience for gaining respect for the officer. The latter is demonstrated by the restriction of advice to professional fields. The female officers did not follow the typical, expected patterns in this study because they did not lead in the use of innovative vernacular variants, which demonstrates the importance of analyzing individual speakers’ patterns. The women used

vernacular variables in different practices: Officers who showed more street-cop style preferred a wider variety of AAVE features. It is notable that while there was no difference across genders, individual speakers within one category showed distinctive linguistic features depending on which practice they employed.

Accommodation theory is another important framework for looking beyond a gender category and considering crucial factors that lead individuals to behave differently. Accommodation is “one way of explaining how individuals and groups may be seen to relate to each other” (Wardhaugh, 2010, p. 113). The role of accommodation in speech style will be addressed further in 2.4.4. Several studies claim that accommodation also shows individual differences within the same gender group.

For instance, Hindle (1979) observed one woman’s use of variables in three practices: at her office, at her home, and playing a card game with friends. He found that she tended to use the extreme, vernacular variable in the game situation and less vernacular variables at home. Even though this woman belongs to a category of female in a binary social concept, she showed distinctive variables depending on different conversation settings.

To conclude, gender is an associated concept in which participants construct and recreate their social features and hierarchy through everyday interaction (Eckert et al., 1992). While people take part in everyday interaction with others, they construct gender identities that are changeable depending on factors like different CofPs and accommodation.

In this sense, it is worthwhile to look at different linguistic uses of a single speaker as well as common patterns found in a whole social category. This applies to not

only gender studies, but any research focusing on language variation, and this is one of the goals this dissertation pursues. Studies on how the same person changes speaking style depending on varying situations will be addressed in 2.4.4, and how this perspective is related to the way people perceive linguistic variation will be discussed in 2.5. Before that, in the next section, I will take a look at the role of social class as a social category in linguistic variation.

2.4.3. Social class

Earlier studies attempted to address social class by positing a binary division, such as middle class versus working class or upper class versus lower class. However, Labov (2001) argued that this binary division cannot examine important aspects of social class hierarchy. Supporting his claim, many studies have since proved that social class consists of more than two categories; for example, five divisions of social class were used in a study of changes in (dh) in the Philadelphia Neighborhood Study: lower working class, middle working class, upper working class, lower middle class, and upper middle class (Labov, 2001). Social class in Korea used to be much different than that in the United States, because it was rigidly stratified until the late 19th century, not unlike the Indian caste system. Nevertheless, these days, most people believe that the old social class hierarchy no longer exists in Korea, and that it has been replaced by a modern social class hierarchy, similar to those of the Western countries, which emphasizes occupation, income, and education level (Chae, 1995).

When it comes to the role of social class stratification in sound change, several studies, such as those on sound changes in New York City (Labov, 1966), Norwich

(Trudgill, 1974), and Panama City (Cedergren, 1973), have postulated that the groups leading the change are in the middle of the socioeconomic hierarchy. Based on these empirical results, Labov (2001) proposed a curvilinear principle for the correlation of social class and sound change:

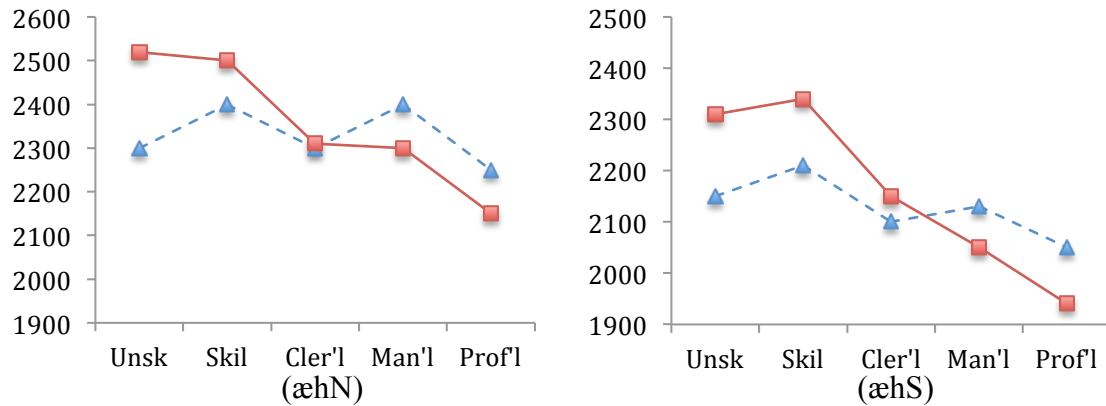
Curvilinear principle: *Linguistic change from below originates in a central social group, located in the interior of the socioeconomic hierarchy.* (p. 188)

Moreover, language changes within social classes are realized in ways closely linked with speakers' gender. For example, among six sound changes observed in Philadelphia, (æhN) and (æhS) are considered nearly completed changes, (owF) and (owC) are middle-range changes, and (aw) and (eyC) are new and vigorous changes. These three kinds of changes show distinctive patterns of correlation between gender and social class. In order to show the different patterns visually, I recreated Labov's (2001) figures representing the expected values of the six sound changes. See Figure 2.5.

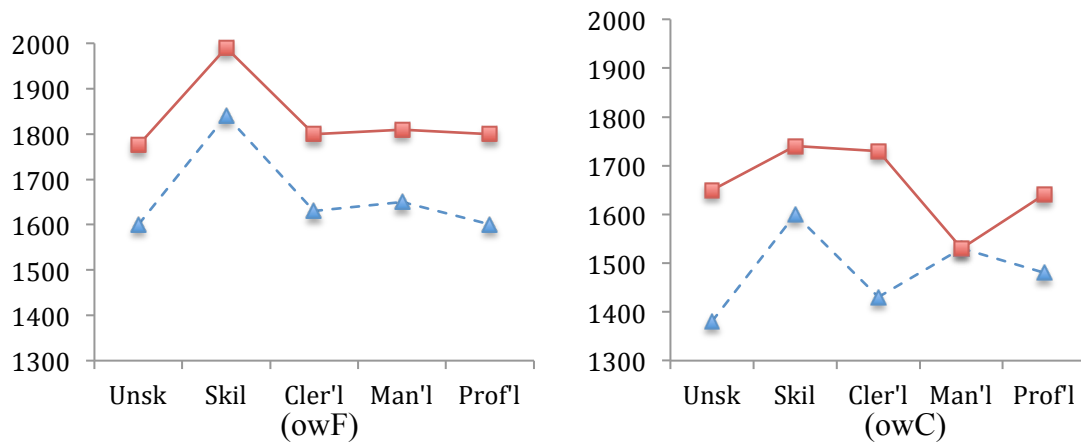
Figure 2.5. Expected values of nearly completed changes for (æh) (a), middle-range changes for (ow) (b), and new and vigorous changes for (aw) and (eyC) (c).

Note: Square = females; triangle, dashed line = males; Unsk = unskilled labor; Skil = skilled labor; Cler'l = clerical; Man'l = managerial; Prof'l = professional; y-axis: expected F2 values

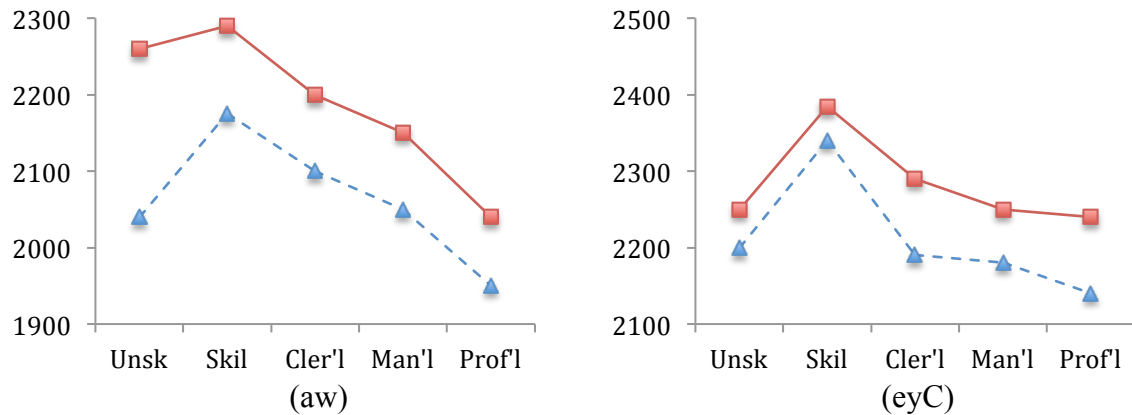
(a) Nearly completed changes



(b) Middle-range changes



(c) New and vigorous changes

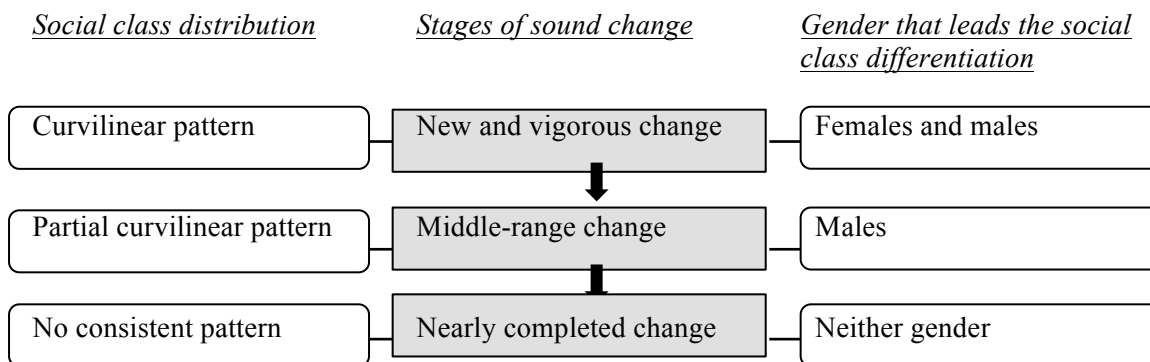


In (a), for the nearly completed changes (æhN) and (æhS), the only difference between the two genders is that females have a steeper slope from unskilled down to professional groups. However, both females and males still have a linear pattern, which indicates that the nearly complete changes do not fit the curvilinear principle. Moreover, in (b), the male skilled labor group has a significantly higher value for both allophones ($p = .01$).⁵ This indicates that, in the middle-range changes, males conform to the curvilinear principle that changes originate in the central sections, not at the extremities, of a social hierarchy. The middle range changes also show a partially consistent pattern; because females employ sound changes at an earlier stage, they do not take part in the middle-range changes, while males still do. These patterns support the six-stage model in Figure 2.4. In contrast, the new and vigorous changes in (c) display an obvious curvilinear pattern for both (aw) and (eyC). Nevertheless, statistical analysis revealed no significant difference between unskilled female and skilled female laborers for the (aw) change. On the other hand, for (eyC), both genders show a curvilinear pattern that has a peak in the second social class. The reason why only (eyC) shows the curvilinear pattern for both males and females is that it is the most recent and vigorous of the six changes.

In conclusion, gender and social class as social categories play mutually supporting roles in different stages of sound changes; their interactions in each stage are illustrated in Figure 2.6.

⁵ Even though the pattern for female speakers is curvilinear, the peak does not show statistical significance.

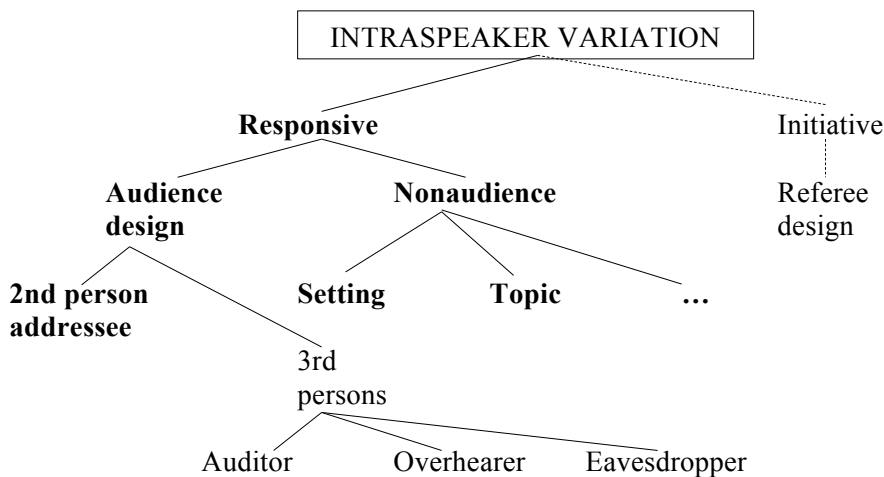
Figure 2.6. Schematic diagram of the interrelation of social class and gender in sound change



2.4.4. Speech setting and addressee

Figure 2.7 illustrates Bell's (1984) categorization of intraspeaker variation into responsive and initiative; Bell pointed out that "style is essentially speakers' response to their audience" (p. 145).

Figure 2.7. Style as audience and nonaudience design (Bell, 1984)



Responsive variation is divided into two categories: audience design and nonaudience design. The basic assumption of audience design is that people change their speech style depending on who their audience is, and the most powerful impact on linguistic variation

is that of 2nd person addressees. Regarding the role of addressee, Giles and Powesland (1975) and Giles and Smith (1979) introduced the term “accommodation,” arguing that style shift occurs in order for speakers to accommodate their speech style to the addressee. More specifically, speakers converge toward or diverge from how the addressee speaks to win social approval or keep distance from her/him, although they also sometimes choose to just maintain their own speech style. The concept of accommodation is supported by many empirical studies including those of Douglas-Cowie (1978), Bickerton (1980), Trudgill (1981), and Thelander (1982).

Nonaudience style design concentrates on nonpersonal attributes that lead to style shift. Among many nonpersonal factors, Bell (1984) emphasized the roles of setting and topic. Topic broadly influences a speaker’s speech style ranging from accent (Giles & Powesland, 1975) to dialectal variation (Blom & Gumperz, 1972). For example, Coupland (1981) quantified travel assistants’ style shift depending on topic change, and found that they showed a large number of style shifts in linguistic variation including (h) dropping, consonant cluster reduction, and intervocalic (t) voicing even when speaking to the same addressee. Speakers also employ different styles of speaking depending on the situations in which they are talking (Hymes, 1974; Brown & Fraser, 1979; Bell, 1984). In Korea, this is mainly related to levels of formality, which means that distinctive styles are chosen depending on how formal or informal the circumstance is (Sohn, 1983). There are various factors that change the level of formality: the kind of occasion; the various social, age, and other differences that exist among the participants; the particular task that is involved, such as writing or speaking; the emotional involvement of one or more of the participants, and so on (Wardhaugh, 2010). Sohn (1983) and Byon (2006) related

formality and informality in Korean speech settings with power and solidarity, claiming that an appropriate style must be used in any power and solidarity relationship. That is to say, it is not unexpected for speakers to use differing degrees of linguistic variants when speech situations vary.

Bearing in mind that language variation is influenced not only by social membership such as age, gender, and social class as a whole but also by stylistic variation, this dissertation will examine both of these aspects of vowel variation in speech production.

2.5. Speech perception: Social meanings of vowel variation

As the importance of social factors in speech production has become of increasing interest to scholars, research on social factors in speech perception has also become more common. Many studies have found that listeners ascribe social meanings to linguistic forms, and these meanings are also related to the way people produce speech. Hence, in this section, I will look into studies on how linguistic variations have social meanings, concentrating on the concepts of indexicality and indexical field and how these notions are related to speech production.

2.5.1. Indexicality

Indexicality is a term used to describe how social meanings and linguistic variables are related. The most pervasive view is that a linguistic variable's meaning is not fixed and static. Rather, the meanings can change over time, and one variable simultaneously has diverse meanings (Silverstein, 2003; Zhang, 2005; Campbell-Kibler,

2007a, 2007b; Eckert, 2008; Moore & Podesva, 2009). In addition, people change their ways of speaking in order to build and show their identities as time goes by and as situations vary.

A well-known example of indexicality is discussed in studies by Campbell-Kibler (2007a, 2007b), which looked into various meanings of *-ing* in American English. She used a matched-guise technique (Lambert, Hodgson, Gardner, & Fillenbaum, 1960) to investigate how listeners judge *-ing* and what kinds of social meanings are indexed to its different realizations. She found that an alveolar variation *-in* is associated with being uneducated, casual, relaxed, or inarticulate, making less effort, or being from the South, while a velar variation *-ing* has social meanings of being educated, intellectual, formal, or articulate, making an effort, or being from the North.

Another example of indexicality is found in interpretations of /t/ release in American English. Eckert (2008) draws on several studies on the social meanings of /t/ release. This discussion differs from the discussion of *-ing*, which is based on experimental evidence of listeners' perceptions, because it is based on the various authors' speculations about how /t/ release's interpretations correlate with social categories and personal traits or stances. More specifically, the studies talk about this variable's association with being clear, intellectual, and articulate, and then in turn with some social types, which are nerd girls (Bucholtz, 2001), orthodox Jewish boys (Benor, 2001), and gay men (Podesva et al., 2002). In addition, regarding its meaning of clarity, it might be related to expressing emphasis, which is in turn associated with exasperation and anger. These works show how the concept of indexicality can be used to explain how

diverse meanings are attached to one variant and how a variant's potential meanings develop and change.

2.5.2. Indexical field

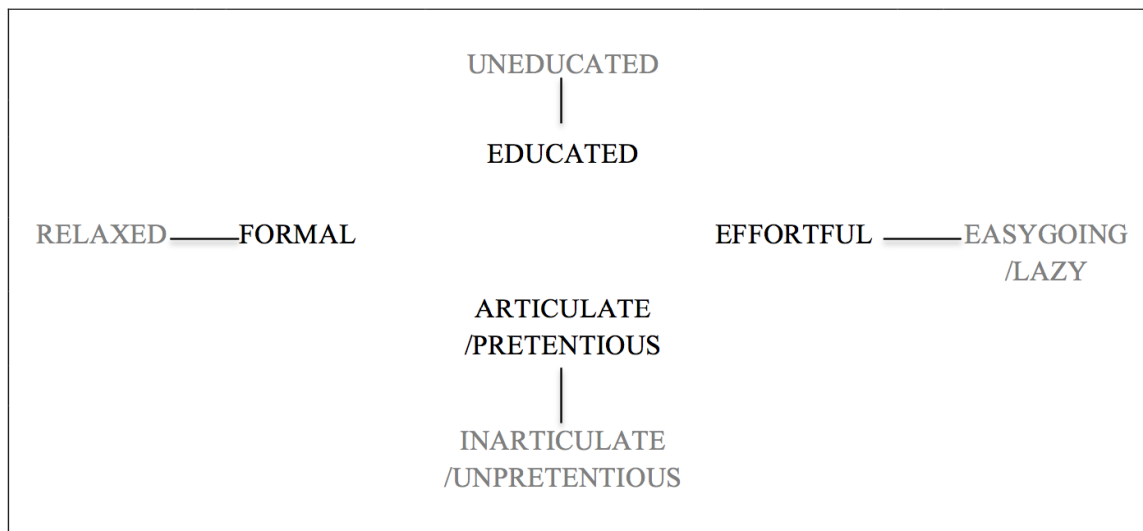
Working with the idea of indexicality, Silverstein (2003) introduced the concept of indexical order, and Eckert (2008) highlighted the importance of an indexical field, which incorporates indexical order. According to Silverstein, a first-order index indicates a pragmatic meaning that can be drawn from an utterance, such as the speaker's membership in the group of Martha's Vineyarders, Beijingers, or Detroiters (Eckert, 2008), and a second-order index takes a variable as a marker of certain personal characteristics attached to that social membership. If a person's social membership is indexed by a first-order index, traits ascribed to that social membership can become part of the individual's characteristics, according to listeners, by a second-order index. In other words, the second-order index is related to stereotypical characteristics. For instance, Silverstein used the example of Labov's (1966) New York City study, and argued that the social stratification of the populations Labov studied is a first-order index, but that social evaluations of what each population's characteristics are become second-order indexes. This process can be repeated, with the correlation between a form and meanings being reproduced and reinterpreted over and over. Silverstein describes this continuous reconstrual as $n^{\text{th}} + 1$ indexical order. Eckert (2008) pointed out that this continuous "meaning-making" process takes place in a so-called "indexical field." She also argued that "the social is not just a set of *constraints* on variation—it is not simply a

set of categories that determine what variants a speaker will use—it is a meaning-making enterprise” (p. 472).

For example, according to Campbell-Kibler’s (2007a, 2007b) discussion, *–ing* variation can be described in terms of an indexical field that contains all the related meanings of the alveolar and velar variables. The indexical field visually presents all related social meanings, as seen in Figure 2.8.

Figure 2.8. Indexical field of *–ing* (based on Campbell-Kibler 2007a, 2007b, adapted from Eckert, 2008)

Note: Black = meanings for the velar variant; gray = meanings for the alveolar variant



In terms of speech perception, listeners associate one variant with some of these meanings in an indexical field depending on stylistic factors of discourse including different situations or contents. This stylistic practice applies to production of speech as well as its perception, which Eckert describes as processes of “bricolage (Hebdige, 1984), in which individual resources...can be interpreted and combined with other resources to construct a more complex meaning entity” (Eckert, 2008, pp. 456–457).

This dissertation will use the concepts of indexicality and the indexical field to explain what kinds of meanings are indexed to [o] and [u] in Seoul Korean in terms of speech perception, and how these meanings are related to speech production in certain contexts.

2.6. Research questions

In the previous sections, I defined Seoul Korean and explained the main scope of this study, and I presented the previous literature on the raising of /o/ in Seoul Korean. In addition, I addressed the significance of social factors as well as linguistic factors in speech production, and discussed how social meanings are related to linguistic variations in speech perception. This chapter has thus provided the background for the dissertation's investigation of how Seoul speakers produce and perceive vowel raising in constituent-final *-ko* and *-to* in colloquial speech. The dissertation addresses four main research questions:

1. Does /o/ in constituent-final *-ko* and *-to* of Seoul Korean have differing phonetic realizations, including formant frequencies, depending on preceding/following environments and prosodic features?
2. Do native speakers of Seoul Korean in different social categories of age, gender, and/or social class use distinctive phonetic realizations of /o/ in constituent-final *-ko* and *-to*?
3. Do Seoul Korean speakers change their way of speaking when the speech setting and addressee differ?
4. Do raised/unraised variants of /o/ have fixed social meanings? If not, what kind of social meanings does each variant have, and how are these linked to speech production?

To answer these questions, I conducted sociolinguistic interviews and an elicitation task to investigate speech production and a matched-guise test to explore speech perception. In the following three chapters, I will present the methods and procedures I used in detail, the resulting data, and my analyses of the data.

CHAPTER 3.

LINGUISTIC AND SOCIAL FACTORS RELATED TO VOWEL VARIATION

3.1. Method: Sociolinguistic interview

This dissertation investigates the speech production of *-ko* and *-to* with data collected in two ways: through sociolinguistic interviews and an elicitation task.⁶ More specifically, the interview data allow me to examine linguistic factors and social factors that affect vowel variations of /o/ in colloquial speech of Seoul speakers, and the elicitation task is a method for looking at speakers' different uses of vowel variants for various stylistic variations. In this section, the method of the sociolinguistic interview will be presented in detail; the procedure of the elicitation task will be addressed in 4.1.

3.1.1. Participants

As the main goal of this research is to examine the influence of speakers' different social traits on speech production, I sought participants of various age, gender, and social class groups. Many of the participants were recruited through word of mouth. For example, one of the participants was a barber working at a public bath where my father has his hair cut on a regular basis, and another participant used to be my younger brother's math tutor. I also recruited participants by posting about the study on the social network service Facebook, which led some of my friends to refer me to their acquaintances. Participants had to speak Seoul Korean and fit into one of the target age groups. Because most of them had some connection to me through family and friends,

⁶ These data collection processes were approved by the UH Committee on Human Studies (#19544).

they seemed to speak naturally to me, even though some interviewees looked nervous at the beginning of the interview. Altogether, I recruited 47 Seoul speakers. I ultimately used data from 45 of them because two of the audio recordings had background noise that prevented acoustic analysis.

The 45 participants are classified into different groups according to their age, gender, and social class. There are three age groups (people in their 20s, 40s, and 60s at the time of the interview), and two gender groups (males and females). For the social class categorization, I adopted Chae's (1995) criteria, except that I excluded the index for the old social class hierarchy in her classification, as it no longer exists in Korea. See Table 3.1.

Table 3.1. Criteria for social class classification (Adapted from Chae, 1995)

<i>a.</i>	<i>Educational level</i>	<i>Points</i>
	More than college education, some graduate study	3
	College, technical school	2
	High school	1
<i>b.</i>	<i>Income level</i>	<i>Points</i>
	Enough to afford children's study abroad	3
	Enough to send children to college in Korea	2
	Cannot afford to send their children to college	1
<i>c.</i>	<i>Occupational level</i>	<i>Points</i>
	Professional, high level manager, or manager at a large company	3
	Semi-professional, small business	2
	Blue-collar workers	1
<i>d.</i>	<i>Social class</i>	<i>Points</i>
	Upper Middle Class (UMC)	8–9
	Lower Middle Class (LMC)	6–7
	Upper Working Class (UWC)	4–5
	Lower Working Class (LWC)	Below 4

As shown in *a* through *c* in the table, there are three indexes for social class grouping: educational level, income level, and occupational level.⁷ The three levels of each index are allocated points ranging from 1 to 3. The numbers are summed up, and this number, shown in *d*, determines the speaker's social class.

Table 3.2 summarizes the distribution of the 45 interviewees' social characteristics.

Table 3.2. Distribution and number of interviewees according to age, gender, and social class

Age	Social class	No. of participants	
		Female	Male
20–29	LWC	0	1
	UWC	3	1
	LMC	5	6
	UMC	0	1
40–49	LWC	1	0
	UWC	3	2
	LMC	1	2
	UMC	2	4
60–69	LWC	0	2
	UWC	5	2
	LMC	0	1
	UMC	1	2

3.1.2. Procedures

Before each interview began, I told the participant that it would be a casual one-on-one talk, and I introduced myself as a graduate student who is interested in investigating the way various people speak. For the place of the interview, interviewees were given a few options: a quiet room of a “study café” in Seoul that specializes in study

⁷ For college students, their income and occupational levels were determined by those of their parents. In addition, when the interviewee was a housewife or already retired, his/her income and occupational level were determined by that of his/her spouse.

groups, group meetings, small lectures, and so on, or the interviewer's or interviewee's house. At the beginning of the interviews, I first asked the participants if I could record our talk, and then I asked them to fill out a participant background form. I then tried to start a conversation as naturally as possible by talking about the interviewee's job or family. Unlike in western culture, it is not rude in Korea to ask people about their personal background including age, job, family, or boy/girlfriends, even at a first encounter. In the interviews, I tried to collect as much spontaneous data as possible by talking about casual topics such as family, friends, childhood, and travel.⁸ In addition, although I led the interview by asking questions, most of the utterances were produced by the participants. The interviews lasted a minimum of thirty minutes to a maximum of one hour, and all conversations were recorded on a TASCAM DR-07 recording device with a 48 kHz sampling rate. Participants were paid \$15.00 as compensation.

3.1.3. Acoustic measurements

For analysis, the recorded interview data were transcribed in ELAN (EUDICO Linguistic Annotator) 4.1.2 (Sloetjes & Wittenburg, 2008), and target vowels were extracted in the computer program Praat (Boersma, 2001).

The analysis included only vowels produced at least 10 minutes after the interview started, as some participants seemed a little bit nervous and reluctant to talk about some matters for the first few minutes. I collected a total of 1033 tokens of *-ko* and *-to*, and the number of tokens produced for analysis (i.e., from 10 minutes on in the interview) by each speaker ranged from 7 to 41. Next, in Praat, F1 and F2 values of each vowel were collected at a mid point of a steady state. These values were automatically

⁸ For details of interview questions, see Appendix I.

normalized with the Watt & Fabricius normalization method NORM (Thomas, Kendall, Yeager-Dror, & Kretzschmar, 2007), which is designed to remove interspeaker differences in formant values that arise from the different vocal tract lengths of each speaker. The normalized values were used for the statistical analysis.

3.1.4. Statistics

The normalized data of the interviews were fit by hand into linear mixed effects models using the statistical tool R. Such models deal simultaneously with multiple factors and their interactions, and unlike other models, can take information about the sample population into consideration as random effects. Including random effects basically prevents one single speaker or stimulus from influencing the results, increasing the results' credibility. In the case of sociolinguistic interviews, the interviewees can be treated as random effects.

For the statistical analysis, there are two separate models depending on whether the vowel is inside the prosodic unit AP or in the prosodic boundary final position (i.e., IP or AP): (i) Model 1: AP-medial /o/ and (ii) Model 2: prosodic final /o/. There are 444 tokens for Model 1 and 589 tokens for Model 2. This division is based on the results of the pilot test, which showed that social factors influence vowel variation largely depending on the kind of prosodic unit to which the vowel belongs. Table 3.3 presents the number of tokens extracted from the interview data for each group of age, gender, and social class depending on each model.

Table 3.3. Interviews: Number of tokens of target vowels for each group of speakers

(a) Model 1: AP-medial /o/

Age	Social class	No. of tokens	
		Female	Male
20–29	LWC	0	20
	UWC	25	21
	LMC	59	63
	UMC	0	10
40–49	LWC	5	0
	UWC	38	4
	LMC	17	17
	UMC	9	30
60–69	LWC	0	13
	UWC	58	12
	LMC	0	17
	UMC	17	9

(a) Model 2: Prosodic final /o/

Age	Social class	No. of tokens	
		Female	Male
20–29	LWC	0	11
	UWC	33	10
	LMC	75	59
	UMC	0	14
40–49	LWC	16	0
	UWC	45	21
	LMC	16	25
	UMC	40	48
60–69	LWC	0	24
	UWC	57	26
	LMC	0	23
	UMC	10	36

In both models, dependent variables are normalized F1 and F2 values, which means that there are two submodels for F1 and F2 in each model, and participant is included as a random intercept. Fixed effects of the two models are presented in Table 3.4.

Table 3.4. Interviews: Fixed effects tested in the mixed effects models

Language-internal factors		Language-external (social) factors	
Following segment ⁹	/i/	Age	Younger
	/e/		Middle-aged
	/ɪ/		Older
	/ə/	Gender	Female
	/u/		Male
	/o/	Social class	LWC
	/a/		UWC
	/j/-diphthong		LMC
	/w/-diphthong		UMC
	/ij/	Two-way interactions of social factors	Age * Gender
	Bilabial consonant		Age * Social class
	Alveolar consonant		Gender * Social class
	Palatal consonant		
	Velar consonant		
	Glottal consonant		
Preceding segment	/t/		
	/k/		
Final tone	High		
	Low		
Word category	Clause connective		
	NP particle		
	Adverb		
	Quotative particle		
	Sentence ender		
	Discourse marker		

3.2. Results

This section describes how language-internal and language-external factors influence vowel variation in constituent-final *–to* and *–ko*. For both types of factor, as stated in 3.1.4, the results of the two different models will be reported.

⁹ In Model I for the AP-medial /o/, /ɪ/ and /ij/ are not included as following segments since no tokens were followed by those vowels in the analyzed interview data.

3.2.1. Linguistic contexts and vowel variation

For the linguistic factors, F1 values are related to vowel height, and F2 values to frontness. Compared to F1 values, F2 values are more likely to change depending on preceding segments as well as following segments: Both anticipatory and perseverative coarticulation take place. It is well known that effects of coarticulation take place more frequently for F2 than for F1 values because “F2 changes reflect variations in overall tongue dorsum movement, whereas F1 is mostly correlated with oral opening degree and, thus, with tongue dorsum and jaw height” (Recasens & Pallares, 2000, p. 501). It seems that this pattern applies to the vowel variation of /o/ in *-ko* and *-to*, because the preceding segment significantly affects the F2 value in both models, while its effect on the F1 value reaches a significant level only in the AP-medial position.

3.2.1.1. AP-medial /o/

In the following tables for coefficients of fixed effects (linguistic factors), the elements that are not shown in the tables are the default factors. In other words, for the preceding segments, following segments, word categories, and final tones, the default factors are preceding /k/, following /ə/, being a clause connective, and ending in a high tone, respectively.

Table 3.5 shows that some of the word categories and preceding and following segments change the F1 values of /o/ in constituent-final *-ko* and *-to* at a significant level. In the table, larger coefficients refer to larger F1 values, which indicate that the vowel is lowered or unraised. More specifically, /o/ in NP particles is lower than in clause connectives. In addition, compared to following /ə/, /o/ has a higher F1 value when it is

followed by /a/ ($p < 0.05$), which indicates that the vowel is more lowered, and a lower F1 value when it is followed by /i/ ($p < 0.01$), /u/ ($p < 0.05$), and alveolar ($p < 0.01$), palatal ($p < 0.01$), and velar ($p < 0.01$) consonants, which indicates that the vowel is more raised. As discussed in 2.3.1, change in F1 depending on the adjacent following segments can be expected because of anticipatory coarticulation. For example, /a/ is a low vowel that is produced with a large jaw aperture, and therefore articulators are presumably ready for lowering while pronouncing /o/ before /a/. Similarly, the raising effect of following /i/ and /u/ can be accounted for by their tongue positions in terms of the tongue height. /i/ and /u/ are two of the highest vowels in the Korean vowel system, and thus articulators are ready for raising before these monophthongs. Moreover, the following and preceding alveolar sound lowers the F1 values of the neighboring sounds, which means that the vowel is raised before and after this sound. This is also explained by the concept of coarticulation, because the vowel is raised due to the high position of the tongue tip for the preceding consonant /t/ and following alveolar consonants. However, as discussed in 3.2.1.2, following palatal and velar consonants are known to make the F1 values higher, as shown in many languages; therefore, in this dissertation, I only report the results, leaving discussion of the causes of these phenomena for future study.

Table 3.5. AP-medial /o/: Coefficients of fixed effects (linguistic factors) for normalized F1 values. Social factor results from this model are shown in Table 3.9.

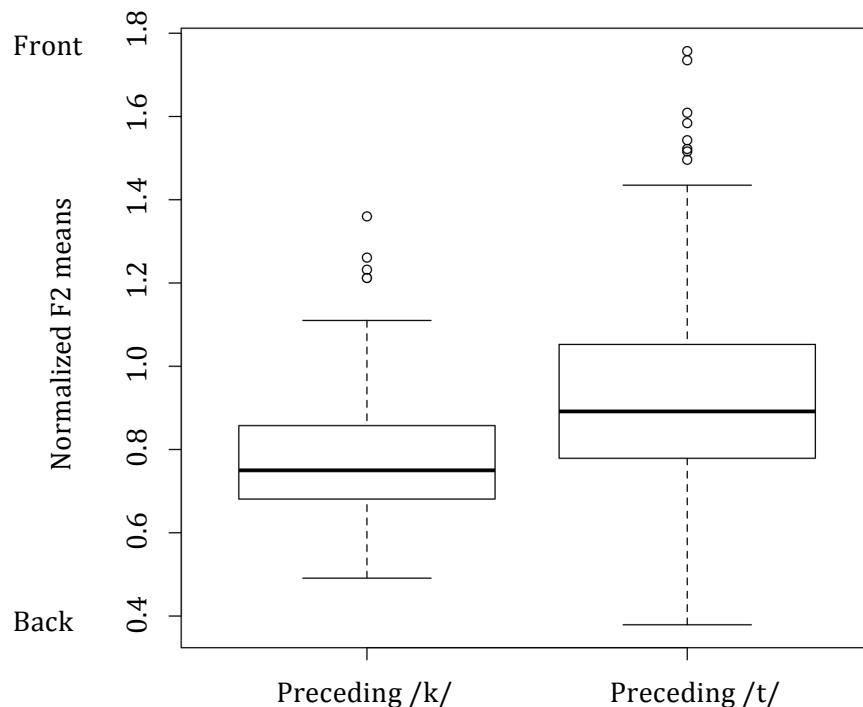
	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	1.04E+00	3.51E-02	2.66E+02	29.769	< 0.0001
Preceded by /t/	-7.81E-02	1.92E-02	4.13E+02	-4.069	< 0.0001
Followed by /i/	-1.25E-01	3.33E-02	4.09E+02	-3.753	0.0002
Followed by /e/	5.96E-02	9.61E-02	4.00E+02	0.62	0.535322
Followed by /u/	-1.62E-01	6.93E-02	3.95E+02	-2.337	0.019936
Followed by /o/	-8.31E-04	7.02E-02	4.06E+02	-0.012	0.990552
Followed by /a/	1.02E-01	4.13E-02	4.05E+02	2.465	0.014135
Followed by /j/-diphthong	-8.24E-02	5.08E-02	4.11E+02	-1.624	0.10509
Followed by /w/-diphthong	3.65E-02	6.56E-02	4.08E+02	0.557	0.578097
Followed by bilabial	-5.63E-02	3.09E-02	4.15E+02	-1.826	0.068582
Followed by alveolar	-8.29E-02	3.09E-02	4.14E+02	-2.687	0.007499
Followed by palatal	-1.22E-01	3.49E-02	4.08E+02	-3.493	0.000531
Followed by velar	-1.17E-01	3.21E-02	4.09E+02	-3.639	0.000309
Followed by glottal	3.15E-02	3.34E-02	4.09E+02	0.943	0.346236
Word category = adverb	1.58E-02	2.66E-02	4.03E+02	0.596	0.551348
Word category = discourse particle	-2.29E-02	1.31E-01	4.04E+02	-0.175	0.861195
Word category = NP particle	5.46E-02	1.99E-02	4.10E+02	2.739	0.006425
Word category = quotative particle	-1.50E-02	2.51E-02	4.08E+02	-0.597	0.551011
Word category = sentence ender	-3.28E-03	5.41E-02	4.07E+02	-0.061	0.951727

Table 3.6. AP-medial /o/: Coefficients of fixed effects (linguistic factors) for normalized F2 values. Social factor results from this model are shown in Table 3.10.

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.69225	0.04648	157.5	14.893	< 0.0001
Preceded by /t/	0.16968	0.01532	404	11.075	< 0.0001
Followed by /i/	0.21479	0.03873	400	5.546	< 0.0001
Followed by /e/	0.36015	0.11035	394.5	3.264	0.001196
Followed by /u/	0.08177	0.07997	394.4	1.022	0.307181
Followed by /o/	0.01613	0.08132	398.7	0.198	0.842844
Followed by /a/	0.03825	0.04803	399.9	0.796	0.42631
Followed by /j/-diphthong	0.18541	0.0506	402.9	3.664	0.000281
Followed by /w/-diphthong	0.06027	0.07493	399.8	0.804	0.421694
Followed by bilabial	0.04047	0.03612	408.3	1.12	0.263261
Followed by alveolar	0.14148	0.03592	404.8	3.938	< 0.0001
Followed by palatal	0.12481	0.04054	400.9	3.079	0.002223
Followed by velar	0.05906	0.03736	401.9	1.581	0.114751
Followed by glottal	0.0916	0.03804	403.5	2.408	0.016501

When it comes to vowel frontness, as shown in Table 3.6 and Figure 3.1, the F2 value is higher when it is preceded by /t/ than when it is preceded by /k/ ($p < 0.0001$). This difference in effects was predictable, as several studies have pointed out that coronal sounds cause fronting of following sounds crosslinguistically (Clements, 1991; Hume, 1992; Flemming, 2002). Similarly, /u/-fronting as a sound change in progress in southern British is a well-known example that shows preceding anterior consonants leading to the fronting of a following vowel (de Jong, McDougall, Hudson, & Nolan, 2007; McDougall & Nolan, 2007).

Figure 3.1. AP-medial /o/: Normalized F2 means depending on preceding segments



As for the effects of following sounds on F2, /o/ is pulled forward by following alveolar consonants ($p < 0.0001$), palatal consonants ($p < 0.01$), glottal consonants ($p < 0.05$), /i/ ($p < 0.0001$), /j/-diphthongs ($p < 0.01$), and /e/ ($p < 0.01$). The anticipatory coarticulation that takes place with the following /i/, /e/, and /j/-diphthongs was also easy to predict; a familiar example in English is of the /k/ in *car* and *key*, where /k/ in *key* is fronted due to the different quality of the following vowel (Oh, 2010). Because /i/ and /e/ are front vowels and /j/-diphthongs basically start with the /i/ sound, anticipatory coarticulation leads the /o/ to a forward position before them. In addition, the fronting of /o/ caused by the following alveolar and palatal consonants also can be explained by anticipatory coarticulation: As with preceding alveolars, the /o/ is also moved forward when followed by alveolar consonants, and it is fronted before palatal consonants because they are relatively front. In summary, most of the differences in F2 values result from anticipatory and perseverative coarticulation. However, to my knowledge, the fronting effect of following glottal sounds has not been reported yet, so more research will be required.

3.2.1.2. Prosodic final /o/

In the AP final and IP final positions, some following segments and final tones influence the F1 values of /o/ as shown in Table 3.7. As for the following segments, being /ə/ is a default factor; /i/ ($p < 0.01$), /j/-diphthongs ($p < 0.05$), bilabial consonants ($p < 0.05$), velar consonants ($p < 0.05$), and glottal consonants ($p < 0.01$) increase the F1 values, which indicates that the vowel is lowered or unraised.

The lowering effect of following glottal sounds can be predicted, and in fact the lowering of a vowel before uvular or post-velar consonants has been reported across languages including Eskimo-Aleut languages (Rischel, 1972), Nuuchahnulth (Wilson, 2007), and Arabic varieties (McCarthy, 1994; Shahin, 2002), among many others. Wilson (2007) used ultrasound to show the lowering movement of the tongue root during the production of a vowel with an adjacent post-velar sound. In a similar vein, lowering of the vowel may also be caused by jaw lowering for adjacent velar consonants (Keating, Lindblom, Lubker, & Kreiman, 1994). Nevertheless, the lowering effects of following /i/, /j/-diphthong, and bilabial consonants are not predicted, because (i) /i/ is a high vowel and /j/-diphthongs basically start with /i/, which mostly results in the raising of the adjacent sound—and this was evident for the raising of AP-medial /o/ before /i/ due to the tongue height of neighboring vowels; and (ii) no tongue contact is needed to articulate bilabial consonants, which makes it difficult to anticipate these consonants' influence on a preceding vowel. Therefore, the current study will not ascribe changes of /o/ when adjacent to these sounds as a result of coarticulation, but leave this matter for future investigation.

In addition to following sounds, whether a phrase ends in a high (H) or low (L) tone influences vowel height.¹⁰ When the vowel ends in L, it is more raised than when it ends in H ($p < 0.0001$). This result echoes earlier studies that showed how tones and vowel quality interact: Tones affect vowel height but not vice versa (Chen & Norman, 1965; Matisoff, 1973; Maddieson, 1976). Nevertheless, this claim has been controversial,

¹⁰ Although there are nine IP boundary tones in the Korean prosodic system (Jun, 2005), according to Park (2003) boundary tones that share the same final tone (either H or L) are interchangeable without a major meaning change. Therefore, this dissertation looks only into final tones, not all nine boundary tones.

as many scholars, including Schuh (1971) and Pilczkova-Chodak (1972), have reported counter examples. In this dissertation, I do not intend to argue that this result follows a general or universal tendency; I only report that, in constituent-final *-ko* and *-to* of Seoul Korean, final tone influences the vowel height, and it is the Low tone that raises the vowel. I leave the question of the mechanism of this phenomenon to future studies in phonetics.

Table 3.7. Prosodic final /o/: Coefficients of fixed effects (linguistic factors) for normalized F1 values

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.922569	0.026144	424.3	35.288	< 0.0001
Followed by /i/	0.073688	0.028235	539.4	2.61	0.00931
Followed by /e/	0.015366	0.055022	537.3	0.279	0.78015
Followed by /i/	0.007979	0.039504	542.9	0.202	0.84
Followed by /u/	0.074757	0.060264	537.3	1.24	0.21534
Followed by /o/	-0.064966	0.082852	539.9	-0.784	0.43331
Followed by /a/	0.051397	0.036486	546.5	1.409	0.1595
Followed by /j/-diphthong	0.07203	0.03351	541.9	2.149	0.03204
Followed by /w/-diphthong	0.031691	0.055057	539.9	0.576	0.56513
Followed by /ij/	0.010566	0.113168	531.5	0.093	0.92565
Followed by bilabial	0.055308	0.026105	540	2.119	0.03457
Followed by alveolar	0.041197	0.024399	537.3	1.688	0.0919
Followed by palatal	0.048871	0.026906	543.1	1.816	0.06987
Followed by velar	0.061313	0.024305	539.6	2.523	0.01193
Followed by glottal	0.076973	0.027679	539.7	2.781	0.00561
Ends in low tone	-0.054834	0.010538	553.8	-5.204	< 0.0001

As shown in Table 3.8, when it comes to the F2 values of /o/ in *-ko* and *-to* in the prosodic final position, they are seemingly affected by preceding segments only:

Preceding /t/ leads to higher F2 values than preceding /k/ ($p < 0.0001$), which means that the vowel is more fronted after /t/. This fronting effect of coronal sounds is the same as

that for AP-medial /o/, discussed in the previous section. Besides preceding segments, no fixed effects reach a significant level for F2 values of prosodic final /o/.

Table 3.8. Prosodic final /o/: Coefficients of fixed effects (linguistic factors) for normalized F2 values

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	6.91E-01	1.19E-02	4.98E+01	58.11	< 0.0001
Preceded by /t/	9.92E-02	8.76E-03	5.55E+02	11.33	< 0.0001

3.2.2. Social factors and vowel variation: Age, gender, and social class

This section presents the results of the analysis of language-external factors influencing vowel variation of /o/ in constituent-final *–ko* and *–to*. Specifically, in the following subsections, the results of the analysis of the sociolinguistic interview data will be addressed, concentrating on how speakers’ age, gender, and social class influence the vowel’s height and/or frontness in the AP-medial position. Because no significant influence of speaker’s social category on vowel variation in the prosodic final /o/ was found in the interview data, only results for AP-medial /o/ will be presented.

AP-medial /o/

In the interview data, language-external factors appeared to significantly affect both F1 (vowel height) and F2 (frontness) values of /o/ in the AP-medial position. Coefficients of fixed effects for speakers’ F1 and F2 values are presented in Table 3.9 and Table 3.10.

Table 3.9. AP-medial /o/: Coefficients of fixed effects (social factors) for normalized F1 values. Linguistic factor results from this model are shown in Table 3.5.

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	1.04E+00	3.51E-02	2.66E+02	29.769	< 0.0001
Age = older	-7.79E-02	2.66E-02	3.35E+01	-2.93	0.006061
Age = younger	-3.95E-02	2.46E-02	3.40E+01	-1.604	0.117881

Table 3.10. AP-medial /o/: Coefficients of fixed effects (social factors) for normalized F2 values. Linguistic factor results from this model are shown in Table 3.6.

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.69225	0.04648	157.5	14.893	< 0.0001
Age = older	-0.11692	0.0471	41.2	-2.482	0.017206
Age = younger	0.01222	0.0435	40.4	0.281	0.780168

As the tables show, among the social factors, only speaker's age played a significant role in changing the F1 and F2 values. First, older speakers produced lower F1 values than middle-aged speakers ($p < 0.01$), which indicates that the vowel of the older generation is more raised than the vowel of the middle-aged speaker group.

Second, vowel frontness is also influenced by the speaker's age at a significant level: Older speakers produced lower F2 values than younger and middle-aged speakers ($p < 0.05$), which means that they used more back variants than the other two groups. In the prosodic final position, none of the factors of speaker's age, gender, and social class significantly influenced either F1 or F2 values.

In conclusion, older generations tend to produce the most raised and back variants of the /o/ of *-ko* and *-to* in the AP-medial position, as Figure 3.2 and Figure 3.3 describe.

Figure 3.2. Boxplot of normalized F1 means depending on speaker age group
Note: On the y-axis, the smaller the number is, the more raised the vowel is.

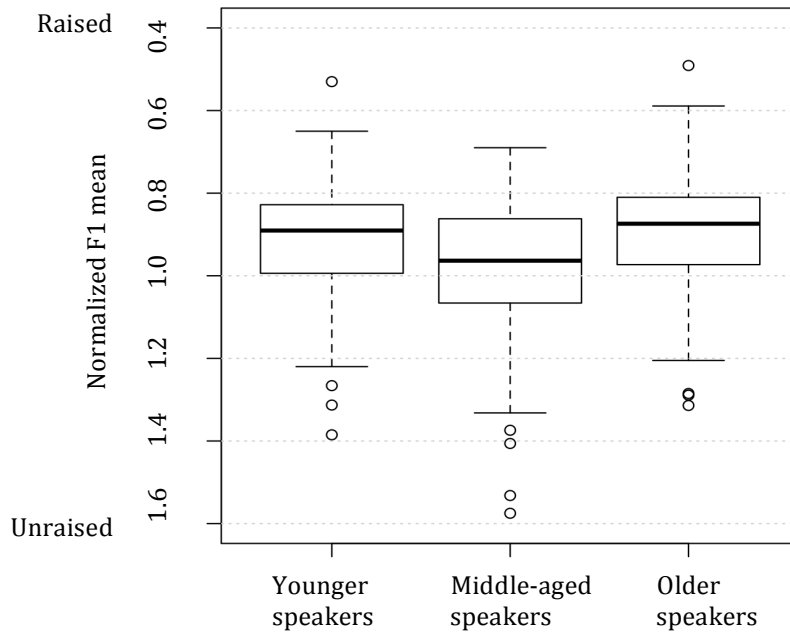
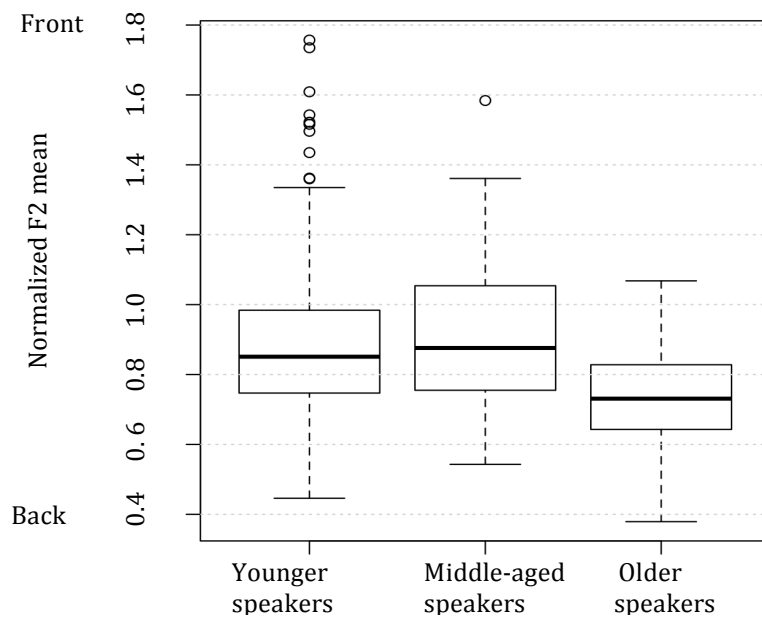


Figure 3.3. Boxplot of normalized F2 means depending on speaker age group
Note: On the y-axis, the larger the number is, the more front the vowel is.



3.3. Summary

In this chapter, I looked into what kind of linguistic and social factors affect vowel quality in *-ko* and *-to*. First, I found that some of the preceding segments, following segments, word categories, and final tones influence the vowel's height and frontness, and most of the influence of preceding and following sounds on /o/ results from coarticulation. Second, speaker's age is the only social factor that changes vowel height and frontness in the AP-medial position. Among the three age groups, the older group used the most raised and back vowel.

CHAPTER 4.

SPEECH SETTING AND ADDRESSEE BACKGROUND

RELATED TO VOWEL VARIATION

4.1. Method: Elicitation task

4.1.1. Participants

Most of the younger and middle-aged interviewees also participated in the elicitation task after a short break. When I asked the interviewees in their 60s if they would take part in this task, almost all of them said that they were too tired to do so. One person in the middle-aged group also refused due to a time limitation. Therefore, a total of 31 participants took part in the elicitation task: 17 younger and 14 middle-aged speakers; of these, 15 were female and 16 were male.

4.1.2. Procedures

The elicitation task was designed to elicit the target vowel /o/ in several specific speech act situations. The task used five pairs of conversation settings that could be expected to influence the way participants speak, as below:

- (1) Formality of the speech act situation
 - a. Speaking in a formal situation
 - b. Speaking in a casual situation
- (2) Solidarity between a speaker and a listener
 - a. Speaking to an intimate listener
 - b. Speaking to a not-intimate listener
- (3) Addressee's gender
 - a. Speaking to a person of the opposite sex
 - b. Speaking to a person of the same sex
- (4) Addressee's age
 - a. Speaking to a person who is older than the speaker
 - b. Speaking to a person who is younger than the speaker
- (5) Addressee's social status
 - a. Speaking to a person who is of a higher social status than the speaker
 - b. Speaking to a person who is of a lower social status than the speaker

In order to compare the two situations in each of the five categories, I set up five pairs of scenarios.¹¹ For each pair, I made up two stories that were the same except for a single difference in the speech act situation or addressee's characteristics. For instance, in order to see how a male participant might change his speaking style when talking to a male versus a female, they were presented the following two scenarios:

- a. You joined a traveling club. You are now talking to a male member at a get-together. He is asking you to recommend a good place to travel where you have been before. Tell him where you would recommend, why it is worth a visit, what to do at that place, and how to get there.
- b. You joined a traveling club. You are now talking to a female member at a get-together. She is asking you to recommend a good place to travel where you have

¹¹ Appendix II includes all 10 scenarios used for the elicitation task.

been before. Tell her where you would recommend, why it is worth a visit, what to do at that place, and how to get there.

I first showed participants the first scenario (a), and asked them to act as if they were in this situation. I then showed them the second scenario (b), and again asked them to act it out. A total of 10 scenarios were presented to each participant through Microsoft PowerPoint in the order of 1a to 5b. I asked them to speak as naturally as possible, and they were allowed to stop or start over whenever they wanted in the middle of the task. Apparently, most of the participants quickly realized what I wanted to compare, and they seemed to easily change their speaking styles. The reason I presented the two scenarios (a) and (b) of each category in consecutive order and allowed participants to notice the difference between the two is that I wanted to see if they showed a clear switch of speaking style when the speech setting or addressee background was changed. This might have biased the results; for example, the speakers may have produced some unnatural utterances if they intentionally tried to speak differently in the two situations. In a future study, it would be interesting to redesign the experiment by presenting the scenarios in a random order, and then to compare the results with those of this dissertation.

The participants seemed comfortable acting out the scenarios in front of me, perhaps because they had already chatted with me for up to one hour in the interview. In addition, I did not pressure them to finish it if they said they did not have much to talk about on a certain topic. I did not stop recording after the interview, so all answers were recorded on the same recording device.

4.1.3. Acoustic measurements and statistics

A total of 1170 tokens were produced in the elicitation task. The procedures for taking acoustic measurements and normalizing the data were the same as those used for the interview data. Table 4.1 shows the number of tokens produced in each scenario (a and b) of the five conversation settings listed in 4.1.2.

Table 4.1. Elicitation task: Number of tokens of target vowels for each conversation setting

Conversation setting	No. of tokens			
	Scenario a		Scenario b	
	<i>-ko</i>	<i>-to</i>	<i>-ko</i>	<i>-to</i>
1. Formality	112	37	101	42
2. Solidarity	96	34	75	21
3. Addressee's gender	93	49	85	50
4. Addressee's age	72	0	52	6
5. Addressee's social status	65	29	111	40

The normalized data of the elicitation task were fit by hand into linear mixed effects models. In each model, dependent variables and random effects were the same as for the interview data analysis: normalized F1 and F2 values for dependent variables and participants of the task for the random effects. For fixed effects, I used five separate models (Model 1 through Model 5) depending on the different speech act situations or the addressees' backgrounds, so that, basically, I could compare two opposite situations in each model, and each model has two submodels for F1 and F2. Table 4.2 shows the factors regarded as fixed effects for each model.

Table 4.2. Elicitation task: Fixed effects tested in each mixed effects model

Fixed effect	Model	Factor
Speech setting or addressee's background	Model 1	Formal vs. casual situation
	Model 2	Intimate vs. not-intimate addressee
	Model 3	Opposite sex vs. same sex addressee
	Model 4	Older vs. younger addressee
	Model 5	Higher social status vs. lower social status addressee
Speaker's age	For all models	Younger Middle-aged
Speaker's gender	For all models	Female Male
Two way interactions of factors	Model 1	Formality * speaker's age Formality * speaker's gender
	Model 2	Solidarity * speaker's age Solidarity * speaker's gender
	Model 3	Addressee's gender * speaker's age Addressee's gender * speaker's gender
	Model 4	Addressee's age * speaker's age Addressee's age * speaker's gender
	Model 5	Addressee's social status * speaker's age Addressee's social status * speaker's gender

4.2. Results

In this section, I will present part of the elicitation task results, focusing mainly on stylistic variation in response to formality (Model 1), solidarity (Model 2), and addressee's age (Model 4). Only these results will be described because Model 3 and Model 5 showed no significant results of fixed effects.

4.2.1. Formality

Tables 4.3 and 4.4 present the coefficients of fixed effects for normalized F1 and F2 values in the two submodels. In these models, the default factors are casual settings and female speakers.

Table 4.3. Coefficients of fixed effects (formality) for normalized F1 values

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.90447	0.02271	34.8	39.83	< 0.0001
Setting=Formal	0.06951	0.01494	273.46	4.652	< 0.0001

Table 4.4. Coefficients of fixed effects (formality) for normalized F2 values

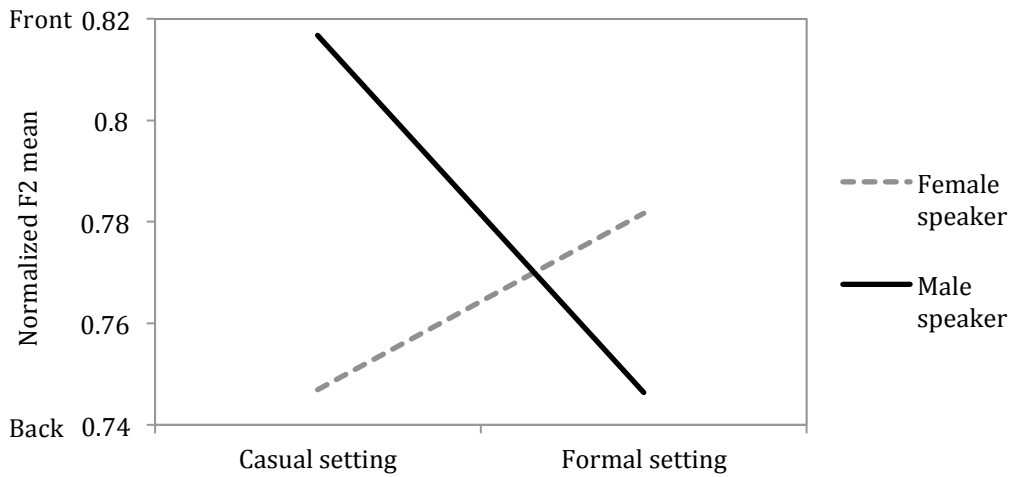
	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.77168	0.03082	26.79	25.038	< 0.0001
Setting=Formal	0.01849	0.02356	268.48	0.785	0.4332
Gender=Male	0.05094	0.04338	30.23	1.174	0.2494
Setting=Formal : Gender=Male	-0.08656	0.03692	275.02	-2.345	0.0198

Among the tested variables and their interactions, only speech setting was found to play a role in changing the vowel's F1 value. Specifically, a formal situation leads to a larger F1 value (i.e., a lower vowel), whereas a casual setting leads to a smaller F1 value ($p < 0.0001$). In other words, speakers tend to use a more raised variant when talking in a casual situation than when talking in a formal situation.

Moreover, in terms of F2 values, I found a significant interaction between speech setting and speaker's gender: For male speakers, a formal speech situation leads to lower F2 values ($p < 0.02$). Figure 4.1 visually shows this trend, presenting the opposite directions of the interactions depending on speaker's gender: Males have a tendency to use more back vowels in a formal setting and more front vowels in a casual setting, while

females tend to use more back vowels in a casual setting and more front vowels in a formal setting.

Figure 4.1. Correlates between speaker gender and formality of the speech setting



4.2.2. Solidarity

As with formality, solidarity between a speaker and a listener also influences the vowel variation in terms of vowel height and frontness, as shown in Tables 4.5 and 4.6 and Figure 4.2. In the tables, high solidarity and middle-aged speakers are the default factors.

Table 4.5. Coefficients of fixed effects (solidarity) for normalized F1 values

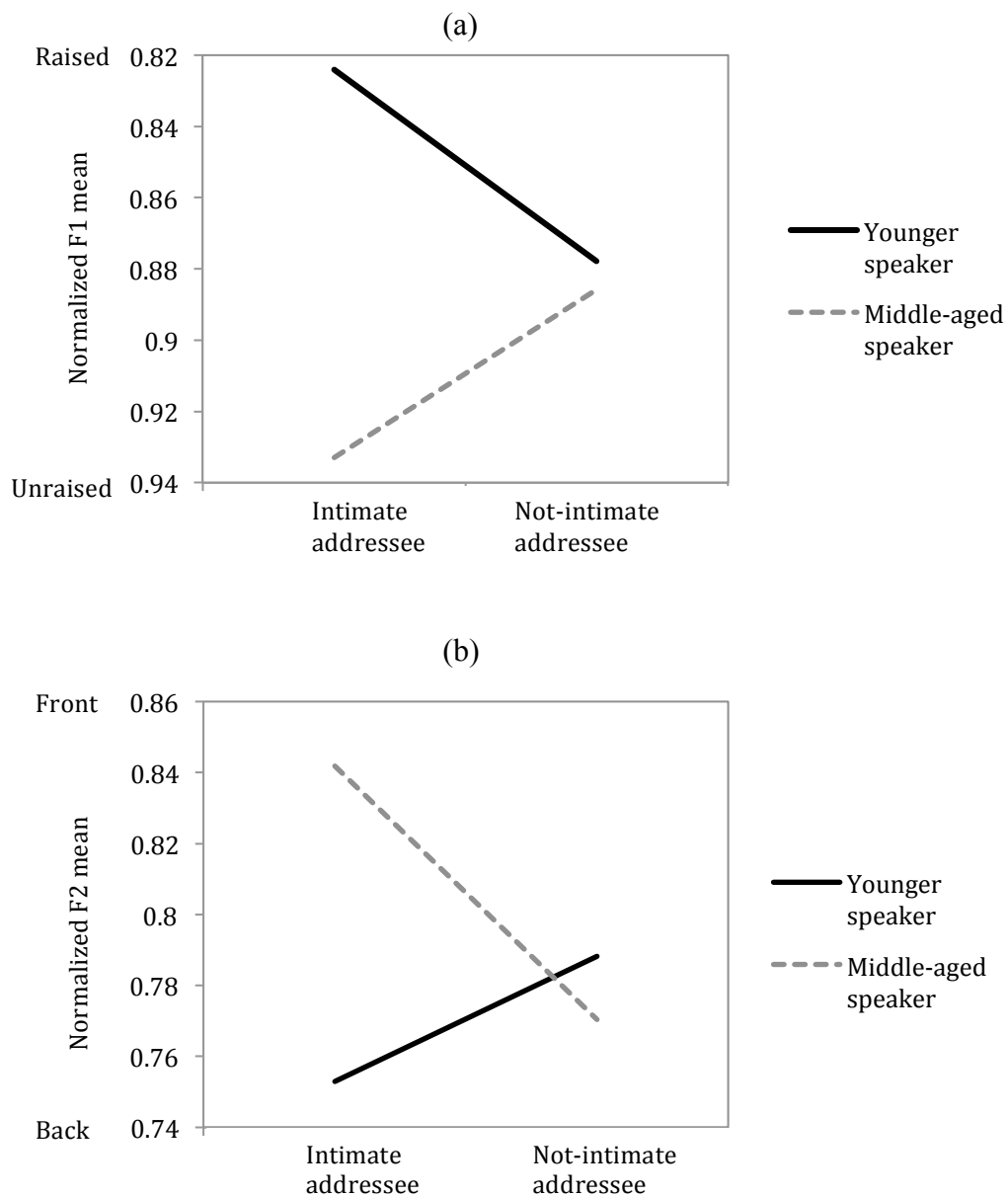
	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.93879	0.03421	29.44	27.443	< 0.0001
Solidarity=Low	-0.04701	0.02749	210.19	-1.71	0.0887
Age=Younger	-0.08511	0.04684	31.98	-1.817	0.0786
Solidarity=Low : Age=Younger	0.0923	0.03645	210.4	2.532	0.0121

Table 4.6. Coefficients of fixed effects (solidarity) for normalized F2 values

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.82783	0.03144	28.58	26.333	< 0.0001
Solidarity=Low	-0.07409	0.03437	216.45	-2.156	0.0322
Age=Younger	-0.06404	0.0438	32.81	-1.462	0.1533
Solidarity=Low : Age=Younger	0.10573	0.04556	216.47	2.321	0.0212

Figure 4.2. Correlates between speaker age and speaker–listener solidarity

Note: (a) and (b) describe results for mean normalized F1 and F2 values, respectively.



Both vowel height and frontness differ depending on the interaction between age and solidarity: whether the speaker is in her/his 20s or 40s and whether s/he is talking to an intimate or not-intimate (i.e., socially distant) addressee. More specifically, a younger speaker's F1 values of /o/ are higher for a distant addressee than for an intimate addressee ($p < 0.02$), and the same applies to the F2 values ($p < 0.03$). These results indicate that talking to a distant addressee leads a younger speaker to use unraised front variants, while talking to an intimate addressee leads her/him to use raised back variants. In addition, as Figure 4.2 shows, middle-aged speakers produce vowels that are more raised and more back for a distant addressee than for an intimate addressee.

Moreover, interactional setting alone plays a role as a main effect in changing vowel frontness. Talking to a non-intimate addressee (i.e., a low solidarity setting) leads to lower F2 values ($p < 0.04$). In other words, people tend to use the back variant when they speak to a distant addressee regardless of their age and gender.

4.2.3. Addressee age

Addressee's age changes vowel quality, especially for F2 values and when it interacts with speaker's gender. In Table 4.7, talking to an older addressee and being a female speaker are default factors.

Table 4.7. Coefficients of fixed effects (addressee's age) for normalized F2 values

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	0.73712	0.02562	30.11	28.768	< 0.0001
Addressee=Younger	-0.05446	0.0299	114.45	-1.821	0.0712
Gender=Male	-0.04076	0.039	38.6	-1.045	0.3025
Addressee=Younger : Gender=Male	0.10351	0.042	116.13	2.465	0.0152

As Table 4.7 indicates, for male speakers, their F2 values of /o/ in *-ko* and *-to* are higher, which means that the vowel is more fronted, when they speak to a person younger than themselves ($p < 0.02$).

4.3. Summary

This chapter addressed the role of stylistic variations in the vowel variation of /o/ in constituent-final *-ko* and *-to* in terms of vowel raising and fronting. Among stylistic variations, formality, solidarity, and addressee's age play roles in vowel raising and fronting. The vowel is raised when (i) people talk in a casual setting and (ii) younger speakers talk to an intimate listener. Moreover, the vowel is more fronted when: (i) male speakers talk in a casual setting, (ii) younger male speakers talk to a non-intimate addressee, and (iii) male speakers talk to a younger listener.

CHAPTER 5.

PERCEPTIONS OF SOCIAL TRAITS RELATED TO VOWEL VARIATION

5.1. Method: Matched-guise test

The matched-guise technique was used for the perception test in order to investigate how native Korean speakers perceive the raised vowels.¹² This technique was first introduced by Lambert et al. (1960) in a study examining listeners' attitudes toward English and French in Montreal. They employed bilingual speakers of English and French, and asked them to read the same text in the two languages. The two resulting texts were called an English guise and a French guise because the content is the same but the language in which they read varies. The findings showed that both English and French listeners had more positive attitudes toward the English guises than the French guises. Several studies have copied and modified this technique in speech perception, especially for looking into hearers' attitudes toward or evaluations of target linguistic forms (Giles, 1970, 1971; Hiraga, 2005; Cavallaro & Chin, 2009).

For instance, Cavallaro and Chin (2009) examined social meanings of Singapore Standard English (SSE) and Singapore Colloquial English (SCE), looking into listeners' attitudes toward these variations. They found that listeners ascribed more than one social meaning to SCE, such as being less intelligent, less confident, less hardworking, less ambitious, and less kind, and speaking less fluent English than speakers of SSE. All of these traits form the indexical field of Singapore English associated with each variant.

¹² The speech perception test was approved by the UH Committee on Human Studies (#19936).

One of the major issues in designing studies using the matched-guise technique is how to create stimuli that vary in a controlled way. A recent trend regarding this issue is to manipulate a single recording to vary by only the target feature, such as vowel quality (Fridland, Bartlett, & Kreuz, 2004; Campbell-Kibler, 2007). For instance, when investigating how alveolar and velar variants of English *-ing* are perceived by speakers, Campbell-Kibler (2007) tried to control the influences of individual variables by using the “cut and paste” function in Praat to create the alveolar and velar variants from the same utterance instead of using two different utterances. Similarly, in their study of social evaluations of a Southern vowel shift, Fridland et al. (2004) used utterances in which the only difference was in the F1 and F2 formants for the target vowels. They used a single recording, but manipulated the formants using a speech synthesis software from Kay Elemetrics Computer Speech Lab (CSL).

I used Campbell-Kibler’s (2007) methodology, modifying only the variable of interest by cutting and pasting the target vowel in Praat. The process of creating the stimuli and the procedures will be described in detail in 5.1.1 and 5.1.2.

5.1.1. Stimuli

In the matched-guise technique in the perception test, the sentence in (2) was used as a stimuli sentence. I selected this sentence as a target sentence in order to make it sound neutral in terms of the content. It is also common for Korean people to start a conversation with the topic of the weather, based on the assumption that this topic does not offend anybody.

(2) <i>nayil-un</i> tomorrow-TOP	<i>nalssi-to/twu</i> weather-also	<i>chwup-ko/kwu</i> cold-and	<i>palam-to/twu</i> wind-also	
<i>pwul-theynikka</i> blow-and so	<i>ttattushan</i> warm	<i>os-ul</i> clothes-OBJ	<i>ip-ko/kwu</i> wear-and	<i>naka-sey-yo.</i> ¹³ go out-HON-POL

‘It will be cold and windy tomorrow,
so please wear warm clothes when you go out.’

In this test, the stimuli included both *-ko* and *-to*, and there are two guises, an [o] guise and a [u] guise, as shown in (2).

For target stimuli, recordings were made of 12 speakers of Seoul Korean who said the sentence in (2) twice, reading it first with the [o] variant and then with the [u] variant. In Pratt, the [u] vowels in the second reading were copied and pasted into the first reading, replacing [o] with the raised variant [u]; the only difference between the two guises is whether the vowel is [o] or [u]. The naturalness of these target stimuli was judged only by the researcher; this might be a limitation of this experimental design, and in further studies, a naturalness rating task should be conducted by native speakers of Seoul Korean other than the researcher. As for the 12 speakers’ ages and genders, they were evenly divided: 2 older females, 2 older males, 2 middle-aged females, 2 middle-aged males, 2 younger females, and 2 younger males. Thus, 24 items (12 speakers x 2 guises) in total were used as target stimuli.

In addition, the experiment included the same number of fillers, which were recorded by six male and six female speakers of Korean as a second language and six male and six female Korean speakers from a city other than Seoul. They read the

¹³ Because the transcription follows Yale romanization, [u] in IPA is represented as [wu] in this sample sentence.

sentence in (2) with the two guises, and the recording that sounded more natural was chosen.

Altogether, therefore, there were 48 stimuli sentences, half of which were test items.

5.1.2. Procedures

Participants were presented with each stimulus (e.g., Stimuli 1 through Stimuli 48) on Microsoft PowerPoint, played on a Macbook Pro through a built-in speaker, not headphones. The order of the stimuli was set by the researcher: Two guises of the same speaker were never played consecutively, and more than two target or filler stimuli were never played consecutively. Participants were allowed to listen to the stimuli as many times as they wanted. Some participants seemed to notice that they heard the same voice twice because they asked me if one speaker recorded the same sentence. In this case, I asked them to intuitively evaluate the voice based solely on what they heard, and I said that it was not a problem for them to rate two voices the same.

Participants were instructed to evaluate the age and characteristics of each item's speaker on a 7-point Likert scale. The questions used for the test are given in Figure 5.1.

Figure 5.1. Matched-guise test questionnaire

[Stimuli number]																																																																																																														
1. How old do you think the talker is? a. 10–19 b. 20–29 c. 30–39 d. 40–49 e. 50–59 f. 60–69 g. 70–79																																																																																																														
2. Rate the talker's characteristics from 1–7. <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 2px 5px;">Less feminine/masculine</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">1</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">2</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">3</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">4</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">5</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">6</td> <td style="width: 5%; text-align: center; padding: 2px 5px;">7</td> <td style="width: 30%; padding: 2px 5px;">More feminine/masculine</td> </tr> <tr> <td style="padding: 2px 5px;">Less cute</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Cuter</td> </tr> <tr> <td style="padding: 2px 5px;">Less educated</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">More educated</td> </tr> <tr> <td style="padding: 2px 5px;">Lower economic class</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Higher economic class</td> </tr> <tr> <td style="padding: 2px 5px;">Less sincere</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">More sincere</td> </tr> <tr> <td style="padding: 2px 5px;">Lower social class</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Higher social class</td> </tr> <tr> <td style="padding: 2px 5px;">Less trustworthy</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">More trustworthy</td> </tr> <tr> <td style="padding: 2px 5px;">Less friendly</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">More friendly</td> </tr> <tr> <td style="padding: 2px 5px;">Casual</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Formal</td> </tr> <tr> <td style="padding: 2px 5px;">Liberal</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Conservative</td> </tr> <tr> <td style="padding: 2px 5px;">Shy</td> <td style="text-align: center; padding: 2px 5px;">1</td> <td style="text-align: center; padding: 2px 5px;">2</td> <td style="text-align: center; padding: 2px 5px;">3</td> <td style="text-align: center; padding: 2px 5px;">4</td> <td style="text-align: center; padding: 2px 5px;">5</td> <td style="text-align: center; padding: 2px 5px;">6</td> <td style="text-align: center; padding: 2px 5px;">7</td> <td style="padding: 2px 5px;">Outgoing</td> </tr> </table>												Less feminine/masculine	1	2	3	4	5	6	7	More feminine/masculine	Less cute	1	2	3	4	5	6	7	Cuter	Less educated	1	2	3	4	5	6	7	More educated	Lower economic class	1	2	3	4	5	6	7	Higher economic class	Less sincere	1	2	3	4	5	6	7	More sincere	Lower social class	1	2	3	4	5	6	7	Higher social class	Less trustworthy	1	2	3	4	5	6	7	More trustworthy	Less friendly	1	2	3	4	5	6	7	More friendly	Casual	1	2	3	4	5	6	7	Formal	Liberal	1	2	3	4	5	6	7	Conservative	Shy	1	2	3	4	5	6	7	Outgoing
Less feminine/masculine	1	2	3	4	5	6	7	More feminine/masculine																																																																																																						
Less cute	1	2	3	4	5	6	7	Cuter																																																																																																						
Less educated	1	2	3	4	5	6	7	More educated																																																																																																						
Lower economic class	1	2	3	4	5	6	7	Higher economic class																																																																																																						
Less sincere	1	2	3	4	5	6	7	More sincere																																																																																																						
Lower social class	1	2	3	4	5	6	7	Higher social class																																																																																																						
Less trustworthy	1	2	3	4	5	6	7	More trustworthy																																																																																																						
Less friendly	1	2	3	4	5	6	7	More friendly																																																																																																						
Casual	1	2	3	4	5	6	7	Formal																																																																																																						
Liberal	1	2	3	4	5	6	7	Conservative																																																																																																						
Shy	1	2	3	4	5	6	7	Outgoing																																																																																																						

When they listened to a male speaker, they were instructed to rate the speaker as less or more masculine, while when they listened to a female speaker, they were instructed to rate the speaker as less or more feminine. I used different characteristics for male and female voices, since, in the pilot test (Yi, 2013), many of the participants agreed that the two variants [o] and [u] are related to femininity and masculinity for female speakers and male speakers, respectively.

In this experiment, all participants heard all stimuli, which is a basic concept of a within-subject design. By having all participants exposed to all stimuli, this design has an advantage in that the number of subjects is relatively high compared to a between-subject design where participants are divided into separate groups, and the different groups are

assigned to differing conditions. Moreover, with this design, all participants were able to take part in the test in equivalent conditions, and no individual differences biased the results.

5.1.3. Participants

Thirty people who took part in the interview also participated in this perception test. This test was conducted after the elicitation task, and one of the younger female speakers stopped partway through. The participants were categorized according to their age, gender, and social class, as shown in Table 5.1.

Table 5.1. Distribution and number of perception test participants according to their age, gender, and social class

Age	Social class	No. of participants	
		Female	Male
20–29	LWC	0	1
	UWC	4	2
	LMC	4	5
	UMC	0	0
40–49	LWC	1	0
	UWC	2	4
	LMC	2	1
	UMC	1	3

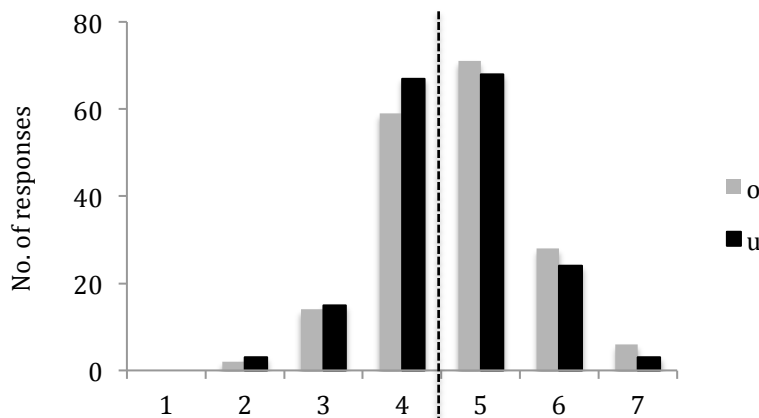
5.1.4. Analysis

As explained in 5.1.2, the participants listened to recorded voices and rated the speakers on a 7-point scale in terms of 12 characteristics: femininity/masculinity, cuteness, sincerity, trustworthiness, friendliness, formality, conservativeness, outgoingness, educational level, economic class, social class, and age. Because the focus

of this experiment is to test whether listeners perceived each voice as having a higher or lower degree of each characteristic, I split the 7-point scale into a binary scale of less/lower and more/higher. To create the binary scale, the responses for [o] and [u] were compared, and the ratings for each characteristic were divided at the point where the trend switches. As each characteristic had a different point where the trend switches, I drew a line for each of them by hand as shown in Figure 5.2. And because the matched-guise test questionnaire asked about different characteristics for the female and male voices (i.e., masculinity and femininity), I analyzed the male and female voice data separately. In Figure 5.2, for instance, for the female voice, educational level is divided into binary categories between 4 and 5.

Figure 5.2. Female voices: Raw data for perception of educational level for [o] and [u] guises

Note: x-axis shows the scores on the scale, and y-axis shows the number of responses for the [o] guise and [u] guise. The dotted line indicates the point where the trend switches.



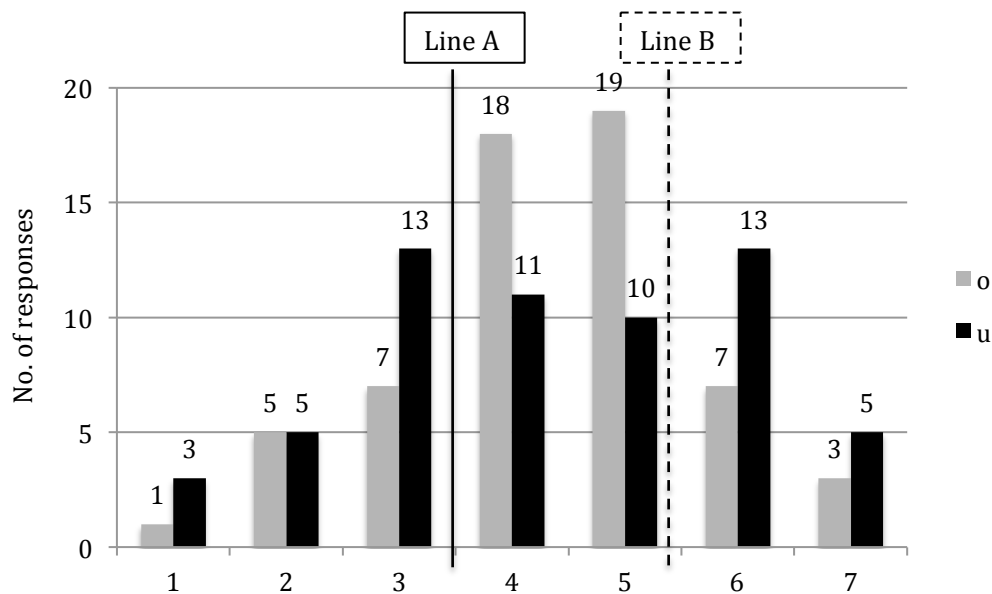
As the figure shows, more listeners rated the [u] guise from 1 to 4, and more listeners rated the [o] guise from 5 to 7, which shows an obvious switch of the trend. Therefore, in this case, I replaced the raw data with binary data by using the standard of 1 through 4 to

indicate that the speaker was considered less educated and the standard of 5 through 7 to indicate that the speaker was considered more educated for female voices.

However, in some cases, instead of a clear point where the trend switched, there seemed to be two different points for binary distribution as seen in Figure 5.3.

Figure 5.3. Female voices: Raw data for perception of outgoingness for [o] and [u] guises by middle-aged groups

Note: x-axis shows scores of outgoingness where 1 = shy and 7 = outgoing; y-axis shows the number of responses.



In Figure 5.3, both Line A and Line B could be trend switch points, and the line that is chosen would certainly affect the results. If Line A is chosen, the data would be interpreted to mean that [o] is perceived as more outgoing while [u] is perceived as shy, while choosing Line B would produce the opposite result. In this case, I added up the numbers before and after the line for each guise to see which line makes a bigger numeric difference between being shy and being outgoing, as seen in Table 5.2.

Table 5.2. Comparison of two lines for binary categories for perception of female outgoingness

Line	Guise	No. of responses		Numeric difference between characteristics
		Shy	Outgoing	
A	[o] guise	13	47	34
	[u] guise	21	39	18
B	[o] guise	50	10	40
	[u] guise	42	18	24

For Line A, the numeric difference between shyness and outgoingness is 34 for the [o] guise and 18 for the [u] guise, whereas for Line B, the differences are larger: 40 for the [o] guise and 24 for the [u] guise. Therefore, Line B was chosen to divide the binary categories, as it shows a clearer switch in the number of responses for each of the two characteristics.

All the raw data were replaced by binary data in this way, and the binary data were used for the statistical analysis.

5.1.5. Statistics

The perception test data for female and male voices were separately fit into mixed effects models using R, mainly because one of the characteristics was femininity/masculinity, as stated in 5.1.4. For both male and female voices, the dependent variable is, for each characteristic, the degree to which the speaker has the characteristic in the participants' perceptions, based on the 7-point Likert scores, and the random effects are the participants of the test. For fixed effects, I included all factors that were expected to affect the dependent variables and their interactions except for the listener's social class, because its distribution was too uneven (only 2 people in the LWC group; 12

people in the UWC and LMC groups). Table 5.3 shows the factors tested as fixed effects for the perception test.

Table 5.3. Matched-guise test: Fixed effects tested

Voice age	Younger voices Middle-aged voices Older voices
Voice guise	[o] guise [u] guise
Listener's age	Younger listeners Middle-aged listeners
Listener's gender	Female listeners Male listeners
Stimuli items	All target stimuli

5.2. Results

5.2.1. Female voices

From the mixed effects model, I found that, for female voices, 7 out of 12 characteristics were significantly affected by the fixed effects. In particular, perceptions of a speaker's economic class and outgoingness were closely related to vowel raising or to the interaction of vowel raising and another factor. In addition to vowel raising, other factors including voice age, listener's age, and listener's gender also significantly influenced perceived characteristics of a speaker. Perceived age, cuteness, trustworthiness, conservativeness, and social class of the speaker did not appear to be affected by the fixed effects tested.

Because the focus of this dissertation is the social meanings of the [o] guise and the [u] guise, coefficients for fixed effects for other factors, for which there is no effect of [o]/[u] guises, such as voice age, listener's age, and listener's gender, will be presented separately in Appendix III. Here, I will briefly address the overall trends for the social factors, as follows:

(1) Educational level

- a. Middle-aged voices were perceived as having the highest educational level, while older voices were perceived as being the least educated, and younger voices as second least educated.

(2) Friendliness

- a. Younger speakers' voices were more likely to sound friendly to the listeners than middle-aged and older speakers' voices.

(3) Formality

- a. Younger voices sounded more casual than middle-aged and older voices.

(4) Sincerity

- a. Younger voices were evaluated as being more sincere than middle-aged and older voices.

(5) Femininity

- a. Younger voices sounded more feminine than middle-aged and older voices.
- b. For male listeners, older female speakers were perceived as less feminine than younger middle-aged females, whereas for female listeners, middle-aged voices were perceived as less feminine than the other two voice age groups.

In 5.2.1.1 and 5.2.1.2, the results regarding the perception of economic class and outgoingness will be described.

5.2.1.1. Economic class

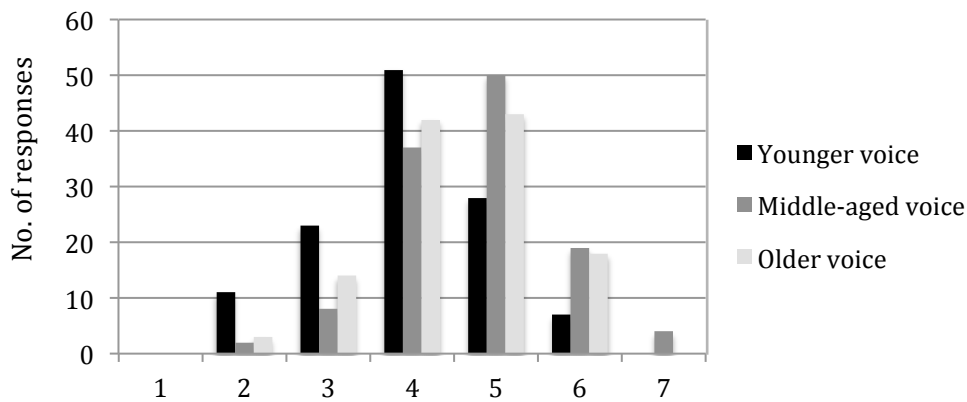
As shown in Table 5.4, the analysis found one main effect and two interactional effects on how people evaluate a speaker's economic class: (i) voice age, (ii) an interaction between voice guise and voice age, and (iii) an interaction between voice guise and listener's gender.

Table 5.4. Female voices: Coefficients of fixed effects for perception of economic class

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.46404	0.48786	0.951	0.34152
VoiceAge=Older	-0.62527	0.42248	-1.48	0.13888
VoiceAge=Younger	-1.06693	0.42771	-2.494	0.01261
VoiceGuise=u	0.88847	0.52572	1.69	0.09102
ListenerGender=Male	0.06827	0.57703	0.118	0.90581
VoiceAge=Older : VoiceGuise=u	0.14669	0.60563	0.242	0.80862
VoiceAge=Younger : VoiceGuise=u	-1.59136	0.65578	-2.427	0.01524
VoiceGuise=u : ListenerGender=Male	-1.42064	0.52083	-2.728	0.00638

First, speaker's age influences perceived economic class. Younger speakers' voices were evaluated as having lower economic class than middle-aged and older speakers' voices ($p < 0.05$) as shown in Figure 5.4.

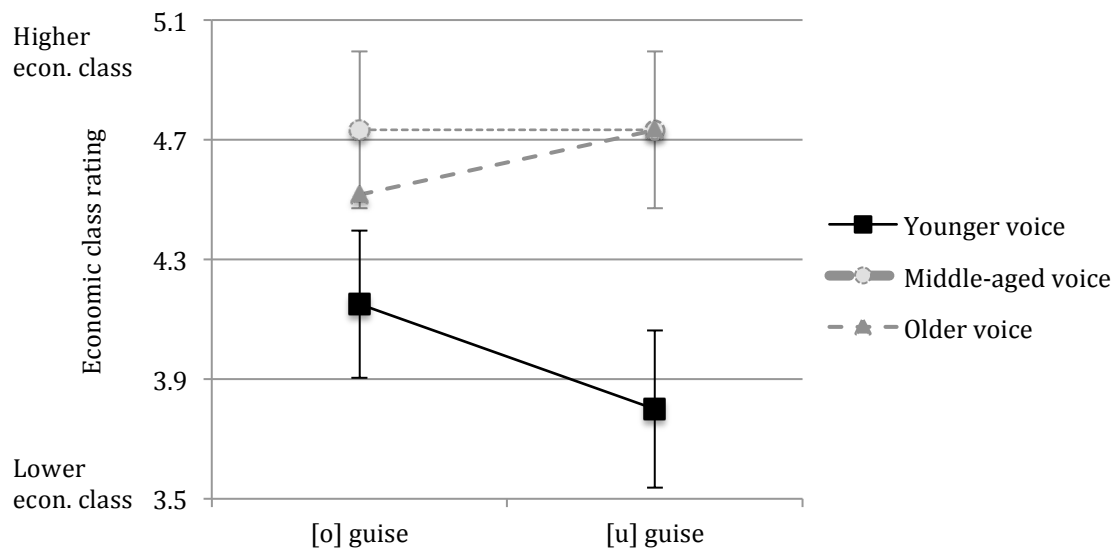
Figure 5.4. Female voices: Raw data for perception of economic class for voice age



Second, the speaker's age together with whether the vowel the speaker produced was raised or not affected evaluations of the economic class of the speaker, and this trend is salient for younger voices ($p < 0.05$). More specifically, as Figure 5.5 indicates, a younger female speaker is more likely to be perceived as of a higher economic class when associated with the unraised variant, [o], and more likely to be perceived as of lower economic class when associated with the raised variant, [u].

Figure 5.5. Female voices: Interrelations between voice age and voice guise in perception of economic class with confidence intervals

Note: y-axis shows average raw scores of economic class where the larger number indicates a higher economic class.

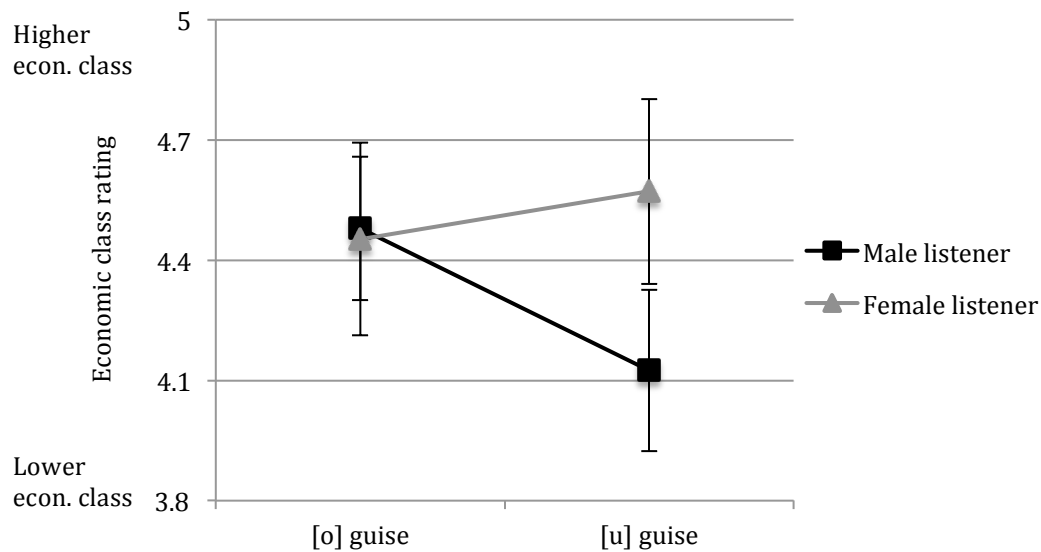


Third, as seen in Figure 5.6, voice guises also significantly interact with listener's gender: When male listeners heard females using the /u/ variant, they judged that the speaker was in a lower economic class compared to when they used the /o/ variant ($p < 0.01$).

Interestingly, as shown in the next section, whether male speakers raise the vowel or not did not affect how listeners evaluated the speaker's economic class. Perception of economic class differs depending on the vowel variants only for female voices.

Figure 5.6. Female voices: Interrelations between listener gender and voice guise in the perception of economic class

Note: y-axis shows average raw scores of economic class where the larger number indicates a higher economic class.



5.2.1.2. Outgoingness

As shown in Table 5.5, several main factors and interactions were found to play a role in the perception of outgoingness: voice guise, voice age, listener's gender, and an interaction between voice age and listener's gender.

Table 5.5. Female voices: Coefficients of fixed effects for perception of outgoingness

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.033372	0.001593	-1276.7	< 0.0001
VoiceGuise=u	0.78788	0.001592	494.9	< 0.0001
VoiceAge=Older	1.113458	0.001592	699.4	< 0.0001
VoiceAge=Younger	0.36346	0.001592	228.3	< 0.0001
ListenerGender=Male	0.107827	0.001593	67.7	< 0.0001
VoiceAge=Older : ListenerGender=Male	-1.71796	0.001592	-1079	< 0.0001
VoiceAge=Younger : ListenerGender=Male	-0.833414	0.001592	-523.4	< 0.0001

First, as with other characteristics, evaluations of outgoingness were influenced by voice age. Older speakers sounded the most outgoing ($p < 0.0001$) and younger speakers sounded the second most outgoing ($p < 0.0001$). That is, the hierarchy of perceived outgoingness depending on voice age is as follows: older speakers > younger speakers > middle-aged speakers.

Second, men and women perceived female voices differently. Male listeners were more likely than female listeners to judge female voices as more outgoing ($p < 0.0001$).

Third, it is noteworthy that voice guise independently affected the degree of perceived outgoingness, unlike other characteristics. A speaker is more likely to be perceived as outgoing when she uses the raised variant and as shy when she uses the unraised variant ($p < 0.001$). This trend holds across speaker generations. In Figure 5.7, regardless of which age group the voice belongs to, listeners gave higher scores for the [u] guise and lower scores for the [o] guise, although the trend of responses switches at different points: between 3 and 4 for younger voices (a), and between 5 and 6 for middle-aged and older voices (b) and (c).

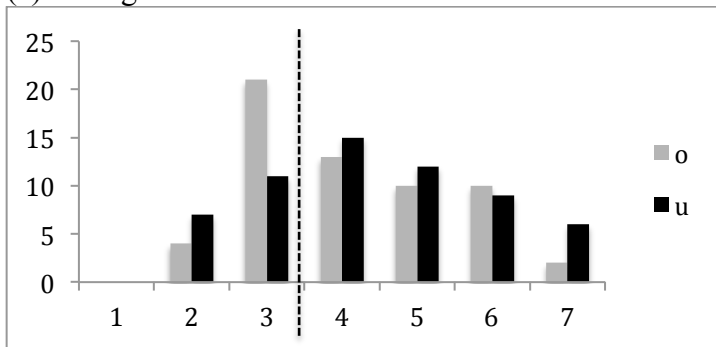
Finally, outgoingness was also perceived differently depending on the interaction of listener's gender and voice age. More specifically, older voices sounded the shyest (p

< 0.0001) and younger voices sounded rather more outgoing than older voices ($p < 0.0001$). This result shows that males perceive a female voice in different ways in terms of outgoingness depending on the age of the speaker.

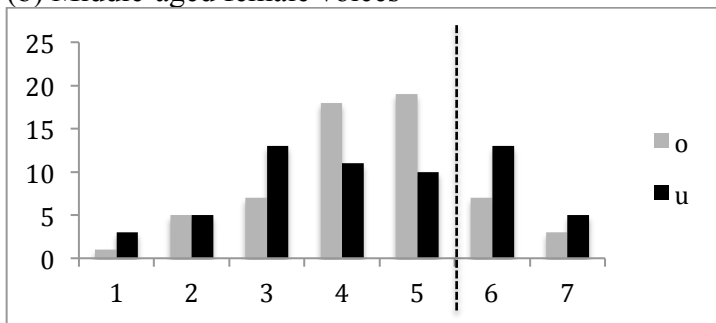
Figure 5.7. Female voices: Perceived outgoingness for three age groups

Note: x-axis shows scores of outgoingness where 1 = shy and 7 = outgoing; y-axis shows the number of responses. The dotted line indicates the point where the trend switches.

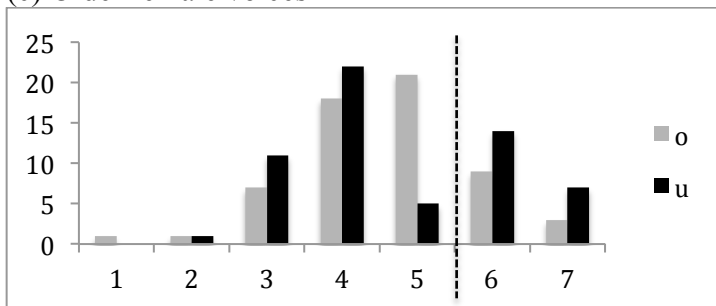
(a) Younger female voices



(b) Middle-aged female voices



(c) Older female voices



Nevertheless, in Figure 5.7, the trend switch line must be placed with caution, especially for (b) and (c). Even though the line placement is based on the summed numeric difference between characteristics, as seen in Figure 5.3, the results might be different if the lines were placed between 3 and 4 for (b) and 4 and 5 for (c). The subjectivity of the decisions on line placement could be a drawback of this analysis, so more objective measurements are recommended for further studies.

5.2.2. Male voices

For male voices, all the fixed effects used for female voices were tested in a single model in the same way. The dependent variable and random effects are also the same as those of the female voices model, as described in 5.2.1. Half of the tested characteristics were not affected by any of the fixed effects: perceived age, educational level, sincerity, trustworthiness, formality, and outgoingness. The voice guise only influenced perceptions of masculinity and cuteness in interaction with voice age, and these results will be addressed in detail in 5.2.2.1 and 5.2.2.2.

In addition, listeners' evaluation of speaker's economic class, social class, friendliness, and conservativeness was influenced by fixed effects other than the voice guise. As with the female voices, coefficients of fixed effects for perceptions of these characteristics are described in Appendix IV, while here the results are only briefly presented, as follows:

(1) Economic class

- a. The hierarchy for perception of economic class is as follows: middle-aged voice > older voice > younger voice.

- (2) Social class
 - a. Younger voices were heard as indicating a lower social class than middle-aged and older voices.
- (3) Friendliness
 - a. Older speakers were judged as being less friendly than younger and middle-aged speakers.
- (4) Conservativeness
 - a. Younger voices were evaluated as being relatively more liberal than middle-aged and older male voices.
 - b. Younger listeners perceived older male voices as sounding more conservative than younger and middle-aged voices.

5.2.2.1. Masculinity

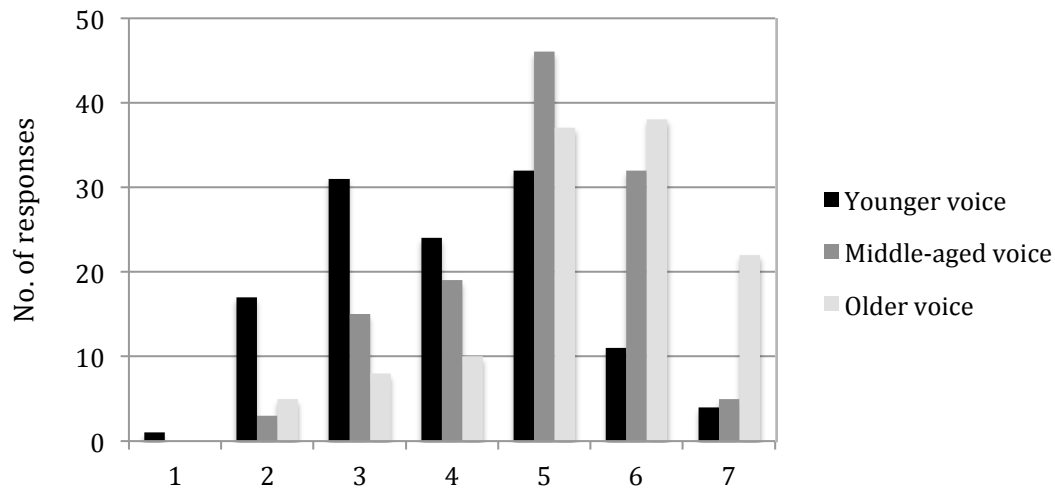
The listeners' evaluation of masculinity differed according to how old the speaker was. In addition, the voice guise also played a role in judgments on masculinity in interaction with voice age.

Table 5.6. Male voices: Coefficients of fixed effects for perception of masculinity

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1.637	0.5282	3.099	0.00194
VoiceAge=Older	0.2709	0.5214	0.52	0.60331
VoiceAge=Younger	-2.75	0.5461	-5.036	< 0.0001
VoiceGuise=u	-0.6129	0.4991	-1.228	0.21939
VoiceAge=Older : VoiceGuise=u	1.4133	0.7651	1.847	0.06472
VoiceAge=Younger : VoiceGuise=u	1.421	0.7015	2.026	0.04279

First, younger male voices were judged as being less masculine than middle-aged and older male voices ($p < 0.0001$).

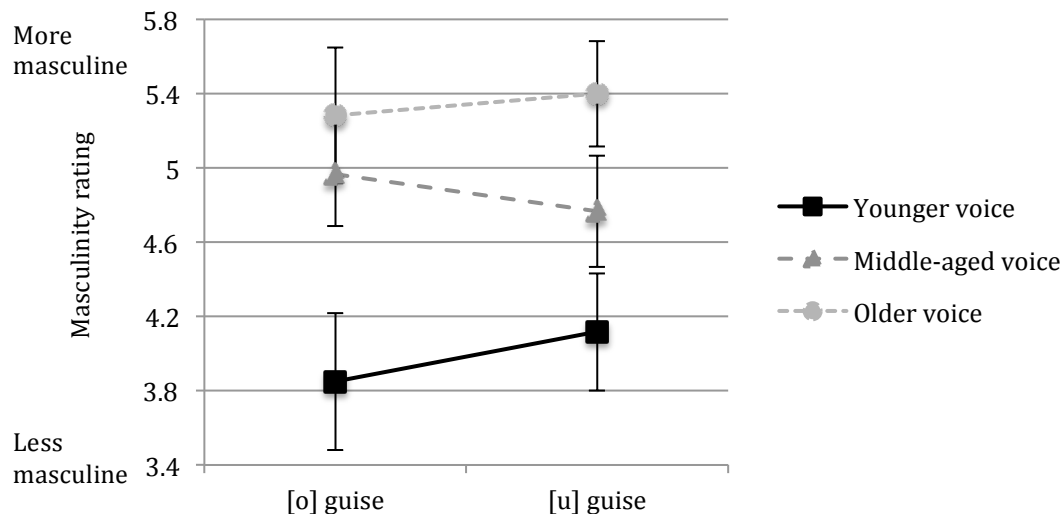
Figure 5.8. Male voices: Raw data for perception of masculinity by voice age



Second, as seen in Figure 5.9, utterances produced by younger speakers were likely to be heard as more masculine when they used the raised variant [u], and as less masculine when they used the unraised variant [o] ($p < 0.05$).

Figure 5.9. Male voices: Interrelations between voice age and voice guise in perception of masculinity

Note: y-axis shows average raw scores of masculinity where the larger number indicates being more masculine.



5.2.2.2. Cuteness

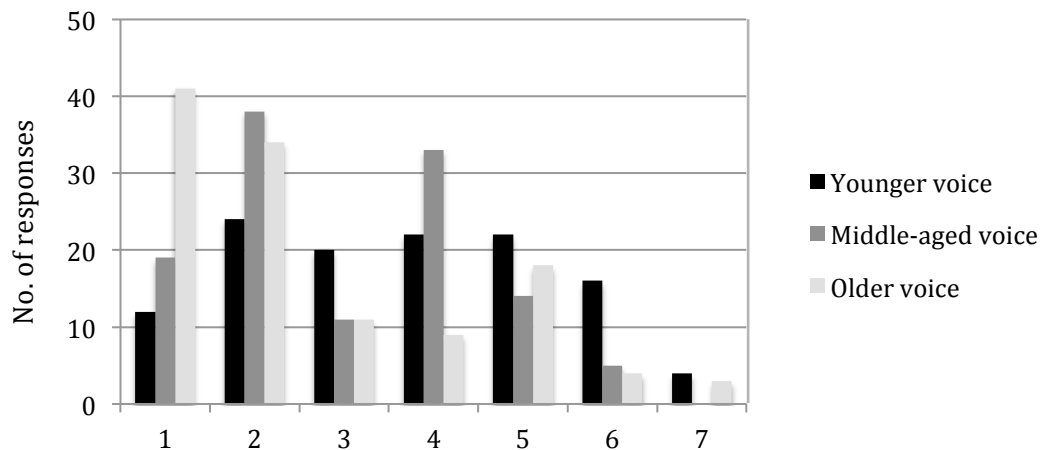
Listeners showed varying perceptions of speakers' cuteness depending on the interaction between a speaker's age and whether he produced [o] or [u]. Cuteness was also evaluated differently according to voice age, voice guise, and listener's gender.

Table 5.7. Male voices: Coefficients of fixed effects for perception of cuteness

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.7661	0.6752	1.135	0.25648
ListenerGender=Male	-2.3075	0.8392	-2.749	0.00597
VoiceAge=Older	-0.2388	0.4891	-0.488	0.62545
VoiceAge=Younger	1.2279	0.5092	2.411	0.0159
VoiceGuise=u	1.0981	0.5048	2.175	0.02962
VoiceAge=Older : VoiceGuise=u	-1.7123	0.7148	-2.396	0.0166
VoiceAge=Younger : VoiceGuise=u	0.4264	0.7578	0.563	0.57363

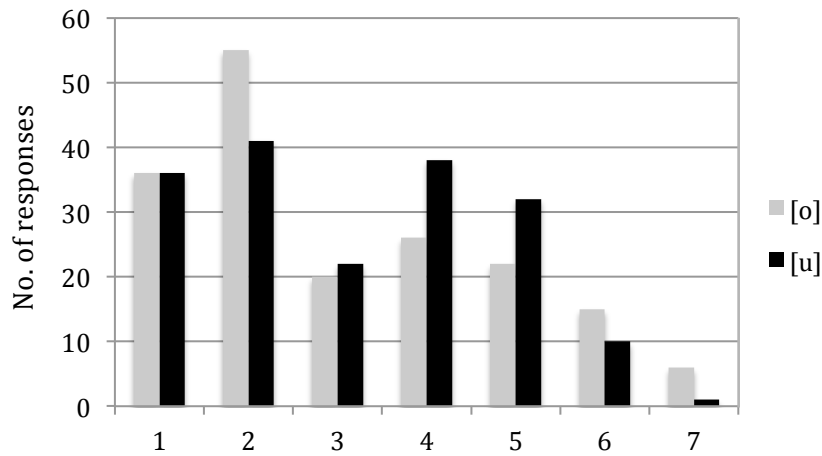
First, younger male speakers were perceived as more cute than middle-aged and older male speakers ($p < 0.05$).

Figure 5.10. Male voices: Raw data for perception of cuteness by voice age



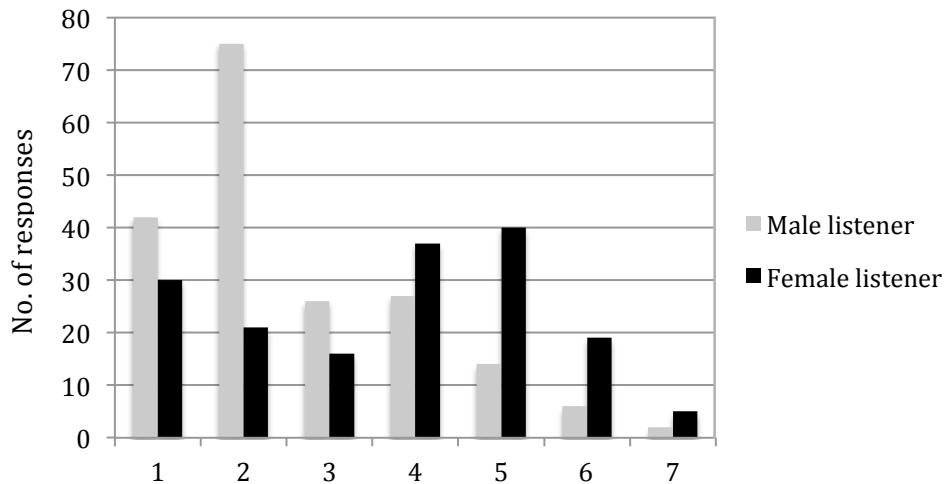
Second, voice guise alone influenced how a male speaker was evaluated: Using /u/ was indexed to being more cute than using /o/ ($p < 0.05$).

Figure 5.11. Male voices: Raw data for perception of cuteness by voice guise



Third, when listening to male voices, male listeners evaluated the speakers as less cute than female listeners judged the same speakers to be ($p < 0.01$), as shown in Figure 5.12.

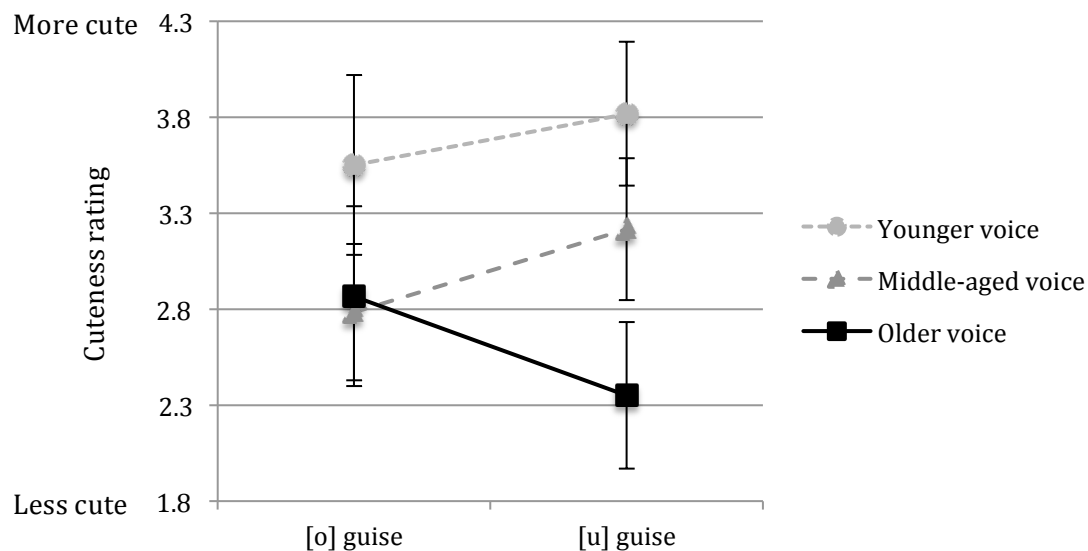
Figure 5.12. Male voices: Raw data for perception of cuteness by listener gender



Fourth, when using the [u] variant, older male speakers sounded less cute than speakers in other age groups ($p < 0.05$); use of the raised variant of younger and middle-aged males was indexed to cuteness. That is to say, using [u] was perceived as being more cute, but this perception shows a differing tendency depending on which generation a speaker belongs to.

Figure 5.13. Male voices: Interrelations between voice age and voice guise in perception of cuteness

Note: y-axis shows average raw scores of cuteness where the larger number indicates being more cute.



5.3. Summary

In conclusion, several factors are involved in the perception of speakers' personal traits, showing different patterns for female and male voices. As I briefly addressed, the age of a voice appears to most broadly influence perception: Either in itself or in interaction with another factor, voice age plays a role in a listener's judgment on 7 out of 12 characteristics for female voices and 6 out of 12 characteristics for male voices. In

addition, listeners' gender and age also partially affect their perception of traits for female and male voices.

When it comes to the vowel variation that is the main focus of this dissertation, for female voices, the raised variant leads a listener to perceive that a speaker is outgoing while the unraised variant is indexed to being shy. Different vowel variants also changed the way people perceived some speakers' characteristics when they interacted with speaker's age. More specifically, in the perception of economic class, a younger female speaker is perceived as being of a higher economic class when she uses the unraised variant [o]. Furthermore, for male voices, the raised variant [u] leads to different perceptions of the following characteristics when it interacts with voice ages: higher masculinity of younger males and higher cuteness of younger and middle-aged males. Also, [u] is in general indexed to cuteness for male voices.

CHAPTER 6.

DISCUSSION AND IMPLICATIONS

6.1. Vowel raising of /o/ in current Seoul Korean

Chae (1995) found that younger speakers of Seoul Korean raised the vowel in constituent-final *-ko* and *-to* more frequently than middle-aged and older speakers, showing that this was a sound change from below in progress. However, the current study shows that, in the AP-medial position, younger speakers are not leading the other age groups any more, and instead, older people use more raised vowels than middle-aged people. In addition, even though the difference failed to reach a significant level, the vowels of the younger speakers are more raised than those of the middle-aged speakers.

It might be expected that the younger generation in Chae's (1995) study would still show a high degree of vowel raising in their speech today, because they were leading the sound change at that time. Nevertheless, almost 20 years later, my participants from that age group (currently middle-aged) have mean normalized F1 values higher than those of the other age groups, meaning that this vowel is lower, as illustrated in Figure 3.2, repeated here as Figure 6.1. However, the reason for this becomes clear if we compare the age range of each group in Chae's (1995) study and the current study. See Table 6.1.

Figure 6.1. Boxplot of normalized F1 means depending on speaker age group
Note: On the y-axis, the smaller the number is, the more raised the vowel is.

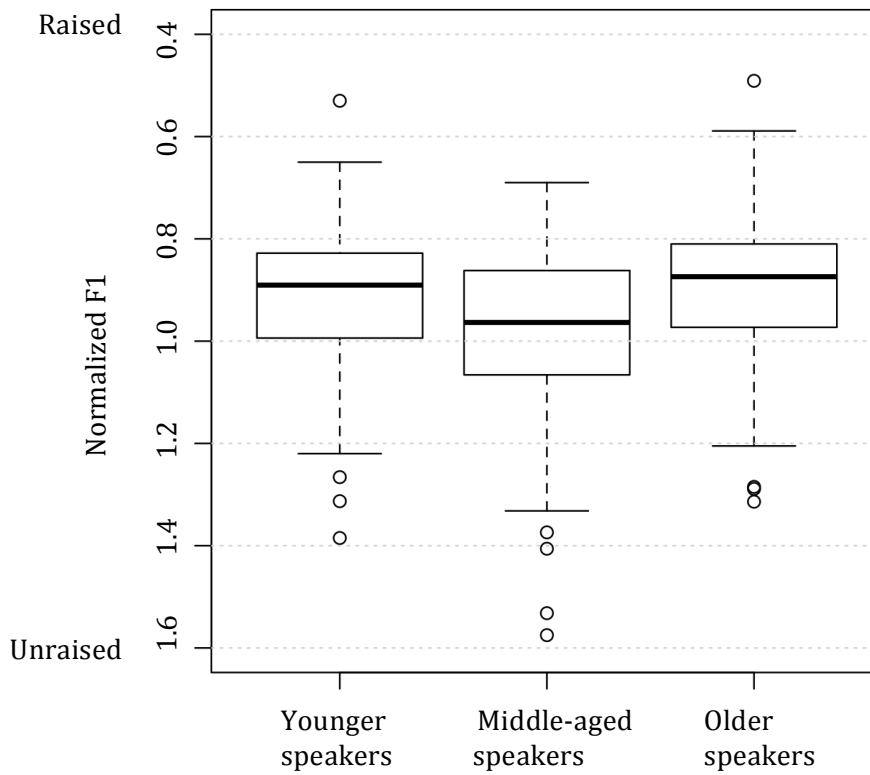


Table 6.1. Age ranges and birth years of age groups in Chae, 1995 and the current study

		Younger speakers	Middle-aged speakers	Older speakers
Age range	Chae (1995)	11–29	30–54	55 and over
	Yi (2015)	20–29	40–49	60–69
Birth years	Chae (1995)	1965–1983	1940–1964	1939 or before
	Yi (2015)	1984–1993	1964–1973	1953 or before

Chae’s younger speakers would have been around 30–48 years old at the time of the current study’s data collection; that is, Chae’s younger group covers a wider age range than the corresponding group in the current study (i.e., 40–49 years of age). In Korea, people in their 40s have a distinctive status compared to those who are in their 30s. Both men and women commonly get married, start work, and have their first children at

approximately 30 years of age. According to the Population Association of Korea's report in 2010, since the Asian financial crisis that hit Korea in 1997, the average age of marriage and employment has been getting higher every year. That is, the life circumstances of people in their 30s are generally not yet stable, whereas people in their 40s are relatively settled and stable. Moreover, those in their 40s are more likely to be in positions of responsibility at work, which broadly affects their language use. For these reasons, the younger participants of Chae's (1995) study are not identical to the middle-aged participants of the present study.

To answer the question of whether or not the vowel raising the current study examined is a sound change in apparent time, as Chae (1995) claimed, careful consideration is necessary, bearing in mind the concepts of generational change and age-grading and the differences between these two, as discussed in 2.4.1. Let us look at Table 6.2, which presents only the second and fourth rows (Types 2 and 4) of Table 2.5.

Table 6.2. Relationship between variation and change in the individual and the community (Meyerhoff, 2006)

	Type of change	Individual	Community	Synchronic pattern
2	Age-grading	Changes abruptly	Invariant	Steady increase / decrease with age
4	Generational change (change over "apparent time")	Invariant	Changes gradually	Steady increase / decrease with age

According to the table above, if the vowel raising is a generational change, which is change over apparent time, new young generations would adopt vowel raising and use it more and more. Nonetheless, as the interview data show, at least for the AP-medial

position, the younger generation is no longer the group that is using the most raised vowel.

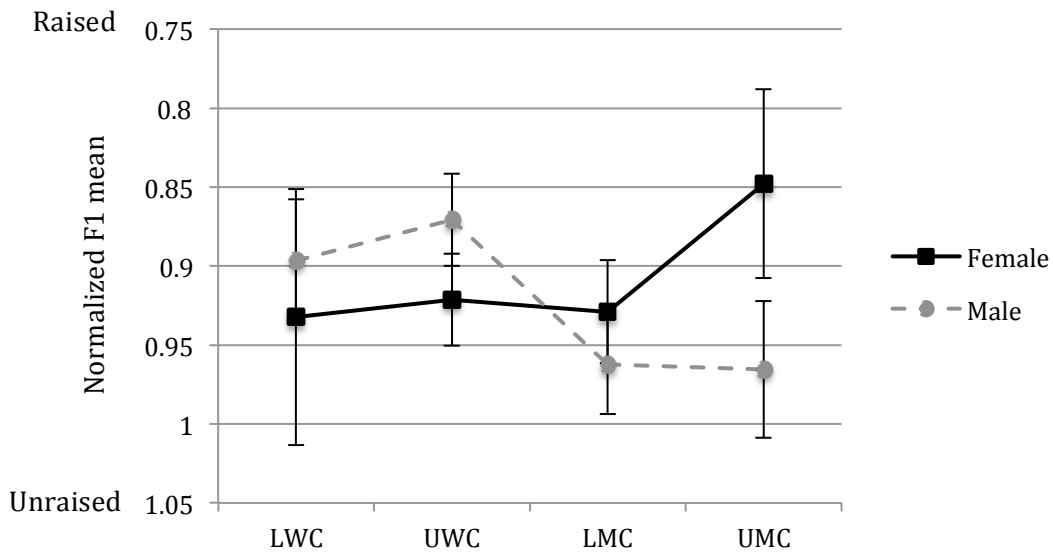
Age-grading is a more appropriate explanation than generational change for this phenomenon for the following reasons. First of all, the vowel raising of /o/ in constituent-final *-ko* and *-to* in the AP-medial position seems to be highly influenced by the linguistic marketplace, an important concept for age-grading. As mentioned in 2.4.1, people show a higher frequency of using standard variants at a certain age, which is most likely to be the period when they start to take part in the workforce. Although Sankoff and Laberge (1978) identified this age as the late teens and early twenties, this age range does not apply in Korean society. As mentioned, a growing number of people in Korea first enter the workforce in their early 30s, which therefore is the age at which they might be trying to adjust themselves to a new linguistic marketplace; in other words, the time that they start to use standard variants such as the unraised variant of /o/ in constituent-finals. For this reason, the middle-aged speakers who took part in the interviews would be expected to use the most unraised variant, and this can be clearly observed in Figure 6.1. Moreover, after the working years, when people have retired, their tendency to favor standard variants may be attenuated as they feel less pressure to use standard forms; as expected, therefore, and as we again see in Figure 6.1, the older group in this study used the most raised variant, which is considered the “not standard” form of /o/.

Second, in the case of a stable variable that is associated with age-grading, one variant does not force out another variant. For instance, Meyerhoff (2006) discusses the example of the (ing) variable, which is realized as the two variants [in] and [iŋ]; according to Meyerhoff, “even though [iŋ] is considered the ‘better’ or more standard

variant, [in] has proved to be a remarkably resilient alternative” (p. 145). Likewise, the raised vowel variant in Korean *-ko* and *-to* co-exists with the unraised vowel variant, even though the raised variant is not considered a standard form. The *Standard Korean Language Dictionary* (2008) also states that the standard form /o/ is commonly replaced by /u/, a raised vowel, in colloquial speech in some circumstances, which implies that both unraised and raised forms have significance in the community. In conclusion, at least in the AP-medial position, vowel raising of /o/ in constituent-final *-ko* and *-to* is an age-graded stable variable rather than a generational sound change.

Another interesting finding from this study’s speech production analysis is that, as seen in Figure 6.2, in the AP-medial position, although no significant interactions of social class and gender were found, UMC females used the most raised variant among the social class and gender groups, which is seemingly related to work effects.

Figure 6.2. Production of AP-medial /o/: Interrelations between speaker gender and social class with confidence intervals



All of the UMC female interviewees had been employed or had owned their own business for years at the time of the interview; thus, they are likely to have been naturally exposed to any linguistic variation. This is a notable change for UMC females when we compare them to UMC females of 20 years ago. In her work, Chae (1995) pointed out that most of the UMC women were discouraged from entering society and the workforce, and rather encouraged to stay at home and care for their children in spite of their high educational level and economic background. However, many UMC women in current Korean society participate in social and economic activities, which, my data suggest, has influenced their sensitivity to vowel variation. This finding shows that this vowel variation is not only language-specific but also socioculturally specific. This work effect is related to the social meanings of /o/ variation in speech perception, as will be discussed in 6.3.

6.2. Stylistic variation of vowel raising

Even though there are general trends in phonetic variation among speakers of a given age, gender, and social class, as shown in the previous section, individual speakers change their way of speaking according to speech situations, conversation topics, addressees, and so on (Bell, 1984). Of these factors, speech setting and addressee play the most significant role in the raising of /o/ in constituent-final *-ko* and *-to* in current Seoul Korean: People in general tend to raise the vowel in casual situations, and the younger generations in particular raise it when they talk to a person with whom they are intimate. In other words, formality and solidarity are the most important stylistic variations in this vowel raising, just as Sohn (1983) and Byon (2006) suggested (see 2.4.4).

Moreover, data from interviews conducted in a pilot study for this research (Yi, 2013) also support this finding. I asked participants the following: “Can you think of any situations where the [ku] variant is frequently used instead of [ko]?” The interviewees said that they use different variants depending on differing speech settings. Let us look at excerpts from the interviews with two younger male participants (YM 1 and YM 2) and one younger female participant (YF 2) of the pilot test. (All translations into English are my own.)

You use it [ku] more in a casual environment. (YM 1)

In order to sound more casual, I try to avoid using [ko] when I send an email to a professor who is close to me. But, if it's an official email, then I use [ko] more frequently. (YF 2)

If used in a formal setting or in a corporate environment, that individual will lose credibility and be looked down upon, and it sounds silly and juvenile. (YM 2)

YM 1, YM 2, and YF 2 all mentioned that using [ku] in a formal situation at work would be inappropriate, and even career damaging, which means that [ku] is preferred only in a casual environment and dispreferred in the formal environment of a workplace; this may be further evidence that the formality of the speech setting affects the raising of /o/ to [u], at least in some workplaces.

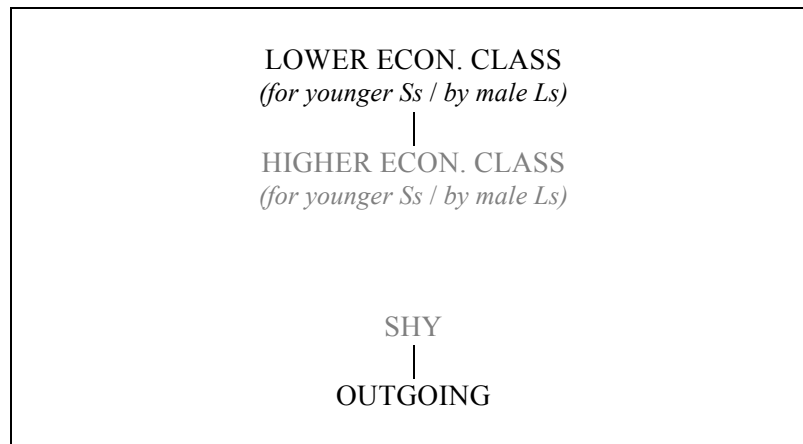
6.3. Social meanings of vowel raising and their relation to speech production

The perception test results described in Chapter 5 show what kind of social meanings this vowel raising has in Seoul Korean. As discussed in 2.5, diverse social meanings are simultaneously indexed to the raised variant [u] and unraised variant [o],

and all these related meanings form an indexical field (Eckert, 2008). For female voices, [u] is associated with (i) outgoingness, (ii) lower economic class (for younger voices), and (iii) lower economic class (by male listeners). Figure 6.3 illustrates an indexical field for these meanings, following Eckert's (2008) depiction of an indexical field for English *-ing* based on Campbell-Kibler's (2007a, 2007b) work (see 2.5.2; Figure 2.8).

Figure 6.3. Indexical field of /o/ in constituent-final *-ko* and *-to* in Seoul Korean for female voices

Note: Black = meanings for the raised variant ([u]); gray = meanings for the unraised variant ([o]); Ls = listeners, Ss = speakers.



In Chapter 5, I reported that younger female speakers who use the raised variant are perceived as being of a lower economic class than middle-aged and older female speakers who use it. However, as Figure 6.3 shows, younger females also are perceived as belonging to a higher economic class when they use the unraised variant [o]. In addition, regardless of speaker age, males evaluate females as being in a higher economic class when they use the unraised variant [o]. It therefore seems possible that younger women consciously or unconsciously choose [o] over [u] to sound like they belong to a high economic class, and that females in all age groups pursue this strategy especially when

talking to a male addressee. In addition, with regard to the social meanings of /o/ variation, females of the highest social class use the most raised variant, probably because of their participation in social and economic activities, as we saw when we looked at the stylistic variation in production in 6.1. That is, the context of work, which was quite recently a new context for this group, would create a new meaning of the unraised variant of /o/, which supports the idea that indexicality is contextual (Levon, 2007). In other words, this meaning is selected by younger speakers to construct their higher economic status style in a working context. Because indexical fields are not fixed but fluid, such contextual meanings can be added and selected by particular speakers to create new individual personae.

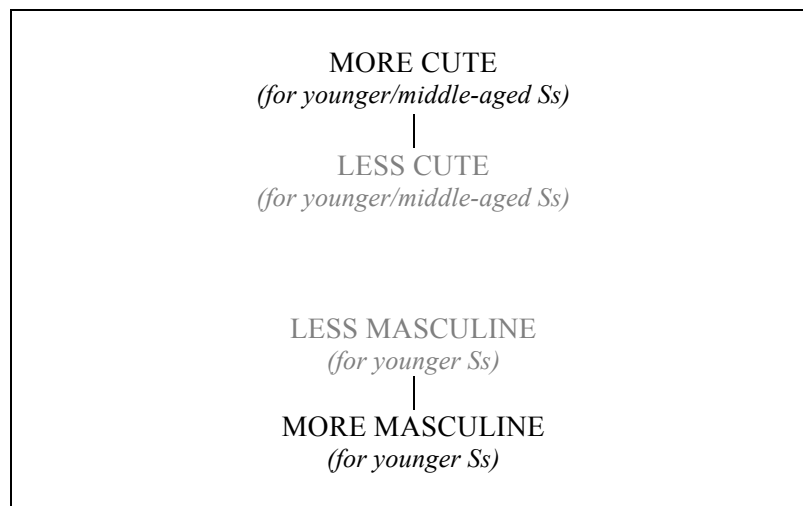
The most powerful influence of the vowel raising is on the perception of the outgoingness of female speakers: All age/gender groups perceived females of all age groups as more outgoing when they used the raised variant [u]. Outgoingness is positively evaluated as a female trait nowadays, but this is a recent trend in Korean society. For instance, Kim and Hong (2014) investigated how portrayals of women's personalities have changed in Korean TV dramas over recent decades. Several studies have argued that such cultural products reflect the current values and preferences of society, culture, and people (Kim & Kim, 2008; Chung, 2009; Kim & Hong, 2014). Kim and Hong found that the preferred personalities of major female characters in TV dramas have changed. Whereas in the 1980s and 1990s, most of the major female characters were patient, obedient, passive, and dependent on men, in the 2000s, they are active, optimistic, and outgoing. In other words, outgoingness of a female speaker is favored in current

Korean society, and, interestingly enough, using the raised variant of the vowel in constituent-final *-ko* and *-to* can make a female speaker sound outgoing.

The indexical field of the raised variant for male speakers, depicted in Figure 6.4, shows that vowel raising by male speakers has two main social meanings, which are completely different than those for female speakers. The raised variant is associated with (i) being cute (especially for younger and middle-aged male voices), and (ii) being masculine (for younger voices).

Figure 6.4. Indexical field of /o/ in constituent-final *-ko* and *-to* in Seoul Korean for male voices

Note: Black = meanings for the raised variant ([u]); gray = meanings for the unraised variant ([o]); Ss = speakers.



Cuteness and masculinity might sound like contradictory traits unlikely to co-exist in one person. However, considering that it is speakers of the younger generation who sound cute and masculine at the same time, there is a probable explanation. Moon (2010) claimed that being cute is a desirable feature for young women in Korea and Japan and “one of the most prominent gendered aspects of culture” (p. 2). Nevertheless, the positive attitude towards cuteness seems to apply to young men as well. For example, unlike in

the 1990s, cuteness as well as masculinity is now both expected and desirable for male stars and popular young singers. In Korea, the popularity of these celebrities is unbelievably high, and they have a huge influence on the society and culture (Kim & Shin, 2011). The younger generations especially try to imitate their fashion, hair styles, make-up, and even ways of speaking. Kim and Shin categorized 15 popular music groups into six image types depending on their characteristics. They found that cuteness is one of the key features for a “toy boy” type, and masculinity is important for both the “charisma” type and the “homme fatale” type; thus, both cuteness and masculinity can be considered positive characteristics for young men. Kim and Shin concluded that, while being cute used to be considered feminine and therefore in contrast to masculinity, the combination of cuteness and masculinity is now positively evaluated for young men. The raising of /o/ to [u] in constituent-final *-ko* and *-to* is one of the behaviors that can lead to a perception of both characteristics.

Moreover, when it comes to the perception of masculinity only, I found that younger male speakers generally sounded less masculine to the listeners (see 5.2.2.1). However, the degree of their perceived masculinity is higher when they use the raised variant [u], as seen in Figure 5.9. That is, using [u] over [o] in production could be a strategy for younger males to represent their masculinity.

In conclusion, a variety of social meanings are indexed to the raised and unraised variants of /o/ in constituent-final *-ko* and *-to* when produced by male and female speakers, and the meanings vary depending on the different backgrounds of speakers and listeners. Social meanings are related to cultural factors as well, as shown in the perception of cuteness and masculinity of male voices. Social and cultural values can

change as time goes by, as we can see by looking at how the perception of men's cuteness has changed in Korean culture. As mentioned in the discussion of indexicality in 2.5.1, the social meanings of a linguistic variable are not static but flexible. The perception of cuteness and masculinity is also related to the speech production of /o/ in constituent-final *-ko* and *-to*, because these characteristics are what younger male speakers seem to aim at when they speak. Finally, male and female speakers have completely distinctive indexical fields of /o/. For instance, while the use of the raised variant influences the perception of a woman's economic class, it seems to have no effect on the perception of men's economic class—which is further evidence of the flexibility and fluidity of the social meanings of linguistic behaviors.

CHAPTER 7.

CONCLUSION

7.1. Summary of the findings

The results of the current study show how language-internal and language-external factors affect the vowel quality in constituent-finals in Seoul Korean. First, of many linguistic factors, following sounds, preceding sounds, word category, and final tone change F1 and F2 values. More specifically, in terms of preceding and following environments, following /a/ leads to higher F1 values, and preceding /t/, following /i/, /u/, and alveolar, palatal, and velar consonants lead to lower F1 values in the AP-medial position. In addition, preceding /t/, following /i/, /j/-diphthongs, /e/, and alveolar, palatal, and glottal consonants lead to higher F2 values in the AP-medial position as well. Moreover, in the prosodic final position, following /i/, /j/-diphthongs, and bilabial, velar, and glottal consonants increase the F1 values, and preceding /t/ increases the F2 values. Most of these findings support the concept of coarticulation of adjacent sounds, and both anticipatory and perseverative (or carryover) coarticulation occur for /o/ in constituent-final *-ko* and *-to* in Seoul Korean. In addition to the following and preceding segments, word category and final tone also influence the F1 of the vowel as well: /o/ in NP particles is lowered in the AP-medial position, and /o/ is more raised when the phrase ends in a Low tone than when it ends in a High tone in the prosodic final position.

Second, the interview data also shed light on the importance of social factors in this phenomenon. The results of the data analysis revealed that the older speakers use the most raised variant of /o/ in the AP-medial position, which is evidence for age-grading

for the following reasons: (i) the linguistic marketplace, which is an important concept in age-grading, supports this idea, because older people use the non-standard form of /o/, which is the raised variant, after they leave the workforce, and (ii) the unraised variant does not push out the raised variant, but rather, they co-exist. In addition, UMC women raise the vowel in the AP-medial position more than any other social class group of women, presumably because of the recent entry of women into the workforce and public affairs.

Third, in addition to age, gender, and social class, stylistic variation plays a significant role in the raising of /o/. Formality and solidarity are the most important factors: People use more raised vowels in casual situations than in formal situations, and younger speakers in particular raise the vowel when talking to a person with whom they are intimate. The important roles of formality and solidarity are emphasized by Byon (2006) and Sohn (1983) as traits specific to Korea and the Korean language.

Fourth, in terms of speech perception, the matched-guise test results show various social meanings of the vowel raising in Seoul Korean. The concepts of indexicality and indexical field (Eckert, 2008) are useful in understanding how the raised and unraised variants simultaneously have diverse social meanings, and how the raised variant has distinctive meanings when uttered in female and male voices. For female voices, the raised variant [u] is associated with (i) outgoingness, (ii) lower economic class (for younger voices), and (iii) lower economic class (by male listeners).

On the other hand, for male voices, [u] is associated with (i) being cute (especially for younger and middle-aged male voices) and (ii) being masculine (for younger voices). These social meanings of the raised variant for females and males are reflections of

current or changing Korean social and cultural values, and some of the results are related to speech production: (i) a positive attitude towards female outgoingness is a recent trend in Korean culture, and using the raised variant may be one way to have a positive impression on listeners by sounding outgoing; (ii) younger women may use [o] instead of [u] in order to sound as if they belong to a high economic class, and women, regardless of age, may apply this strategy when interacting with male listeners; (iii) given that women in the highest social class use the most raised variant due to their active participation in the workforce, this working context may have created a new social meaning of the /o/ variation, which supports the idea that indexicality is contextual, and (iv) unlike in the 1990s, both cuteness and masculinity are currently preferred traits for younger males in Korean culture, and younger men may raise the vowel in order to sound cute and masculine.

7.2. Contributions and suggestions for further studies

The current study makes several important contributions to Korean linguistics. First, unlike previous studies, both language-internal and language-external factors were examined using objective statistical analysis of spontaneous speech data, thus contributing to sociolinguistics as well as general linguistics. This sociophonetic approach shows the directionality of the sound change and its practical and pragmatic use in spoken Korean. Second, in addition to speech production, this dissertation looked into what kind of perceptions and attitudes Korean speakers have toward the two variants, [o] and [u]. This is the first and only perception study that relates the raising of /o/ to Korean-specific social and cultural features, applies the concept of indexicality to the variant's

perception in general, and explores it in relation to speech production. Finally, I believe that further studies will be able to apply the results of this research on the patterns of speech production and perception of the vowel variation to the development of pedagogical approaches. Because social factors are rarely mentioned and rarely included in instruction in the second language classroom, most students, even advanced learners, have difficulty producing natural and spontaneous speech. Teaching differences in variants depending on age, gender, social class, speech setting, and addressee, as well as the ways native speakers perceive each variant, will help learners achieve nativelike speaking skills.

For further research, I suggest that a study of similar design with a larger number of participants would increase the objectivity and credibility of the research on this topic. In addition, investigating the many other vowel variations of all Korean dialects including Seoul Korean would enrich the field of sociophonetics of Korean. For instance, several studies have already reported vowel raising in Chwuncheng Province (Kim, 2004), Kyengsang Province (Jeong, 2009), Cenla Province (Kang, 2005), and in some regions of North Korea (Kwak, 2003). Scrutinizing the sociophonetic aspects of such phenomena would be another contribution to the study of the Korean language. Lastly, research on the production and perception of /o/ variation by language teachers in KFL classroom settings and Korean language learners, and on teaching methods that address such variation, would be a meaningful application of this study to a practical field.

APPENDIX I: Questions used for the interview

- 1) 무슨 일을 하세요? 어떤 일인지 설명해주실 수 있나요?
What do you do for a living? Please tell me about your job.
- 2) 실례가 안 된다면, 부모님/자제분들은 어떤 일을 하시는지 여쭙봐도 될까요?
부모님/자제분들은 어떤 분이세요? 형제가 있으세요? 있다면, 형제 분들과 나이 차이는 어떻게 되세요? 형제 분들은 어떤 일을 하세요? 집 분위기가 어떤가요?
가족들에 대해 이야기해주실 수 있나요? 예를 들어, 부모님/자제분, 형제들의 성격이나 특징에 대해서요.
What do your parents/children do? How would you describe them? Do you have siblings? If so, how old are they, and what do they do for a living? How would you describe your family atmosphere? Please tell me about your family members including their characters and personalities.
- 3) 어릴 때는 어떤 사람이셨어요? 어린 시절의 성격이나 친구 관계, 재미있던 경험 등에 대해 이야기해 주세요.
How was your childhood? Please tell me about your personality, friends, and interesting experiences during your childhood.
- 4) 다른 나라에 여행을 하거나 살아본 적이 있으세요? 있다면, 그 나라의 어떤 점이 좋거나 싫으셨어요? 한국과는 많이 다르던가요? 현지 음식은 입에 잘 맞으셨어요? 한국 음식이 많이 그립지는 않으셨어요? 그 곳에서 재미있었거나 기억에 남을만한 경험, 혹은 힘든 순간이 있었으면 말씀해 주세요.
Have you ever lived in or traveled to a foreign country? If so, what did you like/dislike about the country? Was the food okay with you? Didn't you miss Korean food? Please tell me about any memorable/funny/terrible experience you had while you stayed there.
- 5) 요리 잘 하세요? 가장 잘 만드는 음식이 뭔가요? 어떤 재료가 들어가요? 그 음식을 만드는 OO 씨의 레시피를 말씀해 주세요.
Are you good at cooking? What is your signature dish, and what ingredients do you use? Please tell me your recipe.
- 6) OO 씨는 현재 한국의 위상이 어느 정도라고 생각하세요? 한국의 전통 문화가 세계적으로 인정받을만하다고 생각하세요? 한류에 대해 들어보셨어요? 한류를 전파하는 한국의 대중 가요나 연예인, 드라마는 어떻게 생각하세요?
How do you rate South Korea's status in the world? Do you think Korean culture deserves attention? Have you heard about *Hallyu* 'Korean wave'? What do you think about K-pop, celebrities, and drama that spread *Hallyu* overseas?

- 7) 한국/한국 사람들의 문화 중에서 가장 자랑스럽게 생각하는 것과 가장 부끄럽게 생각하는 것이 무엇인가요? 왜 그렇게 생각하세요?
What part of Korean culture are you most/least proud of, and why?
- 8) 서양의 문화도 한국에 많이 유입되고 있는데, 이 현상에 대해서는 어떻게 생각하세요?
OO 씨는 서양 문화에 대해 긍정적인 입장인가요, 부정적인 입장인가요? 서양 문화에서 배워야 할 것과 그렇지 않은 것에는 무엇이 있을까요?
Nowadays, many Western cultures have been introduced to Korea. Do you have a positive view or negative view toward that? What should we learn and not learn from the West?
- 9) 요즘 연상-연하 커플이 많아지는 추세예요. 연상 여자친구/연하 남자친구를 사귀어본 적이 있으세요? 있다면, 어땠어요? 반대의 경우와 비교했을 때 장점과 단점이 뭐가 있었나요? 없다면, 혹시 연상 여자친구/연하 남자친구를 사귀어보고 싶으세요? 반대의 경우와 비교했을 때 어떤 장점과 단점이 있을 것 같으세요?
In Korea, there has been a growing tendency for a man to have an older girlfriend and a woman to have a younger boyfriend. Have you ever been in such a relationship? If so, what were the advantages and disadvantages? If not, do you want to be involved in such a relationship?
- 10) 지금 사시는 동네에는 얼마나 사셨어요? 어릴 때 친구들을 만나면 보통 뭐 하세요?
How long have you lived in this neighborhood? What do you usually do when you hang out with your old friends?
- 11) 다른 지방에서 살았다면, 사투리가 어색하게 들리지 않으셨어요? 그 지방에서도 계속 서울 말을 쓰셨나요? 서울말과는 다른 그 지역 사투리만의 특이한 점은 무엇이 있었나요?
Have you ever lived in or visited a city other than Seoul? If so, did their dialect sound strange or unfamiliar? Did you use Seoul dialect when you were there? Did you find any features of their dialect that set them apart from Seoul dialect?
- 12) 아직 한국에 지역 감정이 있다고 생각하세요? 있다면, 언제 지역 감정을 느끼셨어요? 서울을 제외한 다른 지방에 대해서는 어떻게 생각하세요? 다른 지방 사람들의 특징에는 어떤 것들이 있을까요? 예를 들어, 서울 사람들과는 다른 경상도/전라도/충청도/강원도/경기도/제주도 사람들만의 특징에는 뭐가 있을까요?
Do you think Koreans still have regionalism? What makes you think so? What are notable features that differentiate Seoul from other provinces such as Kyengsang-do, Cenla-do, Chwungcheng-do, Kangwen-do, and Ceycwu-do?

- 13) 미팅이나 소개팅을 해 본 적 있으세요? 최고/최악의 미팅/소개팅 경험에 대해 말씀해 주세요.
Have you ever gone on a blind date? If so, please tell me your best/worst experience.
- 14) 미혼자: 남자/여자 친구 있으세요? 어떻게 만났어요? 좋은 데이트 장소가 있으면 추천해 주세요.
기혼자: 배우자분은 어떻게 만나셨어요? 예전에 데이트할 때 가보셨던 곳 중에 추천해주실 장소가 있으면 말해 주세요.
To a single participant: Do you have a boyfriend/girlfriend? How did you meet him/her? Could you recommend a good place to go on a date?
To a married participant: How did you meet your spouse? Could you recommend a good place where you went on a date?
- 15) 미혼자: 이상형이 어떻게 되세요? 나중에 내 배우자는 이래야 한다, 이러지 말아야 한다라는 기준이 있나요?
기혼자: 결혼하신지 얼마나 되셨나요? 부부 사이에서 꼭 지켜야 할 것과 이해해야 할 것들을 알려 주세요. 자제분이 있으시다면, 자제분들이 어떻게 살았으면 좋겠다라는 것이 있을까요?
To a single participant: What type of man/woman do you want to marry? What do you look for when searching for your future spouse?
To a married participant: How long has it been since you got married? Please advise me on what to do/what not to do in one's marriage. Do you have children? If so, how do you want them to live?
- 16) 시간이 있을 때 보통 뭐 하세요? 취미 생활로 하는 것이 있으면 말해 주세요.
What is your hobby?
- 17) 요즘 사회적인 문제가 되고 있는 왕따 문제에 대해 어떻게 생각하세요? 주변에서 그런 경험을 겪는 사람을 본 적이 있나요? 이 문제를 해결하기 위해서 개인적으로, 정책적으로 할 수 있는 일이 무엇이 있을까요?
Wangtta (bullying) is one of the major issues in Korean society at the moment. Have you met anyone who got bullied? What do you think each individual or society as a whole should do to resolve it?
- 18) 축구 좋아하세요? 특히 좋아하는 국가대표 선수가 있나요? 어떤 점이 좋으세요?
Do you like soccer? Who is your favorite soccer player? What made you become his fan?
- 19) 드라마 좋아하세요? 가장 좋았던 드라마가 뭐예요? 그 드라마 내용과 등장 인물에 대해 이야기 해 주세요.

Do you like to watch dramas? What is the best drama you have ever watched? Please tell me the plot and characteristics of the drama.

- 20) 얼마 전 대선이 있었는데, 그 결과에 만족하세요? 어떤 후보를 지지하셨는지 말씀해 주실 수 있나요? 그 후보의 어떤 점이 대통령에 적합하다고 생각하세요? 다른 후보는 왜 부적합하다고 생각하세요?

Are you satisfied with the result of the presidential election last year? Please tell me which candidate you supported and how he/she would be capable of becoming the next president. Why do you think the other candidates were less qualified?

APPENDIX II: Elicitation task scenarios

- 1) OO 씨가 일하는 회사의 사장님은 사회적으로도 상당히 지위가 높고 성공한 분으로 유명합니다. 오늘 OO 씨와 사장님은 좋은 일식당에서 저녁을 함께 하고 있습니다. 사장님께 회사 생활의 장단점, 회사 내에서의 인간 관계, 사장님에게 바라는 점 등에 대해 이야기 해 주세요.
Your company CEO is a renowned and accomplished individual, and has an extremely high social status. Today, you and the CEO are eating at a high-end Japanese restaurant, and he wants to listen to your opinions. Please tell him the following: strengths and weaknesses of your company, interpersonal relationships in the company, and your personal expectations of the CEO.
- 2) OO 씨는 현재 한 회사의 대리로 일하고 있습니다. 그런데 이번에 신입사원이 들어오면서 OO 씨가 회사의 전반적인 사항에 대해 설명을 해 주기로 했습니다. 이 사원은 갓 고등학교를 졸업했고 사회 생활 경력도 전무합니다. 오늘 OO 씨와 신입 사원은 좋은 일식당에서 저녁을 함께 하고 있습니다. 신입 사원에게 회사 생활의 장단점, 회사 내에서의 인간 관계, 그 사원에게 바라는 점 등에 대해 이야기 해 주세요.
You are working for a company as a deputy section chief. A new employee just got hired. He recently graduated from high school, and does not have any working experience. Today, you and the new employee are eating at a high-end Japanese restaurant, and he wants to listen to your opinions. Please tell him the following: strengths and weaknesses of your company, interpersonal relationships in the company, and your personal expectations from the CEO.
- 3) OO 씨는 한 대학교에서 강연을 해달라는 요청을 받았습니다. 주최측에서는 OO 씨의 그 동안의 인생 이야기가 학생들에게 도움이 될 것이라고 하며 살아온 이야기를 해달라고 요청합니다. OO 씨가 어디에서 태어났고, 어떻게 자라왔으며, 삶의 좌우명은 무엇인지, 그리고 앞으로의 인생은 어떻게 살 것인지를 이야기 해 주세요.
You are requested to give a formal lecture to college students as a guest speaker. The organizer believes that your life story will help students set their goals and achieve them. Please talk about where you were born, how you grew up, your life motto, and your ultimate goal in life.
- 4) OO 씨는 편안하고 격식 없는 분위기에서 대학생들에게 인생 이야기를 해달라는 요청을 받았습니다. 이들은 OO 씨의 그 동안의 인생 이야기가 학생들에게 도움이 될 것이라고 하며 살아온 이야기를 해달라고 요청합니다. OO 씨가 어디에서 태어났고, 어떻게 자라왔으며, 삶의 좌우명은 무엇인지, 그리고 앞으로의 인생은 어떻게 살 것인지를 이야기 해 주세요.
You are requested to talk about your life story to college students in a comfortable and casual atmosphere. They believe that your life story will help them set their goals

and achieve them. Please talk about where you were born, how you grew up, your life motto, and your ultimate goal in life.

- 5) 길을 걷고 있는데, 80 대로 보이는 어른신 한 분이 길을 물어오십니다. 서울이 처음이라며 근처의 우체국까지 어떻게 가야하는지 말해달라고 하십니다. 우체국까지 가는 길은 꽤 복잡하지만, 자세히 설명해 드리려고 합니다. (지도)

You run into an elderly person who seems to be in his 80s. Since he is a stranger to your neighborhood, he is asking you for directions to a nearby post office. The way to the post office is confusing and you are trying to explain in detail. [The participant will be provided a map of the neighborhood for directions.]

- 6) 길을 걷고 있는데, 초등학교 저학년으로 보이는 어린 아이가 길을 물어옵니다. 서울이 처음이라며 근처의 우체국까지 어떻게 가야하는지 말해달라고 합니다. 우체국까지 가는 길은 꽤 복잡하지만, 자세히 설명해 주려고 합니다. (지도)

You run into a little child who seems to be in the lower grades of elementary school. Since he is a stranger to your neighborhood, he is asking you for directions to a nearby post office. The way to the post office is confusing and you are trying to explain in detail. [The participant will be provided a map of the neighborhood for directions.]

- 7) OO 씨는 여행 동호회에서 활동 중입니다. 오늘 동호회 모임에서 한 여자/남자 [이성] 분과 이야기를 나누게 되었습니다. 그 분이 OO 씨가 여행해본 곳 중에서 좋은 여행지를 추천해달라고 합니다. 어떤 여행지가 좋았는지, 왜 좋았는지, 또 그 곳에서 할만한 일은 무엇이 있는지, 어떻게 가는 것이 좋은지 등을 이야기해 주세요.

You joined a traveling club. You are now talking to an attractive female/male [opposite sex] member at a get-together. He/she is asking you to recommend a good place to travel where you have been before. Tell him/her where you would recommend, why it is worth a visit, what to do at that place, and how to get there.

- 8) OO 씨는 여행 동호회에서 활동 중입니다. 오늘 동호회 모임에서 한 여자/남자 [동성] 분과 이야기를 나누게 되었습니다. 그 분이 OO 씨가 여행해본 곳 중에서 좋은 여행지를 추천해달라고 합니다. 어떤 여행지가 좋았는지, 왜 좋았는지, 또 그 곳에서 할만한 일은 무엇이 있는지, 어떻게 가는 것이 좋은지 등을 이야기해 주세요.

You joined a traveling club. You are now talking to a female/male [same sex] member at a get-together. He/she is asking you to recommend a good place to travel where you have been before. Tell him/her where you would recommend, why it is worth a visit, what to do at that place, and how to get there.

- 9) OO 씨는 가장 친한 친구와 함께 토요일 점심을 함께 하고 있습니다. 이 친구와는 아주 어릴 때부터 가장 가깝게 지낸 친구입니다. 이 친구는 OO 씨의 가족과도 잘 아는

사이입니다. 요즘 가족들은 어떻게 지내냐며 OO 씨 가족 한 명 한 명의 안부를 묻습니다. 이 친구에게 아버지, 어머니, 형제들, 그리고 -결혼을 했다면- 배우자와 자녀들이 요즘 어떻게 지내는지 이야기 해 주세요.

You are having lunch with your best friend on Saturday. He/she has been your closest friend since you were very young. He/she is also close with your family. He/she now asks how your family members are doing these days. Please tell him/her about your father, mother, siblings and, if you are married or have children, your spouse and children.

- 10) OO 씨는 학교/동네/직장 친구와 함께 토요일 점심을 함께 하고 있습니다. 서로 아는 사이긴하지만 평소 거의 말도 안 하고 어색하게 지내던 사이입니다. 하지만 함께 밥을 먹기 때문에 서로 이야기를 해야하는 상황입니다. 둘은 서로의 가족에 대해 이야기 하고 있습니다. 이 친구에게 아버지, 어머니, 형제들, 그리고 -결혼을 했다면- 배우자와 자녀들이 요즘 어떻게 지내는지 이야기 해 주세요.

You are having lunch with your colleague on Saturday. You've rarely had a chance to talk to him/her, and feel awkward. You now have an opportunity to start a conversation and talk about your family. Please tell him/her about your father, mother, siblings and, if you are married or have children, your spouse and children.

APPENDIX III: Female voices: Coefficients of fixed effects for perception of educational level, friendliness, formality, sincerity, and femininity.

Female voices: Coefficients of fixed effects for perception of educational level

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1.1035	0.2901	3.803	0.000143
VoiceAge=Older	-1.6977	0.3123	-5.436	< 0.0001
VoiceAge=Younger	-0.7991	0.3022	-2.644	0.008194

Female voices: Coefficients of fixed effects for perception of friendliness

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.2555	0.2215	-1.154	0.249
VoiceAge=Older	0.364	0.2708	1.344	0.179
VoiceAge=Younger	2.5025	0.3657	6.843	< 0.0001

Female voices: Coefficients of fixed effects for perception of formality

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-2.8416	0.5475	-5.19	< 0.0001
VoiceAge=Older	-1.0227	0.623	-1.641	0.1007
VoiceAge=Younger	-2.4618	1.0686	-2.304	0.0212

Female voices: Coefficients of fixed effects for perception of sincerity

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.04218	0.26826	-0.157	0.875
VoiceAge=Older	-0.04032	0.28273	-0.143	0.887
VoiceAge=Younger	1.20147	0.30313	3.963	< 0.0001

Female voices: Coefficients of fixed effects for perception of femininity

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1.38342	0.3712	3.727	0.000194
VoiceAge=Older	0.85034	0.54683	1.555	0.119938
VoiceAge=Younger	2.76048	1.05615	2.614	0.008956
ListenerGender=Male	-0.01901	0.49948	-0.038	0.969646
VoiceAge=Older : ListenerGender=Male	-1.44166	0.687	-2.098	0.035864
VoiceAge=Younger : ListenerGender=Male	-1.72555	1.18142	-1.461	0.144132

APPENDIX IV: Male voices: Coefficients of fixed effects for perception of economic class, social class, friendliness, and conservativeness

Male voices: Coefficients of fixed effects for perception of economic class

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.7721	0.2993	2.579	0.0099
VoiceAge=Older	-0.7442	0.2992	-2.488	0.0129
VoiceAge=Younger	-2.101	0.3318	-6.331	< 0.0001

Male voices: Coefficients of fixed effects for perception of social class

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.7195	0.3002	2.397	0.0165
VoiceAge=Older	-0.5263	0.2971	-1.771	0.0765
VoiceAge=Younger	-2.209	0.3369	-6.558	< 0.0001

Male voices: Coefficients of fixed effects for perception of friendliness

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1.95302	0.39834	4.903	< 0.0001
VoiceAge=Older	-0.94663	0.35314	-2.681	0.00735
VoiceAge=Younger	0.05788	0.37751	0.153	0.87815

Male voices: Coefficients of fixed effects for perception of conservativeness

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.4454	0.4005	-1.112	0.266117
VoiceAge=Older	0.2682	0.4102	0.654	0.513171
VoiceAge=Younger	-2.284	0.5898	-3.873	0.000108
ListenerAge=Younger	-0.9814	0.5726	-1.714	0.086538
VoiceAge=Older : ListenerAge=Younger	1.2289	0.5849	2.101	0.035629
VoiceAge=Younger : ListenerAge=Younger	-0.886	1.2821	-0.691	0.489515

REFERENCES

- Adamson, H., & Regan, V. (1991). The acquisition of community speech norms by Asian immigrants learning English as a second language: A preliminary study. *Studies in Second Language Acquisition*, 13, 1–22.
- Baley, R., & Preston, D. (1996). *Second language acquisition and linguistic variation*. Amsterdam: Benjamins.
- Beckman, M. E., & Edwards, J. (1994). Articulatory evidence for differentiating stress categories. In P. A. Keating (Ed.), *Papers in laboratory phonology III: Phonological structure and phonetic form* (pp. 7–33). Cambridge: Cambridge University Press.
- Bell, A. (1984). Good copy – bad news: The syntax and semantics of news editing. In P. Trudgill (Ed.), *Applied sociolinguistics* (pp. 73–116). London: Academic Press.
- Bell-Berti, F., & Harris, K. (1979). Anticipatory coarticulation: Some implications from a study of lip rounding. *Journal of the Acoustical Society of America*, 65, 1268–1270.
- Bell-Berti, F., & Harris, K. (1981). A temporal model of speech production. *Phonetica*, 38, 9–20.
- Bell-Berti, F., & Harris, K. (1982). Temporal patterns of coarticulation: Lip rounding. *Journal of the Acoustical Society of America*, 71, 449–454.
- Benor, S. (2001). The learned /t/: Phonological variation in Orthodox Jewish English. In T. Sanches & D. E. Johnson (Eds.), *Penn Working Papers in Linguistics: Selected Papers from NWAV 2000* (pp. 1–16). Philadelphia, Pennsylvania: University of Pennsylvania Department of Linguistics.
- Bickerton, D. (1980). What happens when we switch? *York Papers in Linguistics*, 9, 41–56.
- Blom, J.-P., & Gumperz, J. J. (1972). Social meaning in linguistic structure: Code-switching in Norway. In J. J. Gumperz & D. Hymes (Eds.), *Directions in sociolinguistics* (pp. 407–434). New York: Holt, Rinehart & Winston.
- Boersma, P. (2001). Praat, a system for doing phonetics by computer. *Glott International*, 5(9/10), 341–345.

- Browman, C., & Goldstein, L. (1986). Towards an articulatory phonology. *Phonology Yearbook*, 3, 219–252.
- Brown, P., & Fraser, C. (1979). Speech as a marker of situation. In K. R. Scherer & H. Giles (Eds.), *Social markers in speech* (pp. 33–62). Cambridge: Cambridge University Press.
- Bucholtz, M. (2001). The whiteness of nerds: Superstandard English and racial markedness. *Journal of Linguistic Anthropology*, 11, 84–100.
- Byon, A. (2006). Korean cultural values in request behaviors. In H. Sohn (Ed.), *Korean language in culture and society* (pp. 174–188). Honolulu: University of Hawai‘i Press.
- Cameron, D. (2005). Language, gender and sexuality: current issues and new directions. *Applied Linguistics*, 26(4), 482–502.
- Cameron, D. (2006). Gender and the English language. In B. Arts & A. McMahon (Eds.), *The handbook of English linguistics* (pp. 724–741). Malden, MA: Blackwell.
- Campbell-Kibler, K. (2007a). Accent, (ING) and the social logic of listener perceptions. *American Speech*, 82, 32–64.
- Campbell-Kibler, K. (2007b). *What did you think she’d say? Expectations and sociolinguistic perception*. Paper presented at the Annual Conference on New Ways of Analyzing Variation, Philadelphia, Pennsylvania, October.
- Cavallaro, F., & Chin, N. (2009). Between status and solidarity in Singapore. *World Englishes*, 28(2), 143–159.
- Cedergren, H. (1973). *The interplay of social and linguistic factors in Panama* (Unpublished doctoral dissertation). Cornell University, Ithaca, New York.
- Chae, S. (1995). *External constraints on sound change: The raising of /o/ in Seoul Korean* (Unpublished doctoral dissertation). University of Pennsylvania, Philadelphia.
- Chen, L., & Norman, J. (1965). *An introduction to the Foochow dialect*. San Francisco, CA: San Francisco State College/U.S. Office of Education.
- Chen, N., Slifka, J., & Stevens, K. (2007). Vowel nasalization in American English: Acoustic variability due to phonetic context. *Proceedings of the 16th*

- International Congress of Phonetic Sciences*, 905–908.
- Cho, T. (2001). *Effects of prosody on articulation in English* (Unpublished doctoral dissertation). University of California at Los Angeles.
- Chung, Y. (2009). Contemporary topology and historicity of Korean TV dramas. *Korean Journal of Journalism and Communication Studies*, 53(1), 84–108.
- Clarke, S. (1987). Dialect mixing and linguistic variation in a non-overtly stratified society. In K. Denning et al. (Eds.), *Variation in language: NWAVE-XV at Stanford* (pp. 74–85). Stanford, CA: Department of Linguistics, Stanford University.
- Clements, G. (1991). Place of articulation in consonants and vowels: A unified theory. *Working Papers of the Cornell Phonetics Laboratory*, 5, 77–123.
- Coupland, N. (1981). *The social differentiation of functional language use: A sociolinguistic investigation of travel agency talk* (Unpublished doctoral dissertation). University of Wales Institute of Science and Technology, Cardiff.
- de Jong, G., McDougall, K., Hudson, T., & Nolan, F. (2007). The speaker discriminating power of sounds undergoing historical change: A formant-based study. *Proceedings of the 16th International Congress of Phonetic Sciences*, 1813–1816.
- Douglas-Cowie, E. (1978). Linguistic code-switching in a Northern Irish village: Social interaction and social ambition. In P. Trudgill (Ed.), *Sociolinguistic patterns in British English* (pp. 37–51). London: Edward Arnold.
- Eckert, P. (1989). *Jocks and burnouts*. New York: Teachers College Press.
- Eckert, P. (2008). Variation and the indexical field. *Journal of Sociolinguistics*, 12, 453–476.
- Eckert, P. & McConnell-Ginet, S. (1998). Communities of Practice: Where Language, Gender, and Power All Live. In Coates (1998).
- Eckert, P., & McConnell-Ginet, S. (1992). Think practically and look locally: language and gender as community-based practice. *Annual Review of Anthropology*, 21, 461–490.
- Edwards, J. E., Beckman, M. E., & Fletcher, J. (1991). The articulatory kinematics of

- final lengthening. *Journal of the Acoustical Society of America*, 89, 369–382.
- Flemming, E. (2002). *Auditory representations in phonology*. New York: Routledge.
- Fougeron, C., & Keating, P. A. (1997). Articulatory strengthening at edges of prosodic domains. *Journal of the Acoustical Society of America*, 106(6), 3728–3740.
- Fowler, C. (1980). Coarticulation and theories of extrinsic timing. *Journal of Phonetics*, 8, 113–133.
- Fowler, C. (1981). Production and perception of coarticulation among stressed and unstressed vowels. *Journal of Speech and Hearing Research*, 24, 127–139.
- Giles, H. (1970). Evaluative reactions to accents. *Educational Review*, 22, 211–227.
- Giles, H. (1971). Patterns of evaluation in reactions to RP, South Welsh and Somerset accented speech. *British Journal of Social and Clinical Psychology*, 10, 280–281.
- Giles, H., & Powesland, P. F. (1975). *Speech style and social evaluation*. London: Academic Press.
- Giles, H., & Smith, P. (1979). Accommodation theory: Optimal levels of convergence. In H. Giles & R. St. Clair (Eds.), *Language and social psychology* (pp. 45–65). Oxford: Blackwell.
- Han, J., & Kang, H. (2013). Cross-generational change of /o/ and /u/ in Seoul Korean I: Proximity in vowel space. *Journal of the Korean Society of Speech Sciences*, 5(2), 27–33.
- Henke, W. (1966). *Dynamic articulatory model of speech production using computer simulation* (Unpublished doctoral dissertation). Massachusetts Institute of Technology, Cambridge.
- Hillenbrand, J., Clark, M., & Nearey, T. (2001). Effects of consonant environment on vowel formant patterns. *Journal of the Acoustical Society of America*, 109(2), 748–763.
- Hindle, D. (1979). *The social and situational conditioning of phonetic variation* (Doctoral dissertation). University of Pennsylvania.
- Hiraga, Y. (2005). British attitudes towards six varieties of English in the USA and Britain. *World Englishes*, 24, 289–308.
- Hodge, M., Chesworth, J., Côté, K., Shaw, C., & William, S. (2004). Effect of phonetic context on women's vowel area. *Proceedings of From Sound to Sense*, 43–48.

- Holmes, J., & Bell, A. (1988). Learning by experience: Notes for New Zealand social dialectologists. *Te Reo*, 31, 19–49.
- Hume, E. (1992). *Front vowels, coronal consonants and their interaction in non-linear phonology* (Unpublished doctoral dissertation). Cornell University, Ithaca, New York.
- Hymes, D. (1974). *Foundations in sociolinguistics: An ethnographic approach*. Philadelphia: University of Pennsylvania Press.
- Igeta, T., Sonu, M., & Arai, T. (2014). Sound change of /o/ in modern Seoul Korean: Focused on relations with acoustic characteristics and perception. *The Phonetics and Speech Sciences*, 6(3), 109–119.
- Jeong, Y. (2009). Vowel raising and vowel-rounding of Modern Korean language. *Emwunhak*, 105, 49–78.
- Jun, S. A. (1993). *The phonetics and phonology of Korean prosody* (Unpublished doctoral dissertation). Ohio State University, Columbus.
- Jun, S. A. (2005). *Prosodic typology: The phonology of intonation phrasing*. New York: Oxford University Press.
- Kang, H. (2005). Aspects of the realization of vowel raising and the dialectal differentiations of Korean. *The Korean Language and Literature*, 33, 1–32.
- Kang, H., & Han, J. (2013). Cross-generational change of /o/ and /u/ in Seoul Korean II: Spectral interactions in normalized vowel space. *Journal of the Korean Society of Speech Sciences*, 5(2), 33–41.
- Keating, P. (1990). The window model of coarticulation: Articulatory evidence. In M. E. Beckman & J. Kingston (Eds.), *Papers in laboratory phonology I: Between the grammar and physics of speech* (pp. 451–470). Cambridge: Cambridge University Press.
- Keating, P., Lindblom, B., Lubker, J., & Kreiman, J. (1994). Variability in jaw height for segments in English and Swedish VCVs. *Journal of Phonetics*, 22, 407–422.
- Kim, H., & Kim, M. (2008). Television drama and women discourse: A study on the 30s single women's work and love. *Korean Journal of Journalism and Communication Studies*, 52(1), 244–270.
- Kim, J. (2004). The vowel raising 'ə→i' in the Cheonnam dialect. *Hankul*, 266, 49–75.

- Kim, J., & Shin, S. (2011). The study on fashion beauty design and emotional image by external image type of Korean male idol stars. *Journal of Fashion Business*, 15(6), 71–84.
- Kim, S., & Hong, J. (2014). A study of women's images represented on Korean television dramas of the 2000s. *Enlonhakyenkwu* [언론학연구] 18(2), 25–55.
- King, R. (2006). Dialectal variation in Korean. In H. Sohn (Ed.), *Korean language in culture and society* (pp. 264–280). Honolulu: University of Hawai'i Press.
- Klatt, D. H. (1975). Vowel lengthening is syntactically determined in connected discourse. *Journal of Phonetics*, 3, 129–140.
- Kozhevnikov, A., & Chistovich, L. (1965). *Speech, articulation, and perception*. Washington DC: National Technical Research Service (US. Department of Commerce).
- Kühnert, B., & Nolan, F. (1999). The origin of coarticulation. In W. J. Hardcastle & N. Hewlett (Eds.), *Coarticulation: Theory, data and techniques* (pp. 1–30). Cambridge, UK: Cambridge University Press.
- Kwak, C. (2003). *18 seyki kwukeuy umwunloncek yenku* [A study on the phonology of the 18th century] (Unpublished master's thesis). Seoul National University, Seoul, Korea.
- Kwon, J. (2003). The synchrony and diachrony of Korean declarative sentences in spoken discourse. *The Korean Journal of Linguistics*, 37, 25–46.
- Labov, W. (1966). *The social stratification of English in New York City*. Washington, DC: Center for Applied Linguistics.
- Labov, W. (1990). The intersection of sex and social class in the course of linguistic change. *Language Variation and Change*, 2(2), 205–254.
- Labov, W. (1994). *Principles of linguistic change, Vol. 1: Internal factors*. Malden, MA: Blackwell.
- Labov, W. (2001). *Principles of linguistic change, Vol. 2: Social factors*. Malden, MA: Blackwell.
- Lambert, W., Hodgson, R., Gardner, R., & Fillenbaum, S. (1960). Evaluational reactions to spoken languages. *Journal of Abnormal and Social Psychology*, 60, 44–51.

- Lenneberg, E. H. (1967). *Biological foundations of language*. New York: John Wiley and Sons.
- Lenning, M. (1978). *Acoustic measurement of linguistic change: The modern Paris vowel system* (Unpublished doctoral dissertation). Philadelphia: University of Pennsylvania.
- MacLagan, M., Gordon, E., & Lewis, G. (1999). Women and sound change: Conservative and innovative behavior by the same speakers. *Language Variation and Change*, 11, 19-41.
- Maddieson, I. (1976). The intrinsic pitch of vowels and tones in Foochow. *UCLA Working Papers in Phonetics*, 33, 191–202.
- Major, R. (1999). *Gender marking in second language phonology*. Paper presented at the 28th Annual Conference on New Ways of Analyzing Variation, Toronto.
- Matisoff, J. A. (1973). The grammar of Lahu. *Publications in Linguistics*, 75. Berkeley: University of California Press.
- McCarthy, J. J. (1994). The phonetics and phonology of Semitic pharyngeals. In P. Keating (Ed.), *Phonological structure and phonetic form: Papers in laboratory phonology III* (pp. 191–223). Cambridge: Cambridge University Press.
- McDougall, K., & Nolan, F. (2007). Discrimination of speakers using the formant dynamics of /u:/ in British English. *Proceedings of the 16th International Congress of Phonetic Sciences*, 1825–1828.
- McElhinny, B. (1993). *We all wear the blue: Language, gender, and police work* (Doctoral dissertation). Stanford University.
- Menzerath, P., & De Lacerda, A. (1933). *Koartikulation, Steuerung und Lautabgrenzung*. Berlin: F. Dümmlers.
- Meyerhoff, M. (2006). *Introducing sociolinguistics*. London: Routledge.
- Milroy, J., & Milroy, L. (1978). Belfast: Change and variation in an urban vernacular. In P. Trudgill (Ed.), *Sociolinguistic patterns in British English* (pp. 19–36). London: Edward Arnold.
- Moon, K. (2010). *Doing cuteness in Korea: The social meaning of rising-falling tone in a “reality” TV show*. Paper presented at the Annual Meeting of NWAV, San Antonio, Texas.

- Moon, S. (2007). A fundamental phonetic investigation of Korean monophthongs. *Malsori*, 62, 1–17.
- Moore, E., & Podesva, R. (2009). Style, indexicality, and the social meaning of tag questions. *Language in Society*, 38(4), 447–485.
- Mougeon, R., & Rehner, K. (2001). Variation in the spoken French of Ontario French immersion students: The case of *juste* vs. *seulement* vs. *rien que*. *The Modern Language Journal*, 85, 398–415.
- Oh, E. (2010). Speaker gender and the degree of coarticulation. *Korean Journal of Linguistics*, 35(3), 743–766.
- Park, M. (2003). *The meaning of Korean prosodic boundary tones* (Unpublished doctoral dissertation). University of California at Los Angeles.
- Pilczkowska-Chodak, N. (1972). Tone-vowel height correlation and tone assignment in the patterns of verb and noun plurals in Hausa. *Studies in African Linguistics*, 1, 399–422.
- Podesva, R. J., Roberts, S. J. & Campbell-Kibler, K. (2002). Sharing resources and indexing meanings in the production of gay styles. In K. Campbell-Kibler, R. J. Podesva, S. J. Roberts, & A. Wong (Eds). *Language and Sexuality: Contesting Meaning in Theory and Practice* (pp. 175-190). Stanford, California: CSLI Press.
- Recasens D., & Pallares, M. (2000). A study of F1 coarticulation in VCV sequences. *Journal of Speech, Language, and Hearing Research*, 43, 501–512.
- Rehner, K., Mougeon, R., & Nadasdi, T. (2003). The learning of sociolinguistic variation by advanced FSL learners: The case of *nous* versus *on* in immersion French. *Studies in Second Language Acquisition*, 25, 127–156.
- Rischel, J. (1972). *Topics in West Greenlandic phonology*. Copenhagen: Akademisk Forlag.
- Sankoff, G. (2005). Cross-sectional and longitudinal studies in sociolinguistics. In U. Ammon et al. (Eds). *Sociolinguistics: An International Handbook of the Science of Language and Society* (pp. 1003-1013). Berlin and New York: Mouton de Gruyter.
- Sankoff, G., & Laberge, S. (1978). The linguistic market and the statistical explanation of variability. In D. Sankoff (Eds). *Linguistic Variation: Models and Methods* (pp.

- 239-250). New York: Academic Press.
- Schuh, R. (1971). *Toward a typology of Chadic vowel and tone systems*. Unpublished manuscript, University of California at Los Angeles.
- Seong, C. (2004). An acoustic analysis on the Korean 8 monophthongs: With respect to the acoustic variables on the F1/F2 vowel space. *The Journal of the Acoustical Society of Korea*, 23(6), 454–461.
- Shahin, K. N. (2002). *Postvelar harmony*. Amsterdam: John Benjamins.
- Silverstein, M. (2003). Indexical order and the dialectics of sociolinguistic life. *Language and Communication*, 23, 193–229.
- Sloetjes, H., & Wittenburg, P. (2008). Annotation by category: ELAN and ISO DCR. *Proceedings of the 6th International Conference on Language Resources and Evaluation (LREC 2008)*.
- Sohn, H. (1983). Power and solidarity in the Korean language. *Korean Linguistics*, 3, 97–122.
- Sohn, H. (1999). *The Korean language*. Cambridge: Cambridge University Press.
- Son, O., & Kim, Y. (2009). A study on the connective endings functioning as final endings in Korean spoken language. *Korean Semantics*, 28, 49–71.
- Standard Korean Language Dictionary. (2008, October 8). The National Institute of the Korean Language Retrieved January 5, 2009, from http://www.korean.go.kr/08_new/index.jsp.
- Starks, D., & McRobbie-Utasi, Z. (2001). Collecting sociolinguistic data: Some typical and some not so typical approaches. *New Zealand Sociology*, 16(1), 79–92.
- Stevens, K., & House, A. (1963). Perturbation of vowel articulations by consonantal context: An acoustical study. *Journal of Speech and Hearing Research*, 6, 111–128.
- Strange, W., Weber, A., Levy, E., Shafiro, V., Hisagi, M., & Nishi, K. (2007). Acoustic variability within and across German, French, and American English vowels: Phonetic context effects. *Journal of the Acoustical Society of America*, 122, 1111–1129.
- Thelander, M. (1982). A qualitative approach to the quantitative data of speech variation. In S. Romaine (Ed.), *Sociolinguistic variation in speech communities*

- (pp. 65–83). London: Edward Arnold.
- Thomas, E., Kendall, T., Yeager-Dror, M., & Kretzschmar, W. (2007). *Two things sociolinguists should know: Software packages for vowel normalization, and accessing linguistic atlas data*. Workshop at New Ways of Analyzing Variation (NWAV) 36, University of Pennsylvania, Philadelphia.
- Thorne, B. (1993). *Gender play: Girls and boys in school*. New Brunswick, NJ: Rutgers University Press.
- Trudgill, P. (1974). *The social differentiation of English in Norwich*. Cambridge: Cambridge University Press.
- Trudgill, P. (1981). Linguistic accommodation: Sociolinguistic observations on a sociopsychological theory. In D. S. Masek, R. A. Hendrik, & M. F. Miller (Eds.), *Papers from the parasession on language and behavior* (pp. 218–237). Englewood Cliffs, NJ: Prentis Hall.
- Wardhaugh, R. (2010). *An introduction to sociolinguistics*. Malden, MA: Blackwell.
- White, L., & Genesee, F. (1996). How native is near-native? The issue of ultimate attainment in adult second language acquisition. *Second Language Research*, 12, 238–265.
- Wightman, C. W., Shattuck-Hufnagel, S., Ostendorf, M., & Price, P. J. (1992). Segmental durations in the vicinity of prosodic phrase boundaries. *Journal of the Acoustical Society of America*, 91, 1707–1717.
- Wilson, I. (2007). The effects of post-velar consonants on vowels in Nuuchahnulth: Auditory, acoustic and articulatory evidence. *The Canadian Journal of Linguistics*, 52, 43–70.
- Wodak, D. (1997). *Gender and discourse*. London: Sage.
- Yeon, J. (2012). Korean dialects: A general survey. In N. Tranter (Ed.), *The languages of Japan and Korea* (pp. 168–185). New York: Routledge.
- Yi, S. (2013). *Vowel raising in Seoul Korean*. Paper presented at the Department of East Asian Languages and Literatures Talk Series, University of Hawai‘i, April 2013.
- Yoo, H. (2003). The study on the functional shift of endings from connective to final. *Hangul*, 261, 123–148.

Zhang, Q. (2005). A Chinese yuppie in Beijing: Phonological variation and the construction of a new professional identity. *Language in Society*, 34(3), 431–466.