The Syntax-Phonology Interface in Native and Near-Native Korean

The Harvard community has made this article openly available. Please share how this access benefits you. Your story matters.

<table>
<thead>
<tr>
<th>Citation</th>
<th>Bae, Sun Hee. 2015. The Syntax-Phonology Interface in Native and Near-Native Korean. Doctoral dissertation, Harvard University, Graduate School of Arts &amp; Sciences.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citable link</td>
<td><a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:23845482">http://nrs.harvard.edu/urn-3:HUL.InstRepos:23845482</a></td>
</tr>
<tr>
<td>Terms of Use</td>
<td>This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <a href="http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA">http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA</a></td>
</tr>
</tbody>
</table>
The Syntax-Phonology Interface in Native and Near.Native Korean

A dissertation presented

by

Sun Hee Bae

to

The Department of Linguistics

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

in the subject of

Linguistics

Harvard University

Cambridge, Massachusetts

September 2015
© 2015 Sun Hee Bae

All rights reserved.
The Syntax-Phonology Interface in Native and Near-Native Korean

Abstract

In this thesis, two types of non-native speakers are examined to advance our understanding of the language faculty. Filling a gap in literature, a production study of heritage language speakers of Korean and a comprehension study of heritage and non-heritage language speakers of Korean and of English for phenomena at the syntax-phonology interface are conducted.

In the production study, narrative data collected from American heritage language speakers of Korean from the lower end to the higher end of the proficiency spectrum are examined for error analysis. Various tactics are used in dealing with unfamiliar vocabulary (extending their morphological knowledge of Korean and/or English, circumlocution, asking for the corresponding vocabulary in English, code-switching between Korean and English, and literal translations from English); sentence connections are less than fluent; sentence-level errors are observed with honorifics and with inanimate subjects, along with morpho-syntactic errors concerning misuse of particles (locaives and passives/causatives). Even at the lower-proficiency level, few difficulties in the realm of syntax-phonology interface, or prosody, are observed, motivating the next study.

The comprehension study investigates the issues in the context of prosody and information structure. Information structure in Korean is surveyed, with a proposal laying out the environment in which the otherwise optional case and information-structural particles are
mandatory, based on recoverability. A series of listening experiments with seven-point acceptability rating scores as the dependent variable are conducted to answer the following questions about language spoken by non-native speakers: (i) Do non-heritage and heritage learners acquire prosodic information conveying information structure? (ans heritage: yes, non-heritage: no), (ii) Does Sorace & Filiaci's (2006) Interface Hypothesis, which proposes that phenomena involving the interface of syntax and other areas (pragmatics) are less likely to be learned for very advanced learners, extend to the syntax-phonology interface? (ans no).

The current study demonstrates how heritage language study may contribute to our understanding of the language faculty that other types of acquisition studies cannot.
# Table of Contents

Acknowledgments ........................................................................................................................ vii

Glossary of Abbreviations ........................................................................................................... viii

1. **Introduction** ............................................................................................................................ 1
   1.1 Language learners at both ends of the proficiency spectrum ........................................... 2
   1.2 The syntax-phonology interface in language learning ...................................................... 3
   1.3 The Korean language ........................................................................................................ 4
   1.4 Second Language Acquisition (SLA) ............................................................................. 5
   1.5 Dissertation goals and structure ..................................................................................... 7

2. **Non-native speakers of Korean** ............................................................................................ 10
   2.1 Non-heritage learners ...................................................................................................... 11
   2.2 Heritage speakers ........................................................................................................... 11

3. **Production of narratives** .................................................................................................... 14
   3.1 Method ............................................................................................................................ 16
      3.1.1 Participants ......................................................................................................... 16
      3.1.2 Materials ............................................................................................................ 18
      3.1.3 Procedure ........................................................................................................... 20
   3.2 Error Analysis ................................................................................................................ 21
      3.2.1 Dealing with unfamiliar vocabulary ..................................................................... 21
      3.2.2 Connecting sentences ......................................................................................... 28
      3.2.3 Sentence level ..................................................................................................... 32
      3.2.4 Misusing particles ............................................................................................... 35
   3.3 Discussion ....................................................................................................................... 49
4. Comprehension of prosodic cues in information structure................................. 51
   4.1 Contrastive focus in English........................................................................... 53
      4.1.1 Experiment 1: Contrastive focus in English............................................ 54
   4.2 Information structure of Korean...................................................................... 65
      4.2.1 Topic ...................................................................................................... 65
      4.2.2 Contrastive focus.................................................................................... 71
      4.2.3 Omission of particles and recoverability.................................................. 74
      4.2.4 Experiment 2: Contrastive focus in Korean............................................. 77
   4.3 Indefinites and \textit{wh}-words in Korean.......................................................... 94
      4.3.1 Experiment 3: Indefinites and \textit{wh}-words in Korean.............................. 98
   4.4 Summary of Experiments 1, 2, and 3............................................................... 111

5. Conclusion ............................................................................................................. 112

References.................................................................................................................. 114

Appendix A. Stimuli for the experiments ................................................................. 130

Appendix B. Summaries of the linear mixed model fit............................................. 137
Acknowledgments

I owe a debt of gratitude to Maria Polinsky, C.-T. James Huang, and Michael Kenstowicz, who were kind enough to serve on the dissertation committee. Masha has given me constant support and guidance with lots of patience throughout my graduate life; Jim has been a fatherly figure whose advice and insights have always been inspirational; and Michael was generous enough to read and comment on multiple versions of the draft, which has substantially improved my thesis. I am incredibly lucky and honored to have had them on the committee.

Outside of the committee, I especially thank Lilith Haynes for leading me through the CI-TESOL program and Daniel Donoghue for sitting with me every week to discuss the history of the English language. Special thanks to Adam Albright, Michael Becker, Youngjoon Jang, Sun-Ah Jun, Susumu Kuno, Oksana Laleko, Ju Eun Lee, Shigeru Miyagawa, Andrew Nevins, and Kevin Ryan for allowing me to engage in fruitful linguistic discussions with them. I am also grateful to Eunjin Oh, Hye-Won Choi, and Sung-Hyuk Park at Ewha Womans University for introducing me to the world of linguistics and preparing me for a successful graduate school life.

Friends and colleagues at the Linguistics at Harvard also deserve appreciation. I would especially like to mention Dorothy Ahn, Gasper Begus, Jelena Borise, Laurence B-Violette, Yujing Huang, Sverre Johnsen, Jenny Lee, Daphne Liao, Louis Liu, Marek Majer, Hiroki Narita, Edwin Tsai, and Yimei Xiang.

This project would not have been possible without the financial support from the National Heritage Language Resource Center (NHLRC) and the help of the following individuals: Soomi Hong and Kangil Ji, who assisted with narrative transcriptions; Naomi Levin, Nicholas Longenbaugh, Janine May, Jin Kyoung Hwang, Sungwhan Moon, and Uh Young Park, who normalized the stimuli; Matt Clemens, Kangwon Heo, Moosung Sohn, and Elaine Stranahan, who were the voices of the listening experiments; and all the participants.

Last but not least, I thank my parents and family members for always being there for me.
## Glossary of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC</td>
<td>Accusative case marker</td>
<td>-(lu)l</td>
</tr>
<tr>
<td>ADN</td>
<td>Adnominal modifier suffix</td>
<td>-(nu)n</td>
</tr>
<tr>
<td>ADV</td>
<td>Adverbial suffix</td>
<td>-i</td>
</tr>
<tr>
<td>CAUS</td>
<td>Causative particle</td>
<td>-ttuli-</td>
</tr>
<tr>
<td>CT</td>
<td>Contrastive topic marker</td>
<td>-(nu)n</td>
</tr>
<tr>
<td>DAT</td>
<td>Dative case marker</td>
<td>-hantey</td>
</tr>
<tr>
<td>INF</td>
<td>Infinitive suffix</td>
<td>-a, -e</td>
</tr>
<tr>
<td>IND</td>
<td>Indicative mood suffix</td>
<td>-nun, -(u)n</td>
</tr>
<tr>
<td>LOC</td>
<td>Locative case marker</td>
<td>-ey(se)</td>
</tr>
<tr>
<td>NOM</td>
<td>Nominative case marker</td>
<td>-i, -ka</td>
</tr>
<tr>
<td>N</td>
<td>Nominalizer suffix</td>
<td>-ci, -ko</td>
</tr>
<tr>
<td>PASS</td>
<td>Passive particle</td>
<td>-i-, -hi-, -li-, -ki-</td>
</tr>
<tr>
<td>PL</td>
<td>Plural marker</td>
<td>-tul</td>
</tr>
<tr>
<td>POL</td>
<td>Polite speech level ending</td>
<td>-e.yo</td>
</tr>
<tr>
<td>PST</td>
<td>Past tense and perfect aspect particle</td>
<td>-ess-</td>
</tr>
<tr>
<td>TOP</td>
<td>Topic marker</td>
<td>-(nu)n</td>
</tr>
</tbody>
</table>
1. **Introduction**

In the realm of cognition, one of the things that makes human beings different from other species is linguistic creativity. Although some animals use sounds, movements, or other means to communicate with each other, only humans are creative with symbols, or language (Fry, 1977; Kosslyn & Osherson, 1995; Hauser, Chomsky, & Fitch, 2002). Language is a tool for thinking in the Piagetian school of thought. However, for Vygotsky, not only is language a tool to approach other people’s knowledge, but it is also a cognitive tool for solving problems and thinking about the world. It also provides a way of controlling and revealing thoughts. In other words, the use of language can be a measurement of one’s cognitive ability (Johnson, 2004).

The Cognitive tradition set in motion by Chomsky’s arguments about the language acquisition device (LAD) (1965; 1980; 1981) which made their way through theoretical linguists suggested that every human being is born equipped with Universal Grammar, and that exposure to a language permits every child to set parameters for the language. Based on this conception of language acquisition, Chomsky developed Transformational-Generative grammar (Chomsky, 1965; Radford, 1988), Government and Binding Theory (Chomsky, 1981; Haegeman, 1991), and the Minimalist Program (Chomsky, 1995).

Contemporary research in theoretical linguistics, such as phonetics/phonology, morphology, syntax, semantics, and the interfaces thereof, has come a long way towards unraveling the language systems. As language is a pivotal part of human communication, it pervades countless aspects of human life. Accordingly, it has engendered much research in related fields, such as applied linguistics, clinical linguistics, computational linguistics, and forensic linguistics, to name only a few. As research advanced, more topics at the boundaries of its subfields have been explored, followed by research on interdisciplinary fields in attempts to better understand how language works in the language faculty.
The current thesis is an interdisciplinary research project exploring linguistic phenomena at the syntax-phonology interface of non-native speakers, with the implications, hopefully, reaching not only theoretical linguistics but also applied linguistics. The remainder of this introductory chapter provides background and motivations for the research and outlines the goals and structure of the thesis.

1.1 Language learners at both ends of the proficiency spectrum

In contrast to native speakers, who exhibit complete acquisition of the grammar of their language, non-native learners are known to "typically exhibit persistent signs of non-target-like acquisition in phonetics, phonology, inflectional morphology, semantics, syntax, and discourse/pragmatics" (Benmamoun, Montrul, & Polinsky, 2013, p. 130).

Polinsky & Kagan (2007), in their study of heritage language learning, state that heritage language learners exhibit great variation among themselves. However, they can be placed in a proficiency continuum based on the non-native speaker's distance from the baseline group--the native speakers of the language.

They also affirmed that not all phenomena are of equal difficulty to them. One type of phenomena may be learned at an early stage of acquisition, while another type may be learned only after the native-like mastery of the language (Polinsky & Kagan, 2007), which is in line with Brown (1973) and Dulay & Burt (1975)'s speculation that there is a "fairly stable order of acquisition of structures in language acquisition, that is, one can see clear similarities across acquirers as to which structures tend to be acquired early and which tend to be acquired late (as cited in Krashen, 1981, p. 1-2). In fact, "researchers have noticed intriguing parallels among typologically dissimilar languages with respect to aspects of linguistic knowledge that present systematic challenges in heritage language development" (Laleko & Polinsky, 2013, p.2).
Therefore, it is important to identify which types are learned by the low-proficiency speakers, and which are less likely to be learned by the high-proficiency speakers.

Documentations reveal that heritage speakers, especially at lower proficiency, have been observed to have difficulties with "lexical retrieval, the use of code-switching to fill lexical gaps, divergent pronunciation, morphological errors, avoidance of certain structures, and overuse of other structures due to transfer from the dominant language" (Benmamoun, Montrul, & Polinsky, 2013, p. 132). Language learners at the margins of the proficiency spectrum are especially of interest. Much less has been said about such heritage speakers -- those with near-native-like mastery of the language, and those with a more passive (receptive) knowledge of the language.

Chapter 3 identifies and examines recurring features of heritage learners near the lower margin of the proficiency continuum who can barely speak the language (without a working knowledge of writing), while Chapter 4 examines phenomena at the syntax-phonology interface, deemed to be less likely to be learned by even the advanced language learners. In the process, Sorace & Filiaci's (2006) Interface Hypothesis, which states that phenomena involving syntax and another domain is less likely to be acquired by even the advanced learners of the language, will be examined to verify whether their hypothesis may include phenomena at the interface of syntax and phonology. In addition, a novel hypothesis assuming that heritage language speakers exhibit an advantage for phenomena at the syntax-phonology interface is tested.

## 1.2 The syntax-phonology interface in language learning

It is not hard to find people who distrust the scores on standardized tests, because high scores in these tests do not necessarily translate into mastery of the language. What induces this discrepancy between high test scores and practical communication skills?

Many Korean learners of English as a second language (ESLs), for instance, face difficulty communicating with native speakers of English, even if they receive high scores on
standardized tests, such as the Test of English for International Communication (TOEIC) or the Test of English as a Foreign Language (TOEFL), both of which are widely used as means of demonstrating one's proficiency in English to their potential employers or schools. What is missing from these tests that affects communicative skills?

There has been some research to relate aspects of phonological phenomena to syntactic information. Gussenhoven & Jacobs' (1998) examples demonstrate that syntactic information is sometimes revealed by phonology (the examples are further discussed in Chapter 3, (53)). According to Kenstowicz & Kisseberth (1977), syntactic information may be conveyed by accent patterns; King (1970) and Selkirk (1972) resorted to syntactic conditions to explain disallowance of weak phonetic forms in English (\textit{I know where it is} but \textit{I know where it's}); and Lightfoot (1976) used syntactic conditions to explain environments in which contraction of the infinitival marker was disallowed (\textit{Who do you wanna see?} but \textit{Who do you wanna see this memo?}) (as cited by Pullum & Zwicky, 1988).

However, not much focus has been placed on the acquisition of the syntax-phonology interface by non-native speakers of the language. While language acquisition and testing have focused on syntax, morphology, and vocabulary, prosody--which plays a crucial role in oral communication--has not received much attention in language acquisition or testing. One of the main goals of this thesis is to bring attention to the syntax-phonology interface in non-native speakers of the language, an area of research that has not be explored by others so far.

1.3 The Korean language

In an attempt to study language learners towards the margins of the proficiency spectrum, the Korean language was chosen as the research domain to study low-proficiency heritage
speakers and to study the syntax-phonology interface, which is most likely related to acquisition at the upper end of the proficiency spectrum.

First, the Korean language is ideal in studying heritage speakers towards the lower margin of the proficiency spectrum. There is previous research on the written error analysis of Korean (Lee, Jang, & Seo, 2009), with a written corpus of heritage language learners of the language; but no error analysis of spoken Korean, which is much needed for the study of low-proficiency heritage speakers, is available. The readily available population of heritage speakers of Korean, especially at the lower end of the proficiency spectrum, only reinforces the choice of research language. The lack of current research on spoken learner corpora of Korean makes the Korean language a suitable option for the study of low-proficiency heritage speakers, which necessarily required oral data.

Second, the Korean language exhibits phenomena involving the syntax-phonology interface: information structure embodied in particles and in prosody, and different types of nouns (wh-words and indefinites) being distinguished by accompanying prosodic patterns of the sentence containing it. The availability of both heritage and non-heritage learners of the Korean language was also an appeal, as performances for phenomena deemed to be acquired at a later stage of acquisition could be compared between different groups of non-native speakers of Korean. The existence of phenomena at the syntax-phonology interface made Korean an ideal language of research to study high-proficiency non-native speakers of the language.

1.4 Second Language Acquisition (SLA)

In order to understand the implications of this study for Second Language Acquisition (SLA), it is necessary to understand how research on linguistics proper relates with SLA.

In the history of SLA theories, there had been two streams of thought in the behaviorist tradition—Contrastive Analysis and Error Analysis. The Contrastive Analysis hypothesis,
especially in its weak version, compares the learner’s errors with the learner’s native language.

On the other hand, the Error Analysis hypothesis compares the learner’s errors with the target language. Until today, numerous papers have discussed interlingual errors to study aspects of grammar that transfer from one's native language (L1) to his or her second language (L2).

Intralingual errors of second language learners have also been at the center of research, serving as a basis for evaluating a non-native learner's distance from the target language on a continuum of proficiency levels and as a tool of research for pinpointing recurring areas of difficulty faced by certain proficiency levels (Polinsky & Kagan, 2007).

While these two types of analyses may seem outmoded, it is still very important to identify and distinguish these two types of errors. Not only do they give information about individual languages and language system in general, these types of analyses have implications for language practitioners and language learners.

For a long time in the field of SLA, there has been a uni-directional flow of information from theoreticians to practitioners, and from practitioners to students in the classrooms. Researchers often did not communicate with teachers, and teachers did not take into account what students had to say about their own learning. Johnson (2004) criticized this one-directional flow of information and emphasized researchers' and teachers' collaboration and students' involvement in SLA theory-building.

One such influence of researchers' and practitioners' collaboration is the segregation of non-heritage learners of the language and heritage learners of the language, a type of non-native speaker of the target language who was raised in a home environment where the target language is spoken. The emergence of heritage language acquisition and ensuing findings about the different types of advantages heritage language learners have over non-heritage learners and about the areas of difficulties in grammar heritage learners face compared to non-heritage language learners has motivated this segregation. Nowadays, more and more university-level language courses divide traditional second language classes into heritage and non-heritage tracks,
often disallowing heritage students from taking the non-heritage track, and vice versa. This movement in SLA classrooms was triggered by recent developments in research on heritage language acquisition that demonstrated many differences between the acquisition by heritage and non-heritage speakers of the language.

In addition, the previously mentioned Contrastive Analysis and Error analysis may also be applied to the abovementioned different tracks. While interlingual errors may be focused on when a classroom consists of students who share the native language, common intralingual errors made by heritage (or non-heritage) learners may be dealt with in a heritage (or non-heritage) track course.

The Error Analysis technique is used in Chapter 3, in order to learn more about low-level heritage speakers of Korean, who are often receptive learners, passive learners, or overhearers of the language, and can only produce oral speech. And to be able to interpret the findings within the larger context of second language acquisition environments, the scope of investigation is broadened in Chapter 4 to include non-heritage learners of the language, in addition to heritage learners.

1.5 Dissertation goals and structure

With copious research on second language acquisition and emerging research on its subfield, heritage language acquisition, the current dissertation aims at investigating the area of research that has remained as a gap in the field—production data from heritage speakers near the lower margin of the proficiency spectrum, and comprehension data on phenomena at the syntax-phonology interface. This study investigates the I(nternalized)-language of non-native speakers of Korean through study of their E(xternalized)-language, in the sense of Chomsky (1986).

In order to achieve the goal, oral data of heritage speakers of a wide range of proficiency levels were collected, followed by an error analysis of heritage speakers, focusing on those near
both edges of the proficiency spectrum--speakers near the lower margin of the proficiency continuum who can barely speak the language, and speakers near the higher margin of the proficiency continuum who exhibit near-native-like mastery of the language. Then, three listening experiments involving phenomena at the syntax-phonology interface were conducted and analyzed to evaluate the acquisition of syntax-phonology interface by two types of non-native speakers of the language (heritage and non-heritage). Korean was chosen as the language of research, as there was a gap in the research on spoken learner corpora in the study of heritage Korean, and on syntax-phonology interface phenomena in non-native speakers of the language.

On the theoretical plane, I hope the results will help us understand more about language overhearers and non-native language acquisition of the syntax-phonology interface. As the topic of research is interdisciplinary in nature, I hope this research on non-native language acquisition will be useful to language practitioners, in application to language teaching.

In sum, the goal of this dissertation is to better understand non-native language acquisition on both ends of the proficiency spectrum, while investigating phenomena at the syntax-phonology interface, which is predicted to be an area of difficulty even for advanced learners of the language if Sorace & Filiaci's (2006) Interface Hypothesis were to be applied/extended to the syntax-phonology interface. The dissertation aims at answering the following questions:

- What are the areas of difficulty faced by heritage learners at the lower and higher ends of the proficiency spectrum?
- Does Sorace & Filiaci's (2006) Interface Hypothesis, which proposes that phenomena involving the interface of syntax and other areas (pragmatics) are less likely to be learned for near-native speakers, also apply/extend to the acquisition of phenomena involving syntax-phonology interface in heritage and non-heritage learners?
Do heritage language speakers exhibit an advantage for phenomena at the syntax-phonology interface? If so, to what extent?

The rest of the thesis is structured as follows. Chapter 2 provides an overview of non-native speakers of Korean, with a distinction between heritage and non-heritage learners of the language. Chapter 3 explores common production errors in narratives produced by heritage speakers of Korean at a wide range of proficiency levels, focusing on morpho-syntactic errors. Chapter 4 examines comprehension data for phenomena at the syntax-phonology interface to (i) test the hypothesis that heritage language speakers exhibit an advantage, often reaching a native-like mastery, for phenomena at the syntax-phonology interface compared to level-matched non-heritage language learners, and (ii) verify whether Sorace & Filiaci's IH holds at the syntax-phonology interface in heritage and non-heritage learners of the language. Finally, Chapter 5 concludes and presents outstanding questions.

Korean expressions are transliterated in the Yale system of Romanization.
2. Non-native speakers of Korean

Since as early as Corder (1967), modern linguists have studied language learners' errors, be they in the domain of phonology, morphology, semantics, syntax, or pragmatics, and have tried to characterize their nature with theories. They have been concerned with discovering and generalizing the regularities of a specific language or language in general. Attention to the study of non-native speakers' errors has been reserved for applied linguists, who build theories on how to overcome the obstacles language learners encounter. Recently, linguists have also shifted their attention to non-native learners' acquisition in an effort to understand the language faculty, as “shifting linguistic attention from the model of a monolingual speaker to the model of a multilingual speaker is important for the advancement of our understanding of the language faculty” (Benmamoun, Montrul, & Polinsky, 2013, p. 129). In a world with an “ideal speaker-listener, in a completely homogeneous speech-community, who knows its language perfectly” (Chomsky, 1965, p. 3), a study of monolinguals would suffice, but in an environment of countless bilingual speakers, especially in the USA, a linguistic model needs to include them in order to ensure the reliability of the findings that have been established with the baseline (native) speakers.

Traditionally, the study of language acquisition has been divided into first language acquisition, which studies the process of native language acquisition in infants, and second language acquisition, concerning acquisition of additional languages by children and adults. Recently, linguistic study of heritage speakers has emerged as a subfield, due to their distinct behavior--they share some characteristics with first language acquisition, others with second language acquisition, and sometimes with neither. This section provides background on non-native speakers of Korean, both heritage and non-heritage learners.
2.1 Non-heritage learners

Non-heritage learners of Korean are learners of Korean who do not bear Korean linguistic heritage, i.e. who are not raised in a home environment in which Korean is spoken, although they may be heritage language speakers of other languages. For a long time, non-heritage learners were the main population for research on second language acquisition, on which it is not surprising to find copious literature. Much research has been conducted on the types of difficulty encountered by the learners of the Korean language, covering a wide range of topics from phonetics (fricatives (Cheon, 2005)), semantics (negative polarity items (Song, 2004)), morphology (plural marking systems (Shin & Lesley, 1999) and particles and verbal inflectional morphology (Hwang J., 2002)), syntax (relative clauses (O’Grady, Lee, & Choo, 2003; Gass & Lee, 2007), progressive verbs (Jeon S., 2011), inchoative verbs with -e cita (Kim, Lee, & Lee, 2011)), to the syntax-pragmatics interface (nominal reference (Shin K. S., 2008)).

2.2 Heritage speakers

The most widely used definition of a heritage speaker is the one suggested by Valdes (2000): a person “raised in a home where a non-English language is spoken, who speaks or merely understands the heritage language, and who is to some degree bilingual in English and the heritage language” (as cited in Benmamoun, Montrul, & Polinsky, 2013).

According to Fishman (2001), there are three types of heritage languages in the US. Immigrant heritage languages are languages spoken by immigrants arriving in the US (e.g. Spanish and Korean), indigenous heritage languages are spoken by Native Americans, or American Indians (e.g. Navajo), and colonial heritage languages are languages of the European groups that first colonized the land (e.g. Spanish, Dutch, German, and Swedish), the latter of which may overlap with the first type. Heritage speakers are a common phenomenon in the US,
with a little over 20% of the US population speaking a language other than English at home in 2011, according to the United States Census Bureau (US Census Bureau, 2014).

Among the population speaking a language other than English at home, or a heritage language, those speaking heritage Korean has grown by 327% from 1980 to 2010, following Vietnamese (599%), Russian (394%), and Chinese (345%) (US Census Bureau, 2014). Heritage Korean, considered an immigrant heritage language, is spoken by second generation decedents of Korean immigrants in the US, or who are more commonly described as Korean Americans. Having cultural connections to the language, heritage speakers are distinguished from "foreign" language learners. These speakers grew up hearing (and possibly speaking) the language at home but as an adult, are more comfortable in the predominant language of the society, i.e. English. For the most part without formal education in Korean, they have conversation skills in these languages, often a limited one, acquired by communication with other family members at home. The communication is predominantly bi-directional, but it is not unusual to find heritage language speakers who use English to respond to their parents speaking in Korean (receptive acquisition).

What we call heritage speakers is a largely heterogeneous group: their source dialects, as well as their levels and stages of acquisition, differ. Heritage speakers of the Korean language embrace a broad range of population. As a heritage language is a tie to the heritage culture, many Korean immigrant families promote communication through the Korean language at home, offering a bilingual environment to their children, who receive formal education in English. Other immigrant parents decide to raise their children in a monolingual environment, believing that they can blend into the American society more easily by doing so (Jeon, 2008). In either case, heritage language speakers oftentimes do not maintain their Korean language skills to a fluent level.

There have been many studies explaining the attributes of linguistic deficits exhibited by heritage language speakers as a separate population from non-heritage language learners. The
topics of research include reading ability (Bae J., 2006), the effect of hearing of the language during childhood with a good accent (Au & Oh, 2009), binding and the interpretation of the Korean reflexive *caki* (Kim, Montrul, & Yoon, 2009; Kim, Montrul, & Yoon, 2010), Negative Polarity Items (Kim S.-J., 2012), case-ellipsis (Chung, 2013), and reanalysis of the VOT distinction of consonants as F0 values (Kang & Nagy, 2013). As can be seen from the topics, research on heritage Korean has been largely focused on phenomena of phonology, morphology, semantics, and syntax proper. More recently, studies at the syntax-semantics/pragmatics interface have emerged (Laleko & Polinsky, 2013), but phenomena at the syntax-phonology interface have yet to receive much attention.

The current study aims at filling this gap in research on non-native speakers of Korean at the syntax-phonology interface, along with the gap of research on low-proficiency heritage language speakers, contributing to a better understanding of the language faculty.
3. Production of narratives

First language learners go through the following stages of acquisition: beginning with the Period of Prelinguistic Development, continuing to the Period of Single-word Utterances, and the Period of the First Word Combinations, and through the Period of Simple Sentences: Phonological and Semantic Acquisition, finally reaching the Period of Simple Sentences: acquisition of grammatical morphemes (Ingram, 1989).

The pattern is not so different in second language acquisition. A language learner in his or her earliest stage of language development, or during the Preproduction or Silent Period, has minimal comprehension and tries to communicate with body language yet does not verbalize (Krashen, 1985). Afterward, during the Early Production Period, the student has limited comprehension and produces one-or-two-word responses and uses key words and familiar phrases. Then, in the Speech Emergence Period, the language learner has good comprehension but can produce only simple sentences, and makes production errors. When the learner reaches the Intermediate Production/Fluency Period, he or she has excellent comprehension skills but makes a few production errors, after which he or she reaches the Advanced Production/Fluency Period--a near-native level of speech1.

In first language acquisition, listening, speaking, reading, and writing abilities develop at different stages. Typically, listening/speaking skills develop much earlier than reading/writing abilities. A similar pattern is observed in heritage language acquisition, which shares many traits with second language acquisition and first language acquisition. It is not uncommon for heritage language speakers to be able to listen and speak in the target language but not to read or to write in the language (Benmamoun, Montrul, & Polinsky, 2013). Not surprisingly, heritage speakers

---

1 The approximate time frames of each stages of language development have been purposefully not mentioned, as I believe many factors other than the length affect language development.
are known to have more difficulty with reading and writing than with listening and speaking (Peyton, Ranard, & McGinnis, 2001). Furthermore, low-level heritage speakers are likely to understand spoken language but not be able to read or to write. Therefore, despite the value of the written Korean Learner Corpora developed by Lee S.-H. and her colleagues in allowing discovery of the difficulties mid- to high-proficiency non-heritage and heritage learners of the language face, written corpora fall short on revealing much about low-proficiency heritage speakers who cannot read or write.

Investigations of heritage languages, with the exception of studies in the domain of phonetics/phonology, have largely relied on reading/writing tasks, missing an opportunity to examine the linguistic competence of low-level heritage learners who are likely not to be able to easily read or write the language. In order to supplement the written Korean Learner Corpora and to fill the gap of study of errors made by low-proficiency heritage speakers, the current study elicited oral narratives from heritage speakers of all levels. Representative of spontaneous speech, oral narratives provide insights into the difficulties low-proficiency heritage speakers encounter.

Before discussing the details of the narrative elicitation and its error analysis, a distinction between “errors” and “mistakes” needs to be made. “Errors” involve linguistic competence, while “mistakes” involve linguistic performance (Corder, 1981). In the current analysis of errors, the notion “error” is used in a loose manner, to include “mistakes” along with the above-mentioned “errors”. The cover-term “error” will be employed throughout this study, since weeding out “mistakes” from true “errors” would be a difficult, if not impossible, task without a further study involving comprehension tasks.
3.1 Method

3.1.1 Participants

We recruited Heritage Korean speakers for our production experiment by circulating advertisements on the bulletin boards on campus at Harvard University in Cambridge, Massachusetts and to the mailing list of the Harvard Korean Association. Individuals aged 18 to 35 whose parent(s) spoke the Korean language at home, especially those who knew how to speak basic (but not fluent) Korean, were targeted. Those who were interested in participation signed up via the web by providing their background information in a survey, and subsequently visited the Harvard Language Sciences Lab in order to have their narratives recorded. The participants received compensation for their time and effort. Demographic information of the Heritage Korean subjects is provided in Table 1, with each individual coded as a two-digit number assigned during the sign-up process.

<table>
<thead>
<tr>
<th>Code</th>
<th>Gender</th>
<th>Age (yrs)</th>
<th>US Arrival (yrs)</th>
<th>L Input by Parents</th>
<th>Reply to Parents</th>
<th>L Among Siblings</th>
<th>Self Assessment of Korean</th>
<th>Level by Speech Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>M</td>
<td>20</td>
<td>2</td>
<td>Kor.</td>
<td>Kor.</td>
<td>--</td>
<td>Native-like</td>
<td>High</td>
</tr>
<tr>
<td>17</td>
<td>M</td>
<td>19</td>
<td>0</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Native-like</td>
<td>High</td>
</tr>
<tr>
<td>01</td>
<td>F</td>
<td>21</td>
<td>10</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Native-like</td>
<td>High</td>
</tr>
<tr>
<td>15</td>
<td>F</td>
<td>19</td>
<td>7</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng./Kor.</td>
<td>Native-like</td>
<td>High</td>
</tr>
<tr>
<td>19</td>
<td>F</td>
<td>18</td>
<td>9</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Native-like</td>
<td>High</td>
</tr>
<tr>
<td>02</td>
<td>F</td>
<td>21</td>
<td>9</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Little difficulty</td>
<td>High</td>
</tr>
<tr>
<td>05</td>
<td>F</td>
<td>18</td>
<td>6</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng./Kor.</td>
<td>Little difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>14</td>
<td>M</td>
<td>18</td>
<td>10</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Little difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>07</td>
<td>F</td>
<td>20</td>
<td>7</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Little difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>16</td>
<td>F</td>
<td>18</td>
<td>0</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Eng.</td>
<td>Little difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>24</td>
<td>M</td>
<td>25</td>
<td>0</td>
<td>Eng.</td>
<td>Eng.</td>
<td>--</td>
<td>Some difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>04</td>
<td>F</td>
<td>21</td>
<td>0</td>
<td>Kor.</td>
<td>Kor.</td>
<td>Eng.</td>
<td>Some difficulty</td>
<td>Mid</td>
</tr>
<tr>
<td>09</td>
<td>F</td>
<td>21</td>
<td>2</td>
<td>Kor.</td>
<td>Eng.</td>
<td>--</td>
<td>Some difficulty</td>
<td>Low</td>
</tr>
<tr>
<td>18</td>
<td>F</td>
<td>17</td>
<td>0</td>
<td>Eng.</td>
<td>Eng.</td>
<td>Eng.</td>
<td>Some difficulty</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 1. Demographic information of Heritage Korean participants

Fourteen Heritage Korean speakers in total, ten female and four male, participated in the production experiment. The ages of the participants ranged from 17 to 25, with the mean age of
19.71 years (SD=2.05). Nine of the participants moved to the US after they were born in Korea, in which case the ages of arrival in the US were recorded. The five remaining participants were born in the US (marked as arrived in the US as 0 year-olds). Two subjects indicated that their parents spoke to them in English, to which they mainly responded in the same language; the rest expressed that their parents spoke to them in Korean, of which two replied to their parents in a different language, i.e. English. Hence, ten out of 14 participants communicated with their parents mainly in Korean. Among the 14 participants, 11 subjects had siblings: two subjects indicated that they communicated with their siblings in Korean; two subjects indicated that the selection between English and Korean depended on which language the other siblings were comfortable with (for example, the participant communicated with the older sibling in Korean but in English with the younger sibling who mainly speaks English); and the remaining seven subjects indicated that they communicated with their siblings in English. In reply to a question requesting the subjects to assess their own knowledge and use of Korean, five speakers indicated that they understood and spoke Korean fluently like a native speaker, five speakers marked that they understood and spoke Korean comfortably with little difficulty, and four speakers expressed that they understood and spoke Korean but with some difficulty.

Although self-assessment questions were included in the questionnaire, speech rates were obtained post-interview as a simple, objective, criterion to compare the proficiency among the participants and to categorize the speakers into different levels (Polinsky & Kagan, 2007). The speech rates were measured by counting the number of “words” uttered per minute, excluding filled pauses (e.g. e@fp), false starts (e.g. &koyang), and filler words (e.g. <kunyang> ‘just’).

2 A 17-year-old participant was included in the study with the written permission of her parent.
3 The “words” were counted using the Microsoft Office Word’s Word Count function, which actually counted the number of ecel ‘lit. word phrase’ in Korean. Being an agglutinative language, the Korean language inserts a space or punctuation marks after an ecel ‘lit. word phrase’ instead of a word. (For example, the sentence Celswu-nun hakkyo-ey ka-n-ta ‘Chelswu goes to school’ consists of five words: Celswu ‘Chelswu’, -nun ‘topic marker’, hakkyo ‘school’, -ey ‘locative particle’, and ka-n-ta ‘go-indicative-declarative’. However, this sentence contains three ecels: Celswu-nun, hakkyo-ey, and ka-n-ta.). For convenience, the number of ecel was counted.
Counting started from the onset of the first meaningful word in the narration of one of the clips (the Dooly clip with the vacuum cleaner episode). Speakers were categorized into High (n=6), Mid (n=6), and Low (n=2) groups according to their speech rates, which ranged from 25 to 100 words/minute. When the subjects’ speech rates were plotted on a scatter graph, a natural split was observed between the two lowest numbers (both 25 words/minute) and the rest (the lowest speech rate being 49 words/minute), hence the grouping of the Low group. As the speech rate of the slowest speaker in the control group consisting of the native speakers of Korean (n=15) was 71 words/minute, that number served as the cut-off point for the High group.

In addition to the information given in Table 1, it is worth noting that all of the speakers considered English as their most competent language, and Korean as their secondary language. All of the subjects had parents who spoke Korean as their first language and used Korean to communicate with each other, except for one subject (Code 03) whose father’s first language was English (the subject’s parents spoke English to communicate with each other).

3.1.2 Materials

In order to elicit narratives for analysis while holding the semantic referent constant, the display of images was used to prompt the elicitation of narratives. These images lift the weight of imagination for the participants, and provide linguistic data that can be studied through connected speech (Pavlenko, 2008). Since Berman & Slobin’s (1994) cross-linguistic study, many narrative elicitation studies, including Reilly, Losh, Bellugi, & Wulfeck's (2004) study, have involved display of the illustrations of the wordless book, *Frog, Where Are You?* (Mayer, 1969). The current study, however, chose four video clips from cartoons popular in Korean culture (two from Dooly the Little Dinosaur, one from Ppororo the Little Penguin, and one from Tom and Jerry) to elicit narratives, utilizing material familiar to the participants while evoking their cultural heritage.

---

4 The mean speech rate for the High group was 86 words/minute (SD=8.74), the Mid group 57 words/minute (SD=7.61), and the Low group 25 words/minute. Cf. The mean speech rate for the native speakers of Korean (n=15) was 91 words/minute (SD=18.06).
The selected video clips involved numerous events that were carefully chosen to elicit the narrative. The summaries of each of the four clips used for elicitation of the narratives are provided in Table 2.

<table>
<thead>
<tr>
<th>Title of the cartoon</th>
<th>Length (M:SS)</th>
<th>Summary of the clip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dooly (1)</td>
<td>1:36</td>
<td>A boy, a girl, and Dooly visit a zoo. After watching the boy give snacks to an elephant, Dooly, too, offers a rock to the elephant. Believing it is a snack, the elephant snatches it, and puts it in his mouth. The boy scolds Dooly and gives a cookie to pass on to the elephant. Instead of offering the whole piece to the elephant, Dooly eats most of the cookie for himself and provides the elephant with a crumb. Angry at Dooly, the elephant snatches him into his cage, flings him on the ground, and tries to trample on him. Despite the spectators' worries of Dooly being harmed, Dooly holds the elephant up in the air, spins him around, throws him on the ground, and crosses his legs. The spectators are shocked by Dooly's victory.</td>
</tr>
<tr>
<td>Dooly (2)</td>
<td>1:29</td>
<td>While being dragged around by the vacuum, which is out of control, Dooly, with the vacuum, sucks in the entire backside of Mr. Koh, who is lying on his side watching TV. Taken aback, Mr. Koh finds Dooly sucking in other objects with the vacuum in the bedroom, so he powers off the vacuum. Dooly receives the punishment of standing in the corner with a pillow lifted over his head. Mr. Koh, with new clothes and a cap to cover his shaved head, goes to the living room to have coffee with a guest. In the meantime, Dooly, trying to catch a cockroach, comes out of the bedroom, hits the table with the pillow he was lifting, spilling coffee and snacks. While yelling at Dooly, Mr. Koh's cap falls off, unveiling his awkwardly shaved head. The guest seems bewildered.</td>
</tr>
<tr>
<td>Ppororo</td>
<td>1:29</td>
<td>The scene starts with Ppororo (a penguin) and his friends Eddie (a fox) and Chrong (an alligator) chatting around a table. Ppororo reminisces about a skiing incident, in which he trips on a snow bump while skiing downhill, gets caught by a tree, and is thrown in the air. Despite his effort to land safely by spinning the ski in a propeller-like motion, he gets stuck in the snow, upside down. At that point, Pattie (a female penguin) approaches and puts a band-aid on Ppororo's face. The flashback ends with Ppororo confident that Pattie likes him. However, Chrong, the alligator, disagrees and tells a story about an incident in which he makes a snowman resembling himself, after which Pattie puts a bow tie on the snowman, insisting that it is him that Pattie likes.</td>
</tr>
<tr>
<td>Tom and Jerry</td>
<td>1:35</td>
<td>Jerry the mouse inserts matches in between Tom the cat's toes and lights them up. Tom, playing a piano in efforts to woo a female cat, smells something burning, and realizes that it is his toes that are burning. After putting off the fire, Tom chases Jerry, and falls into a trap set by Jerry. While Jerry is dancing with the female cat, Tom tries to smash him with a dustpan. Jerry escapes and lures Tom to near the window, where he hooks the handle of a blind to Tom's clothes and runs away. After a short chase, Tom feels an external force pulling him, and holds on to a nearby table. Jerry, this time, hits Tom's hands with the dustpan, resulting in the blind rolling away, pulling Tom. After a few dunks into a fishbowl and the sun, Tom's clothes shrink to fit Jerry.</td>
</tr>
</tbody>
</table>

Table 2. Summary of the clips used for elicitation of narratives
The video clips were short enough (each being approximately 90 seconds long) so that the demand of memory load would not act against a coherent storyline or attention to details. The video clips were muted so that the participants would not be affected by the language spoken in the cartoons.

The same clips were used to collect data from Korean monolingual speakers of similar age, which served as the control group.

3.1.3 Procedure

Preceding the narrative elicitation process, each participant was asked to answer the interviewer’s questions on an assortment of topics, ranging from their hobbies and daily life to their attitudes toward Korean. This task was designed to make the subjects feel at ease with using Korean to communicate with the interviewer in the given setting.

Narratives were elicited by showing four animated motion picture clips to the participants. The task was masked as a memory task, requesting the participants to remember as much detail as possible. After watching one of the four short clips of cartoon episodes, the subjects were asked to fully describe what they had seen on the screen: description of the characters and scenes, the sequence of events that had happened in the clip, etc. If the participant had trouble recalling the storyline, the interviewer triggered more speech by asking general (e.g. Do you remember anything else?) and specific (e.g. What did Dooly do to the elephant?) questions deemed appropriate for the particular clip, in the Korean language. If the participant still had trouble recalling what had happened on the screen, he or she was offered an option to watch the clip for a second time. The procedure of watching the clip and describing what happened on the screen was repeated four times, using the four different clips in random order.
3.2 Error Analysis

The current analysis focuses on the syntactic/morphological errors that the heritage speakers of English make. The heritage speakers' production errors identified in the current analysis are by no means exhaustive but represent the most prominent ones. The analysis follows Ming & Tao’s (2008) minimalistic approach, which employs identification of errors “only when there is an obvious deficit” (p. 176), as opposed to identifying something as an error if the change of that element may lead to a more natural sequence to a native speaker of the language.

3.2.1 Dealing with unfamiliar vocabulary

As non-native speakers of the language, heritage speakers are often faced with occasions in which they cannot find the suitable vocabulary that carries the meaning that they intend to convey. In these situations, the speakers resort to diverse strategies. They (over-)generalize the use of a bound morpheme to make up a plausible word, explain the meaning of the word they are trying to say, ask what the heritage language counterpart of a word is in their native language, or simply insert the word of their native language in a sentence produced using the heritage language syntax. Let us look at these kinds of examples in detail.

3.2.1.1 Use of morphemic knowledge

Heritage speakers often resort to their morphemic knowledge to coin a likely word, when they need to use a complex word of which they are not certain. In doing so, they frequently over-generalize the use of a morpheme. As an example, many Heritage Korean speakers struggle to refer to an animal with specification of its gender.
Tom-un  e@fp koyangi # yeça /[/] koyangi yeça#-lul  kkosi-ko  iss-nuntey
Tom-TOP  cat  female  cat  female-ACC  seduce-and  exist-but
‘While Tom was seducing a female cat, …’

… Jerry-nun &koyang koyangi /[/] koyang -nye? [/] koyangi yeça-lang
Jerry-NOM  cat  -woman  cat  female-with
‘Jerry, with the female cat, …’

<tto> nol-le [/]  chwunchwu-ko  iss-ess-e.yo.
again  play-to  dance-and  exist-PST-POL
‘(Jerry) was dancing (with the female cat).’

Referring to the female cat that he saw in the cartoon clip, the participant coded as "14" struggles at finding the correct word to express the female component of the cat and at positioning it in the correct place (1). After a brief filled pause (coded with e@fp), he blurs out koyangi ‘cat,’ and after another pause adds yeça ‘woman’, at which point he repeats koyangi-yeça ‘cat-woman’ in its entirety. At a later utterance, the speaker attempts calling the female cat as such, but stumbles on a false start with the fragment koyang of the word koyangi ‘cat,’ corrects himself with koyangi, and gives another attempt at referring to the female cat as koyang-nye ‘lit. cat lady.’ This, presumably, is done so by falsely reanalyzing i in koyangi ‘cat’ as the bound morpheme -i ‘person,’ and replacing the bound morpheme –i ‘person’ with the bound morpheme –nye ‘woman.’ Realizing the gaucherie, he settles on calling the female cat koyangi yeça ‘cat woman.’

Another speaker decomposes the Sino-Korean word yeça ‘woman’ as ye-ca ‘female person,’ and applies the ye- morpheme denoting ‘female’ to combine with the word denoting penguin to express a female penguin. He continues to use this strategy in a later discourse, in expressing a female cat.

---

5 In this example, as in the entire corpus, pauses are indicated by “#”, filled pauses by “@fp”, retracings by “[/]”, retracings with a correction by “[//]”, fragments by “&”, and fillers by “< >”.
6 The bound morpheme -i also bears the meaning of "a thing," in addition to the meaning of "a person."
7 Incidentally, koyang-nye ‘lit. cat-lady’ is used informally to refer to a female who resembles a cat, who is dressed up as a cat, or who is associated with a cat in a specific event.
Although prefixing the bound morpheme ye- ‘female’ to a noun to restrict its meaning to a female referent is productive (e.g. ye-tongsayng ‘younger sister,’ ye-kija ‘female reporter/journalist,’ etc.), the use of ye- is restricted to humans. For animals and plants, the more general prefix am- ‘female’ is used, eg. am-kkoch ‘female flower,’ am-khay ‘female dog,’ am-thalk ‘hen,’ blocking the use of the human-specific prefix ye- ‘female.’ However, the heritage speakers seem to over-generalize the use of the ye- morpheme, applying it to non-human referents.

Another analysis of over-generalization of the bound morpheme ye- ‘female’ involves personification of animals. In children’s speech or child-directed speech, ye- ‘female (human)’ is occasionally prefixed to non-human referents. In fact, animal lovers who consider their pets a part of the family would prefer the ye- 'female (human)' prefix to the am- 'female (non-human)' prefix.

Other speakers over-generalize the morpheme –kwan to express a building, an institution, or an establishment. As an analogy to its use in tosekwan ‘library,’ pakmwulkwan ‘museum,’ or miswulkwan ‘art gallery,’ more than one participant uses the pseudo-Korean *tongmwulkwan instead of tongmwulwen ‘zoo,’ with the use of the morpheme -wen signifying a childcare facility or more generally an establishment for growth and development.

(2)  i  pheynkwin-i  ku  ye-pheynkwin-hanthey  panha-yss-e.yo.
this  penguin-NOM  that  female-penguin-DAT  fall.for-PST-POL
‘This penguin fell for the female penguin.’

…  coh-a  ha-nun  ye-koyangi-hanthey  <i> <i>  cal  po-i-llako
like-INF  do-ADN  female-cat-DAT  well  see-PASS-so.that
‘so that (he) gets on the female cat’s good side’  [17]

(3)  twulli-ka  e@fp  tongmwulkwan-ey  ka-kaciko
Dooly-NOM  zoo-LOC  go-so
‘So Dooly goes to the zoo, …’  [07]

(4)  twuli-lang  e@fp  ettai  twul-i  e@fp
Dooly-with  some  child  two-NOM
‘Dooly and two children’

&pak  tongmwulkwan-eyse  ket-ko  iss-ess-nuntey,
zoo-LOC  walk-and  exist-PST-but
‘…were walking at a zoo.’  [04]
In both (3) and (4), *tongmwulkwan is misused to refer to a zoo. What is especially intriguing about 0 is that right before *tongmwulkwan is uttered, the speaker initiates a false start by uttering &pak, presumably blurring out the initial syllable of pakmwulkwan ‘museum.’ The false start unwittingly reveals that the –kwan morpheme used in *tongmwulkwan, in fact, comes from morphemic analysis of the complex word pakmwulkwan ‘museum.’

3.2.1.2 Circumlocution

When the subjects cannot recall a particular word, they resort to circumlocution, a method of expressing an idea with more words than necessary. Rather than using the word ehang ‘fishbowl’ (5) or hwapwun ‘flowerpot’ (6) and (7), the subjects describe the item to which they are referring.

(5) ku mwulkoki tam-nun thong-un # [/] mwulkoki tam-nun # [/] that fish put.in-ADN bowl-TOP fish put.in-ADN ‘the bowl in which (one) puts fish …’

mwulkoki iss-nun ku thong-eytaka tasi dunk toy-ka[ciko]
fish exist-ADN that bowl-in again become-so ‘So (he was) once again dunk in the very bowl that has fish (in it)’ [01]

As an attempt to refer to a fishbowl, the speaker makes allusion to ‘the bowl in which (one) puts fish.’ She then realizes that she is not talking about the fishbowl, but the fact that Tom, the cat, was sunk into it, and corrects herself. In the process of retracing to correct the use of the topic marker instead of the locational postposition –eytaka ‘in,’ she begins by repeating verbatim how she referred to the fishbowl, and tries to better describe the referent by changing the description to ‘the very bowl that has fish (in it).’

Now, here are instances in which the speakers tried to convey the meaning of hwapwun ‘a flowerpot’.

(6) sikmwul [/] sikmwul-tul iss-nun # ke-lul mak kentuli-nikka plant plant-PL exist-ADN thing-ACC recklessly touch-now.that ‘Now that (Dooly) was recklessly touching the thing that had plants (in it).’ [14]
The speaker in (6) alludes to the flowerpot by describing it as ‘the thing that has plants (in it).’ In (7), the speaker asks herself “What is it?” before using the roundabout expression ‘the thing in which flowers go.’

3.2.1.3 Asking for the corresponding vocabulary

Knowing that the task requires the subjects to speak in Korean instead of English, some participants take advantage of the fact that the interviewer is a native speaker of Korean, and ask outright what the corresponding English word is in Korean.

(8)  S: ceyli-ka-yo e@fp thom palthrop-ey [//] pal <yeah> [//] pal ## [//] palthrop-ey <ku> Jerry-NOM-POL Tom toenail-LOC foot foot toenail-LOC <that> ‘Jerry, on Tom’s toenail,’

What is this, um@fp ## e@fp “matches”? [15]

I: sengnyang?

S: Yeah. What?

I: sengnyang.

S: sengnyang? sengnyang manh-i manh-i cip-e neh-ese match a.lot-ADV a.lot-ADV grab-INF put-and.then ‘(Jerry) grabbed stuffed a lot of matches (between Tom’s toenails), and then …’

ku-ke-lul # pwul-tha-yw-ess-nuntey-yo that-thing-ACC # fire-burn-CAUS-PAST-but-POL ‘ … put it on fire.’ [09]
Tom-i tasi wa-se <ku> nola-n sayk # (shovel? er@fp # um@fp
Tom-NOM again come-LK <well> yellow-ADN color
‘Tom came again, and well, yellow-colored (shovel? Er, um…’

‘How do you say shovel?)’

sap-ul [%-ulo] # Tom-ul ## um@fp chi-ko siph-ess-nuntey-yo[///]
shovel-ACC [%-INS] # -ACC ## hit-LK want-PAST-but-DECL
‘wanted to hit Tom with a shovel, but’

Tom [///] <no> Jerry chi-ko siph-ess-nuntey-yo
hit-LK want-PAST-but-DECL
‘…Tom, no, (he) wanted to hit Jerry, but’

After hearing the corresponding vocabulary in Korean, the participant practices/Confirms the word multiple times, and finally uses it in the sentence.

3.2.1.4 Code-switching

Code-switching occurs at the level of syntax or larger. According to a well-known model of code-switching by Poplack & Sankoff (1984), the Free-morpheme Constraint stipulates that code-switching between two languages is only allowed (although not always) between free morphemes (i.e. not allowed when a bound morpheme is involved, in which case language borrowing occurs instead), while the Equivalence Constraint requires that the two languages must share the surface structures. However, this model has been criticized for not being sufficiently restrictive in explaining numerous “exceptions” to the model.

The predominant model of code-switching is Myers-Scotton's (1993) Matrix Language-Frame model, according to which content morphemes of the Embedded Language (English) are "embedded" into the Matrix Language (e.g. Korean). The Blocking Hypothesis constrains environments in which code-switching appears: the embedded language must be a content word (cf. function word) with the congruent theta-role assignment.
Some participants embedded English lexical items into the Korean structure.

(10)  
\( ku \ pang-an-ey \ e@fp \ <\text{like}> \ closet-iss-ess-ess-ko, \)
that room-inside-LOC -exist-PST-PST-and
‘(In) that room, closet existed, and’

\( kuliko \ shelves-to \ iss-ess-ko, \ etten \ a@fp \ plant-to \ iss-ess-e.yo. \)
and -also exist-PST-and some -also exist-PST-POL.’
‘shelves existed too, (and a) plant also existed.’ [07]

As an avoidance strategy, it involves simply using the English lexical item instead of retrieving (or attempting to retrieve or describe) the word in their Matrix Language. In our corpus we find that only lexical words, and no functional words, are replaced with their English counterparts, retaining the Korean syntax. The lexical words closet, shelves, and plant are embedded in the Korean sentence structure. It has been known that code switching requires good command of more than one language, and subsequently, advanced speakers who have a certain level of control over more than one language use code switching. However, it seems that individuals who do not have good command of both languages take advantage of the code-switching technique when they are forced to use the non-dominant language, in which they borrow lexical items (which they are not familiar with in the Matrix Language) from the Embedded Language which is the more dominant language.

3.2.1.5 Literal translation from English

Many avoidance strategies were deliberately, or knowingly at the least, employed on the speaker's end to overcome problems with lexical items not being retrieved in the target language. There were, however, instances of errors which as likely as not went unnoticed by the speaker. These were cases of literal translation of the English expressions. Some examples are given below.
Wanting to express 'not to care' in the sense of not being bothered, the speaker used the expression \textit{kwansim-i eps-ta} 'not to be interested in (lit. lack of interest/care)' instead of \textit{sinkyeng ssuci anh-ta} 'not to care / not to be bothered (lit. use one's mind).'

The speaker translated 'while / in the process of' into \textit{-nun tongan} '(lit. during/in the course of)' in an attempt to formulate \textit{-taka}, which is a connective suffix used i) when one action or state is interrupted and replaced with another action or state, ii) when the process of one task becomes the cause or basis for another task not being accomplished. An alternative expression would have been \textit{-nun wacwung-ey} 'in the vortex of.'

### 3.2.2 Connecting sentences

There are two ways to indicate the relationship between two sentences in Korean. One is with the use of a conjunctive adverb (13)a, and the other is with the use of a conjunctive ending (13)b.
(13) a. pi-ka w-a.yo. kuliko chwu-e.yo.  
    rain-NOM come-DECL. and cold-DECL.  

b. pi-ka o-ko chwu-e.yo.  
    rain-NOM come-and cold-DECL.  
    ‘It is raining, and it's cold.’

Conjunctive ending (-ko) being a reduced form of the conjunctive adverb (kuli-ko), both conjunctive adverbs and conjunctive endings set up expectations to the listener as to what follows in relation to the utterance preceding them. There are various types of conjunctive adverbs/endoings carrying similar meanings. Some common adverbials are listed below, along with their usages.

(14) List of conjunctive adverbs and conjunctive endings by their usage:

- **kuliko** -ko  
  'and' ... additional information
- **tekwuntana**  
  'besides' ... additional information
- **tewuki**  
  'moreover' ... additional information
- **tto-han**  
  'likewise' ... additional information
- **kulena** -na  
  'but' ... contrast
- **kulentey** -ntey  
  'but' ... contrast
- **ku-leh-ciman** -ciman  
  'however' ... contrast
- **kele-mulo** -mulo  
  'therefore' ... result
- **ku-lay-kaciko** -ekaciko  
  'therefore (colloquial)' ... result
- **ku-le-nikka** -nikka  
  'so' ... result
- **ku-lay-se** -ese  
  'therefore' ... result
- **ttal-ase**  
  'accordingly' ... result
- **kulayto** -eto  
  'nevertheless' ... unexpected result
- **kule-myen** -myen  
  'then' ... expected result
- **ku-leh-ta-myun** -tamyen  
  'if so' ... expected result
- **kule-ta** -ta  
  'then, all of a sudden' ... sequence/interruption
- **kule-taka** -taka  
  'then, all of a sudden' ... sequence/interruption
- **hok-un**  
  'or' ... alternative
- **tto-nun**  
  'or' ... alternative
- **ani-myen**  
  'if not' ... alternative
- **ku-le-na ce-le-na**  
  'at any rate' ... different topic
- **cuk**  
  'that is' ... reiteration
In the examination of heritage languages, disfluencies related to connectives deserve a category on their own. Heritage speakers often misused a conjunctive adverb/ending, and even speakers at the higher end of the proficiency spectrum used only a handful of conjunctive adverbs/endings. (Benmamoun, Montrul, & Polinsky, 2013; Benmamoun, Montrul, & Polinsky, 2013; Viswanath, 2013)

(15) S: acces-ka cip-ul [//] am@fp am@fp &aka akassi [//]
man-NOM house-ACC lady

<oh> <you know> acces-ka a@fp cip-ey [%-eyse] naka-ss-e.yo.
man-NOM house-LOC go.out-PST-DECL

'The man left the house.'

meeting iss-ess-e.yo [%-ketun-yo].
exist-PST-DECL [%because-DECL]

'(because) he had a meeting.'

twulli-ka cip-ey [/] am@fp cip-ey # &iss
Dooly-NOM house-LOC house-LOC exist

<How do you say like he had to stay there?

I: iss-eya tway-ss-e.yo.
exist-must become-PST-DECL

S: ney.> iss-e.ya tway-ss-e.yo.
yes. exist-must become-PST-DECL

‘Dooly had to stay in the house.’

kulentey am@fp twulli-ka kaymi &pw-ass-e pw-ass-e.yo.
but Dooly-NOM ant see-PST-DECL

‘but Dooly saw an ant (scurrying across the room).’

This speaker at the low proficiency level produces short simple clauses, without the use of conjunctive adverbs or endings (The man left the house. (because) He had a meeting.) When she used a conjunctive adverb to link the sentence (Dooly had to stay in the house. Dooly saw an ant.),
she used *kulentey* 'but' when there is no contrast, instead of *kuleta* 'all of a sudden, then' or *haphilimyen* 'of all things'.

(16) *kuliko* *tto* e@fp #
    and again

    'and the woman, to the guest,'

    *acvumma-nun sonnim-hanthey khephi-lang kwaca-lul kac-ta cwu-taka [%-ko]*
    woman-NOM guest-DAT coffee-and cookie-ACC bring-LK give-while [%-CONJ]

    '(the woman) was bringing some coffee and cookies to the guest,'

    *o-nun kil[%kes]-ul po-ye-cw-ess-ko,*
    come-ADN way[%,thing]-ACC show-LK-give-PST-CONJ

    '(the video clip) showed the way (where the woman was bringing some coffee and cookies to the guest) and coming back.'

Here, the participant is explaining how she saw a woman bringing coffee and cookies to the guest and returning. The woman could not have returned *while* serving snacks to her guest, but *after* serving snacks to her guest.

(17) *kuleko[%kuliko]* em@fp #
    and

    *kyelkwuk-ey-n ta ssawu-ko nan taum-ey-n*
    finally-TOP all fight-CONJ happen-ADN next-at-TOP

    'Finally, after they finished the fight,'

    *khokkili-ka kiwun-i eps-ko ssule-cye iss-e.yo.*
    elephant-NOM energy-NOM not.have-CONJ fall.down exist-DECL

    'the elephant had no energy left and was fallen to the ground.'

Although heritage speakers were producing grammatically correct sentences, there were often disfluencies at the utterance level.
3.2.3 Sentence level  
3.2.3.1 Honorifics  

It is assumed that heritage speakers of high proficiency understand everything but with some register problems (Bermel & Kagan, 2000). As a way of expressing linguistic politeness, honorifics are used in Korean as a part of linguistic registers (along with formal and informal registers). No sentence in Korean can be uttered without the knowledge of the speaker's "social relationship with the addressee and/or referent in terms of age category (adult, adolescent, or child), social status, kinship, and/or in- and out-groupness" (Sohn H.-M., 1999, p. 408).

(18) san wi-eysa sukhi-lul tha-muntey-yo, nem-e ey-ess-e.yo. 
mountain up-LOC ski-ACC ride-but-DECL, overpass-LK become-PAST-DECL. 
'(He) was skiing up in the mountain, but (he) fell.’

kulayse yece penguin-i wa-se ##
So girl penguin-NOM come-and ##
'So the girl penguin came and… well, (she) did the band-aid here, and’

<kue> band-aid-lul yekita ha-yss-kwu. 
<well> band-aid-ACC here do-PAST-and 

<ney> <ce> ta nau-sy-ess-e.yo. 
again <yes> <well> all born-HON-PAST-DECL [%recover-PAST-DECL]. 
'(He) all *recovered. And well…’

(19) kkwum-ey phololo-hako yece-ka te mal-ssum ha-sy-ess-e.yo. 
dream-LOC Ppororo-with female-NOM more talk-HON do-HON-PST-LK-DECL 
'Ppororo talked more with the female (penguin) in the dream,’

The penguin in (18), and Ppororo and the female (penguin) in (19) are all entities that do not require subject honorifics. Nonetheless, subject honorifics are used as if these entities were older or higher in social/occupational status. In the data of the current study, only speakers at the lower end of the proficiency spectrum produced errors in the use of honorifics.
The examination of the narratives produced by heritage language speakers of Korean at various points of the proficiency continuum revealed problems with registers at the lower end of the proficiency continuum only. Further examination of comparison between level-matched heritage speakers and non-heritage speakers may be needed. However, it would not be surprising if heritage speakers of Korean obtain multiple registers at a rather lower level than other languages, as the use of honorifics is more than a grammatical phenomenon, and rather a sociocultural phenomenon. The importance of using the correct register in relation to the listener is very important in Korean culture: One may not maintain a dialogue with an interlocutor without elaborately encoding the relationship between the interlocutors. Brown (2011) reports that non-heritage speakers and professionals "play it safe" by over-generalizing the use of honorifics. This pattern is observed in low-level heritage speakers. Having been raised in a Korean-speaking home, we would assume that the registers have been acquired at a rather earlier stage. The visual stimuli did not provide any data to prompt object honorification.

3.2.3.2 Inanimate subjects for action verbs

In Korean, inanimate agent subjects are "pragmatically avoided except in metaphorical or personified expressions" (Sohn H.-M., 1999, p. 369). Speaking an L1 (English) that has no such restriction, heritage language speakers often use inanimate agent subjects.

(20) kun te y ku nam wu-ka ## u@fp # u@fp ppololo-lul um@fp ## <incey> e@fp ##
but that tree-NOM Ppororo-ACC <now>
‘But that tree (did something to) Ppororo’
&han u@fp hanul ccok-ulo <mwe> tency-ess-e.yo.
sky direction-to <well> throw-PAST-POL
‘(the tree) threw (Ppororo) towards the sky.’ [09]

(21) nam wu-ka am@fp phololo-lul tency-ess-e.yo.
tree-NOM Ppororo-ACC throw-PST-POL
‘(but) the tree threw Ppororo,’ [18]
The tree throwing Ppororo towards the sky is not an unacceptable phrase in English (despite the rare occasions one would have to utter this). However, having the tree as the agent of the throwing action is unnatural in Korean. Compare the description of the same scene uttered from a high-level heritage speaker:

(22) **sukhi-lul tha-ko naylyekata-ka namwu-ey kel-ly-ess-nuntey [//]**

Ski-ACC ride-LK going.down-while tree-LOC hook-PASS--PAST-but [//]

'while going down riding the ski, (he got) stuck in the tree…’

*namwu-ey kel-ly-e-se*

tree-LOC hook-PASS-because

'because he got stuck in the tree he said “Ah, thank goodness, I’m alive.”, but…’

"*a tahayng-i-ta. sal-a iss-kwuna"* ha-nuntey

ah lucky-be-DECL alive-LK exist-DECL say-but

*namwu-ka twi-lo tasi # bend ha-myense #*

Tree-NOM back-to again # bend do-ing #

*tasi hanul wi-lo nall-a ka-ss-nuntey,*

again sky above-to fly-LK go-PAST-but

'The tree was bending to the back again and (Ppororo) flew to above the sky, but’ [01]

This speaker resorts to multiple devices to avoid using inanimate subjects as agents. Instead of phrasing that the tree threw Ppororo (in the air), she selects the verb *bend* that would assign the thematic role of a theme to the inanimate subject 'tree', and continues to express Ppororo's being thrown in the air by changing the subject to Ppororo, although the subject is elided in this example.

(23) **<ku> caktong-i [//] e@fp vacuum-i acessi os [/] os-ul ta**

<that> work-NOM vacuum-NOM man clothes clothes-ACC all

‘The vacuum (ate) all of the middle-aged man’s clothes’

&me *mek-ess-e.yo.*

eat-PAST-POL

‘… ate’ [09]

Notice that the above errors were produced by low-level heritage speakers.
3.2.4 Misusing particles

The area in which most learners of Korean face difficulty, heritage and non-heritage alike, is particles, the definition of which is taken from The American Heritage Dictionary (5th Ed.):

(24) par·ti·cle (Linguistics)

a. An uninflected item that has grammatical function but does not clearly belong to one of the major parts of speech, such as *up* in He looked up the word or *to* in English infinitives.

b. In some systems of grammatical analysis, any various short function words, including articles, prepositions, and conjunctions.

The Korean language employs particles, within the definition of (b) above, which are bound morphemes, to mark parts of speech (e.g. subject, object), their information structure (e.g. topic), or other grammatical elements (e.g. passive voice, active voice). The agglutinative nature of the language allows scrambling of arguments into practically any non-final position of the sentence, one of the major syntactic aspects that differentiates Korean from English. This feature poses a great problem to native speakers of English, whose native language does not make rich use of particles in the same way--for those who view the *to* part of the infinitive, and the adverbial/prepositional portions of phrasal verbs, the negator *not*, as particles). As predicted, many of the errors in the spoken corpora involve incorrect use of particles and missing particles.

3.2.4.1 Dynamic vs. static locatives

There are two morphemes used as (inanimate) locative particles: *-ey* (static) and *-eyse* (dynamic). Static locatives are used with "existential, static, and passive predicates (e.g., manhτa

---

8 Animate counterparts are *-eykey* (formal) and *-hanṭey* (informal) for static locative, and *-eykey-se* (formal) and *-hanṭey-se* (informal) for dynamic locative. (Sohn H.-M., The Korean Language, 1999)
be much', _issta_ 'exist, stay', _salta_ 'live', _namta_ 'remain', _kellita_ 'get caught', _palphita_ 'be stepped on'" (Sohn H.-M., 1999, p. 334), while dynamic locatives are with "activity verbs (e.g., _nol-ta_ 'play', _ca-ta_ 'sleep')" (p. 335). Although the omission of the locative particle rarely occurs in heritage speakers and second language learners alike, the distinction between the static locative _-ey_ and the dynamic locative _-eyse_ poses a great deal of a problems for the learners. The confusion is shown by the bi-directional substitution of the other morpheme.

In the first case, the static locative _-ey_ is often used in place of the dynamic locative _-eyse_.

(25) _kuntey khulong-i manhwa-ey yayki-lul mos ha-nuntey_  
but Krong-NOM comics-LK talk-ACC cannot do-CONN  
'but, Krong (is) unable to talk (in) comics,' [05]

(26) _phololo-ka patak &ttak? patak [/] patak <ok> <ok>_  
Ppororo-NOM ground ground ground  
'Ppororo (hit) the ground,' [18]

_ayki-lul ha-ta_ 'talk/speak' and _yeca-lul pwo-ta_ 'see a woman'. This can be regarded as neutralization of the two types of locatives into the static locative _-ey_.

The above examples involve predicates of activities _yayki-lul ha-ta_ 'talk/speak' and _yeca-lul pwo-ta_ 'see a woman'. This can be regarded as neutralization of the two types of locatives into the static locative _-ey_.

Distribution-wise, the static form has a wider semantic distribution. Sohn H.-M. (1999) explains that static locatives also "denote the locations of time (e.g., _yel si ey cata_ 'sleep at 10 o'clock'), age (e.g., _phal-sip sey ey tolaka-sita_ 'die at the age of 80'), proportion (e.g., _chen wen ey two kay_ '2 items for 1,000 won'), reference (e.g., _kenkang ey cohta_ 'be good for one's health'),

---

_e.g._ _Tongmin.i-hanthey chayk-i mah-ta._  
Tongmin-at book-NOM many-DECL  
'Tongmin has many books.' (lit. 'Many books are at Tongmin.')

He does not give examples of _-eykey-se_ or _-hanthey-se_ being used as the animate dynamic locative particle. The Unabridged Standard Korean Dictionary published by the National Institute of the Korean Language also restricts the use of _-eykey-se_ or _-hanthey-se_ to their uses as source particles. The animate dynamic locative, it seems, to be the gap in the locative paradigm.
agent (e.g., *kay hanthey mul-lita* 'be bitten by a dog'), cause (e.g., *kamki ey kel-ita* 'catch a cold'), and addition (e.g., *swul ey pap ey cal mekta* 'have a good meal with wine and rice')" (p. 335). Not surprisingly, the following heritage language speaker has made the mistake of using a dynamic locative instead of the static locative in marking location of time:

(27) twulli-ka ku swunkan-se [//] ku swunkan-eyse
Dooly-NOM that moment-LOC that moment-LOC
'Dooly, at that moment,'

<k> peykay-lul kaci-ko pelley-lul cwuk.il-lyeko ha-nuntey,
<that> pillow-ACC have-CONJ bug-ACC kill-in.order.to do-CONN
‘…was trying to kill the bug with the pillow (in his hand),' [03]

It is not uncommon in a phonological rule for phonemes to lose contrast and neutralize into an unmarked structure. (e.g. vowels in non-stressed syllables becoming schwa in English). We might expect the same in language acquisition--marked structure being neutralized into an unmarked structure. However, the seemingly more marked, in terms of narrower distribution, locative dynamic is also used in place of the locative static.

(28) tham-uy os an-eyse <ku> oskeli-ka iss-ki ttaymwuney
Tom-GEN clothes inside-LOC <that> hanger-NOM exist-N because
‘because the hanger was in Tom’s clothes,’ [03]

(29) kuliko ku # &sss snowman # -i [//] &s [//] ku konglyong [//]
and that # &sss snowman # -NOM [//] &s [//] that dinosaur [//]
‘And that snowman…’

snowman kath-un konglyong-i # [//] <no> snowman [//]
snowman like-ADN dinosaur-NOM # [//] <no> snowman [//]
‘And that snowman… that dinosaur… the snowman-like dinosaur… no… snowman…’

konglyong kath-un snowman-i &man
dinosaur like-ADN snowman-NOM &man

keki san wi-eyse iss-ess-nuntey-yo
there mountain top-LOC be-PAST-but-DECL
‘the dinosaur-like snowman was there on the mountain top, but’ [09]
In the above examples, the existential *iss-ta* 'exist' is used for the subjects (taking the thematic roles of themes) *oskeli* 'hanger' and *konglyong kath-un snowman* 'the dinosaur-like snowman' calling for the static locative marker *-ey* instead of the dynamic locative marker *-eyse*. This is particularly surprising because even the self-assessed near-native speaker (code 03) who had a high speech rate was also making this mistake, not to mention a low-level speaker (code 09) who made the same mistake. In (30), the speaker made the mistake of using the dynamic locative with the passive predicate *kel-li-ta* 'be caught' instead of the static locative.

\[(30)\]  
I: *namwu-ey* kel-ly-ess-taka tto ettehkey tway-ss-cyo?  
tree-LOC catch-PASS-PST-while again what become-PST-Q  
‘After he was caught in the tree, what has become of him?’

S: *namwu-eyse* kel-ly-ess-taka  
tree-LOC catch-PASS-PST-while.CONJ  
‘While being caught in the tree,’

*Ilehkey* <mak> ama thwingky-e-naw-ass xxx kuliko tto  
like.this <recklessly> probably catapult-LK-come-PST and then  
‘he was probably catapulted out of the tree.’

This data is especially interesting, given that the interviewer used the correct form of the locative—static locative—in the question, to which the participant replied using the dynamic form.

Nonetheless, the distinction between static and dynamic locative is not always obvious or clear-cut for every predicate. There are verbs that can take both types of locatives depending on the implication that the speaker intends to give, be it a 'static' or 'dynamic' status of the verb: "*salta* 'live', *suta* 'stand', *cata* 'sleep, nathanata' 'appear', *nata* 'occur', *phita* 'bloom', *issta* 'exist', and *epsta* 'not exist'." For example "the theme is a static physical object (theatre) in [(31)], but an event (movie) in [(32)]." (Sohn H.-M. , 1999).
The speaker's intention to stress the dynamicity rather than the staticity is sometimes indicated by the use of other particles.

In (33), the 'too' particle indicates that Dooly was ruining another room (performing an action), in addition to the one he had destroyed before. On the other hand, the speaker could not have meant that Dooly was also in this other room statically, in addition to being in the previous room, as he could not have be in multiple places at the same time. From this context, it may be deduced that the speaker made an error by using the static locative instead of the dynamic locative.

Still, in most cases, there is no other linguistic clue (e.g. particles) to indicate whether the speaker was focusing on the static or dynamic aspect. Consider the following examples in which both a dynamic verb and the static verb 'exist' follow a locative marker.

In (33), the 'too' particle indicates that Dooly was ruining another room (performing an action), in addition to the one he had destroyed before. On the other hand, the speaker could not have meant that Dooly was also in this other room statically, in addition to being in the previous room, as he could not have be in multiple places at the same time. From this context, it may be deduced that the speaker made an error by using the static locative instead of the dynamic locative.

Still, in most cases, there is no other linguistic clue (e.g. particles) to indicate whether the speaker was focusing on the static or dynamic aspect. Consider the following examples in which both a dynamic verb and the static verb 'exist' follow a locative marker.
In order to focus on the status of being on the mountain or being on the tree, respectively, the static locative -ey may be used. However, if the foci were on the action of sukhi tha-ta 'v. ski (lit. ride ski)' or ttele-ci-ta 'fall', the dynamic locative -eyse must have been used.

Although Shin, in his (2008) study of written data, reports that if there is any substitution error between locative static and locative dynamic case, that there is more than 90% chance it will be substituted by the locative static particle, the current oral data exhibits bi-directional errors between static locative and dynamic locative cases. One may argue that the static-as-dynamic error is production related (linguistic performance) rather than grammar related (linguistic competence), as these errors are only observed in speech and not in writing. However, that explanation may not explain the bi-directional nature of the error between the static and dynamic distinction of the locative marker. Whether this bidirectional error is heritage-language speaker specific or extends to second language learners needs further examination.

The confusion between the two types of locatives is exacerbated by the fact that the locative paradigm coincides with the goal-source paradigm.

<table>
<thead>
<tr>
<th>Static locative / GOAL</th>
<th>Dynamic locative / SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inanimate</td>
<td>-ey</td>
</tr>
<tr>
<td>Animate (formal)</td>
<td>-eykey</td>
</tr>
<tr>
<td>Animate (informal)</td>
<td>-hanthey</td>
</tr>
</tbody>
</table>

Table 3. The static-dynamic / goal-source paradigm

Identical forms are used for static locatives and goal particles (including datives), and another set of identical forms are used for dynamic locatives and source particles. Notice that the neutralized form -ey is embedded in the dynamic locative -eyse, which includes "the fossilized morpheme –se, whose meaning may be equated with 'inception' or 'dynamicity'") (Sohn H.-M., 1999, p. 334).
Due to the sharing of the paradigm between locative and goal-source particles, participants commit errors when mentioning location as a goal or source.

(36)  
\textit{ku taum-ey-nun <ch> e@fp e@fp twul-i ttwi-ess-nuntey}  
that next-at-TOP two-NOM jump-PST-CONN  
‘Afterwards, the two jumped,’

\textit{syopha wi-eyse ollaka-ko,}  
sofa top-LOC climb.up-CONJ  
‘went onto the sofa.’  \footnote{16}

The \textit{syopha wi} 'top of a/the sofa' is the landing site for the jumping action, or the goal, calling for a goal particle -\textit{ey}, which coincides with the static locative particle. However, it seems that the speaker used the dynamic locative, which coincides with the source particle, presumably thinking that a jumping action was involved. The reverse error also occurs.

(37)  
\textit{acessi-ka a@fp cip-ey nak-ass-e.yo.}  
man-NOM house-LOC go.out.of-PST-LK-DECL  
‘the man went out of the room.’  \footnote{18}

The \textit{cip} 'house' is the originating location (=source) of the man's action of going out. However, it is likely that the participant used the static locative -\textit{ey} in place of the source particle -\textit{eyse}, focusing on the static vs. dynamic distinction without regard to the source meaning.

This type of error is not restricted to inanimate locative markers. In the following utterances, the (informal) animate locative -\textit{hantey} is employed rather than the informal animate source particle -\textit{hantey-se}.

(38)  
\textit{kyeysok twulli-uy <ku> chinkwu-tul-hanthey cip.e-mek-nuntey}  
repeatedly Dooly-GEN <that> friend-PL-DAT pick.up-LK -eat-CONN  
‘(the elephant) was picking up and eating (those peanuts) from Dooly’s friends over and over again.’     \footnote{03}
So, the suit shrank (in the water) and came off (Tom’s body).’

‘...became the same size as Jerry’s.’

Now, the coincidence of the static locative with the goal particle, and that of the dynamic locative with the source particle seems to be arbitrary or language-specific. In Japanese, which also distinguishes locative particles by static and dynamic, the coincidence is reversed. Static locative *ni* (cf. dynamic locative *de*) shares its form with the dative particle. Narratives of heritage Japanese (Miwako Hisagi, p.c.) report that Japanese heritage learners rarely made locative particle mistakes, suggesting that the locative particle errors prevalent in Korean heritage learners may be due to the fact that the static and dynamic locatives are very close in form and that the dynamic locative is a concatenation of the static locative *-ey* and the dynamic particle *-se*, which also coincides with source particle.

### 3.2.4.2 Passives and Causatives

Passive and causative morphemes in Korean, both of which are derivational morphemes, fill the same location in a word.

(40) Passive: *mek-hi-ess-ta*

eat-PASS-PST-DECL

‘was eaten’

(41) Causative: *mek-i-ess-ta*

eat-CAUS-PST-DECL

‘made someone eat, fed’

The two morphemes share syntactic behavior, and they are very similar in form to one another with overlapping variants (*-i, -hi, -li, -ki*, etc.), leading to a proposal that the passive morpheme is derived from the causative morpheme by the process of functional shift (Sohn H.-M. , 1996).
addition to the abovementioned affixal derivation, there exist phrasal passive/causative structures, which are largely productive but convey connotations distinct from their morphemic counterparts (if there is one). For these reasons, passive and causative constructions are major sources of confusion for learners of Korean of all levels. The narratives produced by heritage language speakers confirm this: They sometimes neglected to use the passive/causative morphemes, or even overused them. Let us examine these cases in detail.

There are three ways of forming a passive sentence in Korean. Lexical passive verbs do not have a passive morpheme, as in *ttayli-ta* 'hit' vs. *mac-ta* 'be hit' or *ha-ta* 'do' vs. *toy-ta* 'become'/*tangha-ta* 'undergo'. Affixal passives involve phonologically conditioned passive derivational allomorphs -i, -hi, -li, and -ki. Finally, phrasal passives consist of a verb followed by –e/-a and the inchoative verb *ci-ta* 'get to be, become', as in *cwu-ta* ‘give’ vs. *cwu-e ci-ta* ‘be given’. With the semantics of change of state, the phrasal passive "can convey passive meaning when it occurs with a transitive verb" (Sohn H.-M., 1999, p. 372). Less has been thoroughly studied about the semantic differences between the affixal passive and phrasal passive and their distribution, and the acceptability between the two varies among native speakers of Korean. These subtle differences will not be dealt with in this study, but only the obvious ones, focusing on the form of the affixal passives.

In heritage Koreans' speech, the passive affix was often omitted, giving the sentence an active voice, instead of the intended passive voice.

(42) *acessi meli-to <ku> vacuum ttaymwuney yeki-ka kkakk-ass-e.yo.*
man hair-also <well> vacuum because here-NOM cut-PAST-DECL

‘Also, this part of the man’s hair (was) cut because of the vacuum.’

The utterance in (42) is a double-subject construction. *Acessi meli ... yeki 'this part of the man's head (with the intended meaning of hair),' which is the subject of the sentence, was cut by
someone else, calling for a passive predicate \textit{kkakk-i-ess-e.yo} 'cut-PASS-PST-DECL' rather than the active predicate \textit{kkak-ass-e.yo} 'cut-PST-DECL'.

\begin{enumerate}
\item \textit{ccoc-a-ka-taka} blinder \textit{ttaymwuney} <\textit{ilehkey}> twi-lo tasi cappacy-e-see chase-LK-go-after because <\textit{like.this}> backward-to again fall.down-LK 'While (Tom was) chasing (Jerry), (Tom) fell down backwards because of the blinder'
\item \textit{<\textit{ilehkey}> blinder <\textit{ilehkey}> mal-ly-ess-taka naylye-ka-ss-taka} <\textit{like.this}> <\textit{like.this}> roll-PASS-PST-after down-go-PST-after '(Tom was hanged on) blinder like this, rolled, dropped,'
\item \textit{mith-ey iss-nun ehang-ey myech pen tamk-a//} \textit{tamk-ass-taka} bottom-LOC exist-ADN fishbowl-LOC several times soak-LK soak-PST-after 'soaked (into) fish bowl (on) bottom) several times,'
\end{enumerate}

In (43), the speaker is describing the event in which Tom was hooked to the handle of the roll-up blind, pulled up by the handle, and was immersed in the fishtank upon the release of the blind. Tom was not immersing an object: Tom was immersed. Therefore, the predicate involves the passive voice \textit{tamk-i-ess-ta} 'soak-PASS-PST-DECL' instead of the active voice \textit{tamk-ass-ta} 'soak-PST-DECL'. Notice that this speaker does use the passive form in \textit{mal-ly-ess-taka} 'roll-PASS-PST-after', suggesting that this may be a speech error which may not emerge in writing.

As much as the HK speakers do not use passives where they are needed, they also overuse passives where they should not be used. This gives the meaning of the sentence a passive voice, when an active voice was intended.

\begin{enumerate}
\item \textit{Jerry-ka} \# \textit{<\textit{ku}> match-lul palkalak-ey-ta kkoc-hy-e-kaciko} -NOM \# \textit{<that>} -ACC toe-LOC-at put-PASS-LK-so 'Jerry stuck the match between (Tom’s) toe(s)'
\item \textit{pwul-ul pwuth-y-ess-e.yo.} fire-ACC set-CAUS-PAST-DECL '...and set fire.'
\end{enumerate}
Notice that the above utterances involve transitive structures with direct objects. Jerry is the agent in performing the action of placing the matches between Tom's toes (44), and of hanging Tom's clothes (there) (45). In the above utterances, the infixed passive morphemes need to be removed.

As was the case with passives, there is more than one way of expressing causation in Korean. Short-form causatives involve either causative derivational morphemes (-y, -i, -hi, -ki, -khi, -wu, -ywu, -iwu, -chwu, and -kwu) or lexical causative verbs (ha-ta 'do' vs. sikhi-ta 'cause to do, order', ka-ta 'go' vs. ponay-ta 'send', or cala-ta 'grow' vs. kilu-ta 'raise'), while long-form causatives involve addition of –key ha(y) ‘cause to do/be’ after a predicate (Sohn H.-M., The Korean Language, 1999; Lee & Ramsey, 2000). Heritage language speakers often struggled in choosing to use/not use the causative morpheme on the one hand, and using the appropriate type of causative structures (affixal/phrasal) on the other hand.

The causative affix is often omitted in HK’s speech.
In (46), *pwul pwuth-i-nun kes* 'setting (the matches) on fire' is intended in place of *pwul pwuth-nun kes* 'being on fire.' In (47), *cwuk-i-ess-e* 'killed' is intended for *cwuk-ess-e* 'died', as Dooly hit the ant and killed it. Noticing the awkwardness after uttering "he *died the ant", the speaker asked the interviewer how to say "he killed it."

Not only are causative markers under-used, they are also overused.

In the above utterance, the speaker meant to say that Tom felt his foot burning (*tha-nun kes* 'burn-ADN thing') rather than causing something else to burn (*tha-ywu-nun kes* 'burn-CAUS-ADN thing').

(49) *kulayse chongso [%chengso] ha-nuntey,*
so cleaning do-but
‘So (he) cleaned but the vacuum cleaner… vacuum’

vacuum cleaner-*ka [/] vacuum-* *nemwu * u@fp ## u@fp e@fp [/]
-NOM [/] -NOM too
‘was too…uh… uuhuh… eh…

vacuum-*i ## com kocang na-y-se ###
-NOM a.bit break happen-CAUS-LK
‘the vacuum (was) broken, so’
Similarly, the vacuum broke (kocang na-ta), and was scolded (hon na-ta) in (49) and (50), respectively.

There are also semantic differences between the two types of causative constructions.

While short-form (lexical and affixal) causatives express direct causation (or indirect causation, at times, depending on context), long-form (phrasal) causatives only expresses indirect causation.

The phrasal causative is productive. Consider the following examples:

(51)  a. Short-form causative (direct causative)

\[
\text{Emma-ka Yengi-eykey os-ul ip-hi-n-ta.}
\]

‘Her mother puts Yongi's clothes on (for) her.’

b. Short-form causative (indirect causative)

\[
\text{Yengi emma-nun Yengi-eykey enceyna pissan os-man ip-hi-n-ta.}
\]

‘Yongi's mother always lets her wear expensive clothes.’

c. Long-form causative (indirect causative)

\[
\text{Emma-ka Yengi-eykey os-ul ip-key ha-n-ta.}
\]

‘Yongi's mother lets her put (her own) clothes on.’

---

Unaware of these semantic differences, a long form or phrasal causative was employed instead of a direct causative in the following utterance.

(52)  
\[khokkili-ka \quad twulli-lul \quad cap-ko-sen\]  
elephant-NOM Dooly-ACC catch-CONJ-LK  
‘at the moment (talking with his friends), the elephant catches Dooly,’

\[caki-ka \quad an-ey \quad i-ss-nun [//]\]  
oneself-NOM inside-LOC exist-PST-ADN  
‘in the cage where he is,’

\[<ku> \quad cage \quad an-ey [//] \quad &ke \quad keki \quad an-ey \quad iss-nun [//]\]  
<that> cage inside-LOC there inside-LOC exist-PST-ADN  
‘in the wire mesh inside of it,’

\[&che \quad chelmang \quad an-ey \quad em@fp#\]  
wire.mesh inside-LOC  
‘with his nose, Dooly’

\[&ca \quad casin-uy \quad kho-lo \quad twulli-lul \quad kat-hi-key \quad ha-ko\]  
oneself-of nose-INS Dooly-ACC lock.up-PASS-to do-CONJ  
‘with his nose, Dooly’

\[keki-se \quad mak \quad koylop-hi-cyo.\]  
there-LOC recklessly bother-LK-DECL  
‘locks up (Dooly) and bothers (him) there recklessly.’

In the above utterance, the speaker has derived a passive form through derivational morphology, and has used the long-form causative formation. As mentioned earlier, passive and causative morphemes fill the same slot, so the two cannot be used at the same time (*kat-hi-u-ta / *kat-u-hi-ta). However, the use of the long-form causative implies that the elephant's nose was an indirect cause of Dooly's being locked up, when in fact, Dooly was wrapped around by the elephant's nose, a direct cause of Dooly's being locked up.
3.3 Discussion

Even with these types of errors, heritage speakers produced speech with such prosody that they could pass as native speakers’ speech. For those with more acute hearing ability, their speech may come off as having a Korean American accent. With further instrumental examination, these heritage speakers of Korean may reveal distinct phonetic qualities from that of native speakers of the language, as did Godson’s (2003) phonetic study of Western Armenian heritage speakers. However, likely differences in phonetic, or segmental, qualities between heritage speakers and Seoul Korean by no means indicate that there are phonetic areas that heritage speakers struggle with in learning the language, as the language they speak may be considered a Korean American dialect, rather than an incomplete acquisition of Seoul Korean.

The heritage speakers’ vowel space, for example, is optimized for their dominant language and their heritage language, and remains that way. It also seems unfair to evaluate heritage speakers’ proficiency based on Seoul Korean when, in fact, their language input/source dialects consist of different dialects of Korean. The varied nature of their input is reflected in the phonetics and morphology in the narratives of heritage speakers at all levels (pikyey ‘pillow in Kangwon, Kyeongsang, Cheonnam, Choongcheong dialects’ for peykay ‘pillow’, ti-ta ‘burn oneself in Kangwon, Cheongnam dialects’ for tey-ta ‘burn oneself’, tayngki-ta ‘go/frequent in Kyeongsang dialect’ for tani-ta ‘go/frequent’, etc.). Even if the source dialect, which is the dialect spoken by the parents of heritage speakers, is Seoul Korean, heritage speakers are exposed to the source dialect which has been frozen at the time it was brought into the country. For instance, Kang & Nagy (2013) found that the aspirated and lenis stops in Korean “are merging in Voice Onset Time (VOT) and are better distinguished by the F0 (Fundamental frequency) of the following vowel than by their VOT” (p. 1) in heritage speakers of Korean in Toronto, as in younger female speech in Seoul Korean. Taking these into consideration, the phonetics of
heritage language seems easier to acquire than any other aspects of grammar, and is fully acquired at an early stage, prior to the acquisition of morphology, syntax, or pragmatics.

The morpho-syntactic errors described in this chapter are by no means an exhaustive list of errors that heritage speakers of Korean make. However, I hope the errors identified here will be useful in revealing characteristics of errors made by various levels of proficiencies. The crude error analysis may further provide basis for future research in the area of heritage Korean learning, and/or quantitative data for heritage Korean language teaching.

Such study may involve a comprehension task, which will be useful in confirming whether the above identified errors are grammar-related (linguistic competence) or production-related (linguistic performance). The identification of the grammar-related errors may help in methodological issues. If an error is a grammatical error, hindering communication, it may be helpful to devise a better way of teaching the particular grammar point, as the learner needs to be taught the appropriate use. However, if an error is a production issue, or reflects performance mistakes, it may be overcome with some practice, and the immediate correction upon making of the mistake may not be useful.

Another such study, which will be explored in the next chapter, involves the syntax-phonology interface. The production data showed no errors at the syntax-phonology interface: disregarding the rate of speech, the stress and intonation patterns very much resembled those of native speakers, which is a surprising outcome for the Interface Hypothesis by Sorace & Filiaci (2006), which proposes that phenomena involving the interface of syntax and other domains are less likely to be acquired by even the advanced second language learners of the language. Hence, whether the domain of syntax-phonology interface is an exception to the Interface Hypothesis is explored in the next chapter.
4. Comprehension of prosodic cues in information structure

It has long been accepted that understanding of a language precedes production of the language\textsuperscript{10}. Children with primitive utterances, or "telegraphic" speakers, respond better to well-formed sentences (e.g. *Throw me the ball!*\textsuperscript{11}) than to telegraphic speech (e.g. *Throw ball!*\textsuperscript{11}) (Shipley, Smith, & Gleitman, 1969). Benedict's (1979) study of mothers' reports on their children's language development demonstrates that children understand 60 words at the time they are producing 10 words and that children produce 50 words 5 months after they understand the same number of words.

The pattern is not so different in second language acquisition. According to Krashen (1985), a language learner in his or her earliest stage of language development, or during the Preproduction or Silent Period, comprehends minimally and tries to communicate with body language without verbalization. Throughout the ensuing stages until he or she reaches native-like performance, or the Advanced Fluency Stage, a language learner understands more than he or she can speak (Krashen & Terrel, 1983).

In order for a listener to comprehend the meaning of a sequence of sounds, one's ears collect sound waves and send signals to his or her brain, where the listener interprets the sequence of sounds as words. Then, he or she parses out the words, which forms a phrase, a clause, and an utterance, subsequently. For an overview of the theories of language comprehension, see Treiman, Clifton, Meyer, & Wurm (2003).

Understanding a language, however, requires more than combining the meanings of the individual words. An appropriate syntax is necessary for the listener to correctly construe the

\textsuperscript{10} Some studies claim that production develops independent of comprehension (Chapman & Miller, 1975; Ruder & Finch, 1987; Keenan & MacWhinney, 1987; Smolensky, 1996).
meaning of a clause: Even with the same sequence of words, a clause can be interpreted in more than one way, depending on its structure, which often interacts with phonology.

(53) a. Why don't you sell Janet, your Honour?
   b. Why don't you sell Janet your honour?

In (53)a, in which your Honour is a vocative, the assimilation of [t j] to [tʃ] is impossible. However, in (53)b, your honour is a de-accented indirect object of the verb sell, allowing the optional assimilation of [t j] to [tʃ] (Gussenhoven & Jacobs, 1998). Hence, if the boundary of the words Janet and your in (53) is produced with [t j], one has to search the context in which the sentence is uttered, as it can be translated into either (53)a or (53)b. However, if it is uttered with the assimilated form [tʃ], the listener may immediately understand the sentence to be an answer to the question Who shall I sell my honour to? (53)b, rather than a question addressed to your Honour (53)a. As in this case, syntax is not always independent of phonology. In fact, discourse structure is closely related to and often cued by suprasegmental features, or prosody.

Sorace & Filiaci's (2006) Interface Hypothesis proposes that language structures involving an interface between syntax and other domains, especially the syntax-pragmatics interface, are less likely to be acquired even at very advanced stages of adult second language acquisition. However, the lack of production errors in the realm of grammar at the syntax-phonology interface as discussed in Section 3.3 gave the impression that phenomena at the syntax-phonology interface may not be difficult to acquire for heritage language speakers. As over-hearers of the language in home environment, at the very least, do heritage language learners have an advantage over non-heritage learners of the language with regard to grammar at the syntax-phonology interface? Do non-heritage learners of a language transfer their knowledge of the syntax-phonology interface to the target language of acquisition, as they do with other aspects of grammar, such as direct translation, animacy, and pluralization?
This chapter aims at providing insights into the differences in the comprehension of grammar at the syntax-phonology interface among native, heritage, and non-heritage non-native speakers of the language. To achieve this goal, I will address the relationships between prosody (stress and intonation patterns) and information structure (focus, givenness, and topic), the latter of which also surfaces through case markers, and homonyms in Korean. Specifically, I will explore these topics through controlled auditory experiments of (i) contrastive focus in English, which incorporates prosody into information structure; (ii) contrastive focus in Korean, which, I argue, results in the blocking of the ensuing case-marker; and (iii) Korean homonyms accompanying different prosodic patterns in a clause.

4.1 Contrastive focus in English

Let us examine one of the phenomena at the syntax-phonology interface, information structure in English. In English, prosodic prominence falls on the contrasting constituent, as in the response in dialogue (54):

(54) A: Did a grey dog pass by?
    B: I haven't seen it, but I saw a grey CAT pass by.

In (54), the response indicates that the speaker saw a cat, instead of a dog. In order to express this type of contrast, the cat is F-marked\textsuperscript{11}, which means it "bears maximal stress within any prosodic domain that contains it." (Kratzer & Selkirk, 2009, p. 26) (See Bolinger (1961) and Chafe (1976) for their stances on contrastive information). Now, the response becomes awkward when a constituent that is not being compared or contrasted, is focused, as in (55):

\textsuperscript{11} Although the cat may also seem to be new information, in addition to contrastive information, there are differences in semantics and in phonology between focused elements and elements conveying new information. For a detailed discussion, see Katz & Selkirk (2011).
A: Did a grey dog pass by?

B: #I haven't seen it, but I saw a GREY cat pass by.

There have been numerous studies on the prosody associated with topics since 1972, when Jackendoff suggested that the fall-rise “B-accent” (cf. falling "A-accent") was associated with topics. Buring (2002), following Pierrehumbert (1980), later suggested that the B-accent to which Jackendoff was referring was actually associated with contrastive focus. The following question and answer pairs are taken from Katz & Selkirk (2011):

(56) a. A: Sarah mailed the caramels.
    B: No, ELIZA mailed the caramels.

b. A: Eliza ate up the caramels.
    B: No, Eliza MAILED the caramels.

c. A: Eliza mailed the poster.
    B: No, Eliza mailed the CARAMELS.

Katz & Selkirk (2011) analyze the correction constituents in (56), indicated using capitalization, as contrastive focus elements. These F-marked constituents, even if they are verbs, necessarily carry distinctive phonetic qualities of duration, pitch, and intensity, and have noticeable prosodic properties. Elements following the focus constituent never receive any distinctive pitch, although those preceding it optionally receive pitch accents.

4.1.1 Experiment 1: Contrastive focus in English

4.1.1.1 Goal and predictions

The phonetics/phonology and the semantics of items receiving contrastive focus have been extensively studied, especially in the English language. However, it has not been a topic of research within the context of second language acquisition. In English, in which contrastive focus is conveyed by prosodic prominence, the prosodic prominence on contrastive focus cannot be
neutralized without losing the focus. This feature of contrastive focus is not explained in textbooks, and it is seldom, if ever, taught by language instructors. Yet, SLA students are faced with contrastive focus structures, and are expected to grasp the implications of contrastive focus through associated prosody in communication with native speakers of the language. The immediate question yet to be answered is whether learners of the language are able to grasp this information structural phenomenon involving suprasegmental features.

The current experiment is designed with two goals in mind. On the one hand, it is designed to confirm that native speakers of English, including US heritage speakers of Korean, indeed use prosody to differentiate elements bearing contrastive focus. On the other hand, it aims at learning more about second-language learners on the upper end of the proficiency spread by examining their use (or non-use) of contrastive focus in English, which involves understanding of information structure embodied in prosody, which may be difficult to learn in classroom settings.

Predictions

(i) The native speakers of English (including US-born heritage speakers of Korean) will find the response to a question or a comment bearing the "correct" use of prosodic prominence on the element receiving contrastive focus to be significantly more acceptable than a response without any prosodic cue or a response with prosodic prominence on an element that is not expected to receive prosodic prominence.

(ii) If non-native learners of English are less likely to comprehend contrastive focus which is encoded in prosody, second-language learners of English will be less likely to rate responses with prosodic prominence on elements receiving contrastive focus to be more acceptable than those without prosodic prominence or with prosodic prominence on an element that is not expected to receive contrastive focus, as is predicted by Sorace & Filiaci's (2006) Interface Hypothesis. If non-native learners of English do comprehend the relationship
between prosodic cues and contrastive focus, they will favor the response with the appropriate prosodic cue.

4.1.1.2 Method

Participants

Native speakers of (North American) English were recruited to provide baseline data for this experiment. Participants signed up to partake in the current experiment by providing their language background in the survey for which the link was provided in the email advertisements distributed in social media. Twenty-seven native speakers of English formed the Native speakers of English (NE) group.

Participants for the Second language Learners of English group (L2E) were recruited by posting advertisements for the experiment at an online forum of Ewha Womans University in Korea and two other public Education forums. Thirty Korean L2 learners of English were paid to participate in the experiment.

All the participants in the L2E group were born and currently live in Korea. They learned English as a second language in Korean classroom settings, and had no or little experience (less than 1 year) living in another country. Their ages ranged from 18 to 35 years. Their dominant language was Korean, and their father and mother's primary language of communication was Korean.

<table>
<thead>
<tr>
<th></th>
<th>NE</th>
<th>L2E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>27 (f=19)</td>
<td>30 (f=19)</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>20.44 (sd=1.78)</td>
<td>25.73 (sd=3.84)</td>
</tr>
<tr>
<td>Born and residing in</td>
<td>USA</td>
<td>Korea</td>
</tr>
<tr>
<td>Primary language of</td>
<td>English</td>
<td>Korean</td>
</tr>
<tr>
<td>communication between</td>
<td></td>
<td></td>
</tr>
<tr>
<td>parents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proficiency score (out</td>
<td>21.00 (sd=1.39)</td>
<td>16.23 (sd=2.82)</td>
</tr>
<tr>
<td>of 22)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Demographic information on participants in Experiment 1
Materials

Twelve items were constructed as question and answer pairs. As a response to a yes-no question, three different types of response were constructed: (a) a natural answer to the question, with prosodic prominence on the subject of the sentence; (b) the same sequence of words as condition (a), but without prosodic prominence on the subject; and (c) the same sequence of words as conditions (a) and (b) but with prosodic prominence on the verb rather than on the subject.

(57) An example item for Experiment 1

a. Does Julie grow her own fruit? √I don't know, but MORGAN grows her own fruit.

b. Does Julie grow her own fruit? ?I don't know, but Morgan grows her own fruit.

c. Does Julie grow her own fruit? #I don't know, but Morgan GROWS her own fruit.

While the response in (a) is the acceptable question-answer pair for the above question, response in (b) was constructed to confirm that contrastive focus in fact accompanies phonetic/phonological prominence. Condition (c) was constructed to test whether the participants were sensitive to prosodic cues when prosodic prominence is wrongfully placed on other parts of speech.

As participants could only see one condition (which was randomly chosen) out of the three conditions for all items, and as items, along with subjects, were treated as random effects, all items were carefully constructed so that they would share an identical construction. In order to control for tense, all questions were constructed in the present tense (although they could have also been constructed in the past tense altogether). And in order to control for argument structure, only transitive verbs were used (although intransitive verbs or bi-transitive verbs could have been
used instead). The length of each item was controlled for by limiting the number of syllables in the interrogative sentence to from seven to nine.

In addition to 12 test items constructed in 3 conditions each, 24 filler items were added in order to mask the purpose of the experiment. Fillers were created so that the experiment would have 50% acceptable question-answer pairs overall. (As 12 test items contained a third of unacceptable conditions, translating into roughly 4 unacceptable dialogues out of 12, 14 acceptable fillers and 10 unacceptable fillers were used.) Among the 24 fillers, 22 served as tools to assess proficiency levels.

The constructed dialogues were recorded by a female native speaker of English from Michigan and a male native speaker of English from Iowa, both speaking General American, or Standard American English. In each experiment, half of the items were asked by a female speaker, and the other half were asked by a male speaker. The order of the auditory stimuli was randomized.

Procedure

The auditory stimuli created as mentioned in the above subsection were coded to be presented on a computer screen via Web using the Experigen RT platform (Pillot, Scontras, & Clemens, 2012), which is a modified version of the original Experigen platform (Becker & Levine, 2010). All instructions and feedback were given in written form in the native language of the participants (English for NE and Korean for L2E).

The experiment began with a practice session consisting of two question-answer pairs followed by feedback. When the subject clicked the play button, a question-answer pair audio file was played, to which the subject was instructed to rate the acceptability of the response on a scale of 1 to 7 ("1"=totally unacceptable, "2"=unacceptable, "3"=slightly unacceptable, "4"=I don't
know, "5"=slightly acceptable, "6"=acceptable, "7"=totally acceptable). Once a response was submitted, appropriate feedback was given in writing.

For example, a rating of 7, 6, or 5 for the acceptable pair such as that in (58) would have triggered a positive feedback (i.e. Correct. Thank you for providing an appropriate score.), while it would have triggered a negative feedback for ratings 1, 2, 3, or 4, followed by suggested corrections (i.e. Incorrect. The response was acceptable, so 7(totally acceptable), 6(acceptable), or 5(slightly acceptable) are appropriate scores.).

(58) A: Does Alice check the clock regularly?

B: Yes, Alice checks the clock every hour.

On the other hand, an unacceptable pair such as that in (59) would generate a positive feedback for the ratings 1, 2, or 3 (i.e. Correct. Thank you for providing an appropriate score.), and a negative feedback accompanied by suggested corrections for ratings 7, 6, 5, or 4 (i.e. Incorrect. The response was unacceptable, so 1(totally unacceptable), 2(unacceptable), or 3(slightly unacceptable) are appropriate scores.).

(59) A: Did Grace accompany Jude to Japan?

B: #No, Grace accompanied Jude to Japan.

When the participant provided an inappropriate rating score, triggering the "Incorrect" feedback, a prompt urging another try (Please re-play the dialogue and confirm your choice.) was displayed. The participant could re-play the practice dialogue multiple times, with the appropriate feedback for each try. Answers during the practice session were not recorded, and no participant was excluded based on the performance on the practice session.

After the practice session, a written instruction ensued, followed by the main session. Each trial called for two mouse-clicks. Part one directed the participants to click on the play
button to listen to the question followed by a response. Once the audio file completed playback, additional instructions were given below the play button, to quickly rate the acceptability of the response by clicking a number from 1 to 7. The experiment consisting of 2 practice trials and 34 main trials (12 test and 22 fillers) lasted 10 to 12 minutes. The order of the auditory stimuli including the fillers was randomized for each participant.

After all participants completed their sessions, the data from each group were submitted to a mixed-effects model with crossed, independent, random effects for subjects and items\(^\text{12}\) (Baayen, Davidson, & Bates, 2008) for analysis using R: The R Project for Statistical Computing (Ver. 3.1.2, 2014).

**4.1.1.3 Results**

A linear mixed effects regression model was used to examine (i) the effect of the correct prosodic cues and (ii) the effect of the incorrect prosodic cues, with items and participants as random effects. For each participant group across subjects, differences in acceptability among the three conditions were compared. Table 5 presents mean acceptability ratings for the target question-answer pairs across the three conditions in the two participant groups. The box and whiskers plot for the participants in the NE group's acceptability ratings by conditions is offered in Figure 1.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>NE (N=27)</th>
<th>L2E (N=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a (correct prosodic cue)</td>
<td>5.63</td>
<td>4.76</td>
</tr>
<tr>
<td>b (neutral prosody)</td>
<td>4.91</td>
<td>4.75</td>
</tr>
<tr>
<td>c (misplaced prosodic cue)</td>
<td>3.62</td>
<td>4.48</td>
</tr>
</tbody>
</table>

Table 5. Mean acceptability ratings in Experiment 1

\(^{12}\) The current analysis uses crossed random effects for subjects and items, as opposed to nested random effects, which assumes correlation between the two.
As expected, the NE group exhibits a difference in acceptability ratings between the neutral prosody condition (b) and the misplaced prosodic cue condition (c), and even more so, between the correct prosodic cue condition (a) and the misplaced prosodic cue condition (c). On the contrary, for the L2E group, the mean value of the misplaced prosodic cue condition (c) is only slightly lower than that of the correct prosodic cue condition (a) or that of the neutral prosody condition (b). In fact, their medians seem to be identical, or at least very similar, to one another. Moreover, the result for conditions (a) and (b) have more variance than their NE counterparts.

With the acceptability rating score (from 1 to 7) as the dependent variable, the independent variables used in the analysis are listed in Table 6, and the fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting a linear model to the data in Experiment 1 is provided in Table 7.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATIVE</td>
<td>0</td>
<td>(Non-heritage) L2 learners of English (L2E)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Native speakers of English (NE)</td>
</tr>
<tr>
<td>PCUE</td>
<td>0</td>
<td>No correct prosodic cue (conditions b &amp; c)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>(Correct) prosodic cue (condition a)</td>
</tr>
<tr>
<td>PMISCUE</td>
<td>0</td>
<td>No misplaced prosodic cue (conditions a &amp; b)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Misplaced prosodic cue (condition c)</td>
</tr>
</tbody>
</table>

Table 6. The levels of factors used for analysis in Experiment 1

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>4.76</td>
<td>0.23</td>
<td>20.66</td>
<td>0.000</td>
</tr>
<tr>
<td>NATIVE</td>
<td>0.15</td>
<td>0.31</td>
<td>0.48</td>
<td>0.630</td>
</tr>
<tr>
<td>PCUE</td>
<td>0.01</td>
<td>0.19</td>
<td>0.05</td>
<td>0.958</td>
</tr>
<tr>
<td>PMISCUE</td>
<td>-0.28</td>
<td>0.19</td>
<td>-1.48</td>
<td>0.139</td>
</tr>
<tr>
<td>NATIVE:PCUE</td>
<td>0.71</td>
<td>0.27</td>
<td>2.62</td>
<td>0.008***</td>
</tr>
<tr>
<td>NATIVE:PMISCUE</td>
<td>-1.01</td>
<td>0.27</td>
<td>-3.72</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

Table 7. The fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting linear model to the data in Experiment 1

Setting the L2E group's acceptability rating of the pair with neutral prosody (condition b) as the baseline (intercept), the analysis found no significant effects of NATIVE, PCUE, or PMISCUE alone, but significant interaction effects between NATIVE and PCUE, and between NATIVE and PMISCUE were found. In other words, being in the NE group (NATIVE) and having a correct prosodic cue (PCUE) raised the rating score by 0.71 points (p=.008), and being in the NE group and having a misplaced prosodic cue (PMISCUE) lowered the estimate by 1.01 points (p=0.000). Let us look further into the results.

According to the results obtained by the mixed-effects model with independent random effects for subjects and items (Table 7), there was no difference in the overall acceptability ratings between the control group (NE) and the study group (L2E). Participants in the control group (NE) gave a significantly higher acceptability rating to the response with a positive prosodic cue compared to the response with neutral prosody when contrastive focus was involved (p=0.008), and a significantly lower acceptability rating to the response with a misplaced prosodic cue than the response with neutral prosody (p=0.000). Naturally, the difference in
discourse acceptability becomes greater if the response with a positive prosodic cue is compared to that of the misplaced prosodic cue. However, the L2E group did not bring about any significant difference in acceptability rating scores across the three conditions. (Summaries of the linear mixed model fit for the analyses in the rest of the chapter are provided in Appendix B.)

4.1.1.4 Discussion

As predicted, the native speakers of English found the response to a question or a comment bearing the "correct" prosodic prominence on the element receiving contrastive focus to be significantly more acceptable than a response without any prosodic cue, which in turn was significantly more acceptable than a response with prosodic prominence on an element that is not expected to receive prosodic prominence. In contrast, the non-native learners of English gave similar ratings on all three conditions: They were less likely to comprehend contrastive focus which is encoded in prosody.

As indicated by the non-significance of the NATIVE factor, the NE group and the L2E group overall gave comparable acceptability rating scores in this experiment, when PCUE and PMISCUE factors were not taken into account. This hints at comparable acceptability ratings of the dialogues when prosody is not taken into consideration.

Native speakers of English, as indicated by the interaction of NATIVE with the other two independent variables, PCUE and PMISCUE, gave higher acceptability ratings to the sentence containing a subject that received contrastive focus in English, which was accompanied by a distinct contour of (correct) prosody, than to a sentence containing a subject that did not have the contrastive prosody and was uttered rather with a neutral tone (NATIVE:PCUE), confirming the role of prosodic prominence incurred by contrastive focus. They of course disliked the sentence when contrastive focus was assigned to the unexpected constituent (verb, in the current
experiment schema), which was not related to the pragmatic notion of "newness" (NATIVE:PMISCUE).

Notably, there was no effect of prosodic cues, both correct and incorrect, for the advanced Korean learners of English group, which served as the baseline in the current analysis. Although prosody of information structure is rarely taught in second language classes, this was still a surprising result, given that the native language of the language learners also employs prosodic prominence on contrastive focus. The results can be interpreted as Korean L2 learners of English not extending their knowledge of prosodic cues to second language acquisition for information structure that are meaningful in their language. These findings offer initial evidence that there is no transfer of L1 to L2 for phenomena when prosody and information structure is involved.

The goal of the current experiment was to attest to the native speakers' use of prosodic cues in the comprehension of contrastive focus structures, and to investigate language learners' use (or non-use) of prosodic cues on contrastive focus structures. The overall acceptability ratings between the control group (NE) and the study group (L2E) were undifferentiated, suggesting that not only the NE group but also the L2E group were aware of the grammar at syntax proper. However, as the matching rating scores among the three prosodic conditions in the L2E group suggest, they do not use prosodic cues to infer information structure, or more likely, they have not acquired the prosody of information structure, which lies at the interface of syntax, pragmatics, and phonology. The results of the current experiment are predicted by Sorace & Filiaci's (2006) Interface Hypothesis, which proposes that grammar at an interface between syntax and other domains compared to grammar at syntax proper, is less likely to be acquired by even advanced learners of the language.
The results of the current experiment raise further questions: (i) Do all phenomena that involve the interface between phonology and syntax present such difficulty for non-native speakers of the language?; and (ii) do all language learners, including heritage speakers, have difficulty learning phenomena at the syntax-phonology interface? In order to address these questions, Experiments 2 and 3 were conducted for the Korean language.

4.2 Information structure of Korean

4.2.1 Topic

The Korean language employs topic markers to mark information structure, or a "temporary state of the addressee's mind" (Krifka, 2008, p. 244), in addition to marking grammatical functions such as subject or object in syntax. As a topic-prominent language (Li & Thompson, 1976), a topic marker attaches to the topic of the clause, which denotes what the sentence is about (Reinhart, 1981). On the syntactic level, a topic is moved to the Spec, CP position. On the semantic/pragmatic plane, a topic denotes given (shared) information, which is recoverable from context. On the phonological level, a topic is unmarked.

However, as early as in Kuno (1973), another use of the "topic" marker has been recognized. Being treated separate from its thematic use in the sense of Reinhart (1981), which is moved to the clause-initial position, its contrastive use has been identified as remaining in-situ (Saito, 1985; Hoji, 1985; Tomioka, 2007; Watanabe, 2003). Consider the following examples in Japanese, which has been largely studied in parallel to the Korean language in regards to topic markers. The sentences come from Vermeulen (2009).
Following earlier works of others, she explains that a constituent followed by wa may be a thematic topic in the clause-initial position (60)a, but not in the in-situ position as in (60)b. In contrast, sono hon-wa 'that book-wa' in both sentences in (61) bears contrastive meanings. In other words, a clause-initial constituent followed by a topic marker bears the meaning of a thematic topic, whereas the in-situ constituent followed by a topic marker bears a contrastive meaning.

The Korean -(n)un shares a similar licensing condition with the Japanese wa. Only a clause-initial constituent allows a thematic topic marker to be attached. The Korean -(nu)n, the primary function of which is to express the theme of the clause, or given information as in (62), is also used to convey a contrastive meaning as in (63), by being attached to a nominal element in any position of the clause.
(63) Contrastive -(n)un:

a. ce chayk-un Meyli-ka sa-ss-ta.
   that book-TOP Mary-NOM buy-PST-DECL

b. Meyli-ka ce chak-un sa-ss-ta.
   Mary-NOM that book-TOP buy-PST-DECL

'Mary bought that book.' (Implicature: Mary didn't buy a different one.)

This predicts that while -(n)un attached to a clause-internal constituent may only bear contrastive meaning, the clause-initial element followed by -(n)un may be interpreted as thematic or contrastive depending on the context in which the clause is uttered. While (64) is solely interpreted as having a contrastive meaning, (65) may bear a thematic or a contrastive reading.

(64) Con-i ce chay-un sa-ss-ta.
    John-NOM that book-TOP bought

'John bought that book.' (Implicature: John didn't buy a different one.)

(65) ce chayk-un Con-i sa-ss-ta.
    that book-TOP John-NOM bought

'Speaking of that book, John bought it.' OR
'John bought that book.' (Implicature: John didn't buy a different one.)

Examination of the phonetic/phonological qualities of the topic with thematic use and that with contrastive use provides a further difference between the two. In Chung & Kenstowicz (1997), the authors compared prosodic prominence of contrastive expressions in different syntactic conditions to their neutral counterpart in Korean, and found that "the grammatical/pragmatic prominence coincides with an F0 prominence" with "the peak following [the contrastive expression] ... downstepped in order to enhance the [contrastiveness]" in each of the speakers in their study (Chung & Kenstowicz, 1997, p. 100). An analysis of the F0 contour and syllable durations of the recordings for the pilot study of Experiment 2 replicates their findings. While a thematic topic bears neutral prosody (66), a contrastive topic in Korean is often accompanied by prosodic prominence (high pitch accompanied by longer duration) either on the topic marker (67)a or on the phrase that is being contrasted (67)b.
kanhosa-ka cikum kanhosa-sil-ey iss-ni?
nurse-SUBJ now nurse-room-LOC exist-Q?
'Is the nurse in the nurses' station?'
- Ani, kanhosa(-nun) cemsim mek-ule ka-ss-e.
  no, nurse-TOP lunch eat-to go-PST-DECL.
  'No, as for the nurse, she went for lunch.'

Tamtang yaksa-ka cemsim mek-ule ka-ss-ni?
responsibility pharmacist-NOM lunch-ACC eat-to go-PST-Q?
'Did the pharmacist in charge go for lunch?'
  well, nurse-TOP lunch eat-to go-PST-DECL.
  'Well, (I don't know about the pharmacist in charge, but) the nurse went for lunch.'
- b. Kulssey, KANHOSA-nun cemsim mek-ule ka-ss-e.
  well, nurse-TOP lunch eat-to go-PST-DECL.
  'Well, (I don't know about the pharmacist in charge, but) the nurse went for lunch.'

The observation that the phrase being contrasted may also receive prosodic prominence was made while recording the auditory stimuli for the pilot of Experiment 2. Voice actors were asked to produce a naturally sounding speech of the dialogues provided with different contexts (thematic topics, contrastive topics, descriptive subjects, and exhaustive subjects). In some utterances with a contrastive topic or exhaustive subject, prosodic prominence was given to the contrastive topic marker or the exhaustive subject marker, which have been noted as receiving prosodic prominence in previous literature. In other utterances, the phrase followed by the contrastive topic marker or the exhaustive subject marker received prosodic prominence, a pattern which had been dubbed an "early peak" phenomenon in Chung & Kenstowicz (1997), which attracted the peak to the second syllable of the sequence of a two-syllable word and a marker. In addition to inter-speaker variance, this variation occurred within a speaker: Identical contexts sometimes produced different prosodic patterns on different attempts. After observing this intra-speaker variation, the voice actor was apprised of these inconstancies and was explicitly
instructed to utter each contrastive sentence twice: once with emphasis on the subject and once with emphasis on the topic/sentence marker. Hence, eight sentences in three conditions (emphasis on DP, emphasis on -(nu)n, and neutral) were recorded for analysis. One of the eight sentences is given in (68), and the rest may be found in Appendix A, Stimuli for Experiment 2 (the first eight sentences, with the topic marker -(nu)n replacing the subject marker -ka).

(68) a. DP

*KANHOSA-nun cemsim mek-ule ka-ss-e.*

nurse-TOP lunch eat-to go-PSTDECL.

'(I don't know about the pharmacist in charge, but) the nurse went for lunch.'

b. nun

*kanhosa-NUN cemsim mek-ule ka-ss-e.*

'(I don't know about the pharmacist in charge, but) the nurse went for lunch.'

c. neutral

*kanhosa-nun cemsim mek-ule ka-ss-e.*

'As for the nurse, she went for lunch.'

For the analysis, Xu's (2013) ProsodyPro Praat script was used to calculate the mean F0 and duration of each syllable. These measures were then normalized with Z-scores. The normalized pitch contours of the 8 sentences in 3 conditions (=24 sentences) are represented in Figure 2, with the z-scores of the mean duration of each syllable represented in Figure 3.
Figure 2. Normalized F0 contour of the sentence with topic marker in three prosodic conditions (Z-scores)

Figure 3. Mean duration of each syllable in the sentence with topic marker in three prosodic conditions (Z-scores)
The pitch contour graph demonstrates that for the sequence of the three-syllable DP and the topic marker, the neutral sentence showed a rising pattern, or a minimized LHLH pattern of an Accentual Phrase. The emphasis on the topic marker (nun) attracted a steep peak while maximizing the LHLH tonal contrast. The emphasis on the DP attracted the peak to the second syllable, elongating the peak to the topic marker while maintaining the LHLH pattern.

The graph of mean duration shows that in the neutral sentence, the topic marker is slightly lengthened, while the sentence ending marker attracts the longest duration. In the condition in which the topic marker was emphasized (nun), there was an exaggeration of the topic marker, which exceeded the length of the sentence-ending marker. In the DP-emphasis condition, the initial syllable of the DP was produced longer than the topic marker.

4.2.2 Contrastive focus

The same prominence pattern holds for Korean sentences with contrastive focus, which is marked with the case marker of the focused item. The pitch accent on the contrastive focus may fall on the particle following the focused element as well as on the focused element itself, as indicated using capitalization in the sample dialogue (69).

(69) Tamtang yaksa-ka cemsim mek-ule ka-ss-ni?
responsibility pharmacist-NOM lunch(-ACC) eat-to go-PST-Q?
'Did the pharmacist in charge go for lunch?'

- a. Ani, kanhosa-KA cemsim mek-ule ka-ss-e.
  no, nurse-NOM lunch eat-to go-PST-DECL.

- b. Ani, KANHOSA-ka cemsim mek-ule ka-ss-e.
  no, nurse-NOM lunch eat-to go-PST-DECL.

'No, the NURSE went for lunch.'

As in the sentences with topic markers, eight sentences in three conditions (emphasis on DP, emphasis on -ka, and neutral) were recorded for analysis. One of the eight sentences is shown in
(70), and the rest may be found in Appendix A, Stimuli for Experiment 2 (the first eight sentences).

(70)  

a. DP  

*KANHOSA*-ka  

cemsim  

mek-ule  

*ka-ss-e.*  

nurse-NOM  

lunch  

eat-to  

go-PST-DECL.  

'It is the nurse that went for lunch.'

b.  

*ka*  

kanhosa-*KA*  

cemsim  

mek-ule  

*ka-ss-e.*  

'It is the nurse that went for lunch.'

c. neutral  

kanhosa-*ka*  

cemsim  

mek-ule  

*ka-ss-e.*  

'The nurse went for lunch.'

The normalized pitch contours of the eight sentences in three conditions (=24 sentences) are represented in Figure 4, with the Z-scores of the mean duration of each syllable represented in Figure 5.
Figure 4. Normalized F0 contour of the sentence with subject marker in three prosodic conditions (Z-scores)

Figure 5. Mean duration of each syllable in the sentence with subject marker in the three conditions (Z-scores)
In Figure 4, the pitch contour for the sequence of the three-syllable DP and the subject marker in the sentence with emphasis on the subject marker attracted peaks to the DP and the subject marker (ka). Although the peak of the DP (the second syllable) was as high as the subject marker peak, the intervening L reached a steep low point in order to maximize the tonal contrast. Emphasis on the DP attracted the peak to the second syllable, elongating the peak to the subject marker while maintaining the LHLH pattern.

In Figure 5, the graph of mean duration shows that in the condition in which the subject marker was emphasized, there was an exaggeration of the topic marker. In the DP-emphasis condition, the initial syllable of the DP was lengthened.

4.2.3 Omission of particles and recoverability

As mentioned in Section 3.2.4, particles are utilized in Korean to mark parts of speech or information structure, or other grammatical elements. Including postpositions or case markers (nominative -i/-ka, accusative -(l)ul, genitive -uy, dative -ey(key), locative -ey(se), instrumental -(u)lo, and comitative -hako/-(k)wa/-(i)lang) and informational clitics (topic marker -(n)un and additive marker -to), these case markers have been thought of as being "generally" optional and may be omitted in informal registers (Kuno, 1976).

Particles such as subject markers, object markers, or topic markers are generally optional in colloquial speech as in (71), but they may not be covert and require surface realization when the marker carries a non-neutral meaning or special focus, such as contrastive topic, as in (72).

(71) khipodu(-ka) caktong(-ul) ha-ni?
    mouse-NOM work-ACC do-Q
    ‘Does the keyboard work?’

    - khipodu(-nun) kocang na-ss-e.
      keyboard-TOP trouble grow-PST-DECL
      ‘(No,) as for the keyboard, it is out of order.’
Particles following contrastively focused elements (marked with the appropriate case marker to express exhaustivity) are also such particles, which are mandatory regardless of formality, registers, or forms of speech.

I propose that the distribution of optional vs. mandatory particles in Korean is governed by whether the particle contains semantic components: basic particles (descriptive subject markers, thematic topic markers, and object markers) are all optional, whereas those including semantic components (exhaustive subject markers, contrastive topic markers, exhaustive object markers, corrective markers, etc.) are all mandatory and are blocked from omission. These "exceptions" to optionality are linked to non-null semantics. This approach provides a unified account of which particles can and cannot be optional in Korean.

Note that this analysis is based on the environment in which particles may and may not be omitted, rather than the environment in which certain particles are favored by overt realization over covert realization when both are perceived as acceptable. In other words, this analysis concerns the factors that block the omission of otherwise optional particles.
From as early as Chomsky (1964), recoverability has been one of the major driving forces for various linguistic phenomena: phonological phenomena such as vowel devoicing in Cheyenne (Milliken, 1983) and syncope in Korean (Bae, 2008), and syntactic phenomena such as syntactic derivation (Hankamer, 1973), null arguments (Roberge, 1986; Kim I., 1992), and sluicing (Romero, 1997), just to name a few. While postpositions purely marking syntactic case (nominative -i/-ka, accusative -(l)ul, genitive -uy, dative -ey(key)) and the topic marker -(n)un in its thematic use are optional, postpositions carrying inherent thematic roles (locative -ey(se), instrumental -(u)lo, comitative -(hako)/(k)wa/(i)lang, and additive -to) are mandatory in Korean. Syntactic cases and thematic topic are predictable by structure, allowing omission of the particle. However, particles bearing inherent thematic roles are not recoverable by structure and often lead to ambiguity without their theta roles being overtly marked, rendering their status as mandatory. The same reasoning applies to topic markers carrying contrastive meaning and case markers carrying contrastive focus--the contrastive, exhaustive, and/or corrective meanings would be lost if deleted, therefore they are not optional.

The link between optionality of an item and its recoverability, or predictability, also gains support from relativization in Chinese. In Chinese, a free relative can be formed on an empty NP-argument head. Being able to predict from the verb the existence of an obligatory empty argument (e.c. for ‘empty category’), the relative clauses (74) and (75) are grammatical.

(74) John xihuan e.c. de
goal like de
 'the thing John likes'

(75) e.c. xihuan John de
goal like John de
 'the one that likes John'
However, a relative clause cannot be formulated as (76) with the intended meaning 'the reason John saw Bill', 'the way John saw Bill', or 'the day John saw Bill', etc, as the reason, the way, the day are adjuncts of the verb, hence, cannot be predicted.

\[(76) \quad *John \quad kanjian \quad Bill \quad de\]

\[\quad John \quad see \quad Bill \quad de\]

'*the reason/way/day John saw Bill'

Although the recoverability condition is insufficient to explain this paradigm, it is a driving force behind the phenomenon (Huang C. T, p.c.). For a full account of the paradigm, the reader is referred to Aoun & Li (2003).

4.2.4 Experiment 2: Contrastive focus in Korean

Studies in first language acquisition of the Korean language reveal that the exhaustive subject marker (a type of contrastive focus) is acquired earlier than the neutral subject marker, as is the contrastive topic marker is acquired before its neutral counterpart is learned (Lee C., 2001). Lee (2001), in his study of acquisition of topic and subject markers, asserts that "[c]hildren are sensitive to focal elements. When markers begin to be employed, they are contrastive or focal ones initially" explaining that "children are more sensitive to these particular functions of the markers that draw their special attention" (p. 4-5). He also finds historical support in Japanese, that the only use of the topic marker wa was contrastive in the eleventh century (Hanamoto, 1959; Lee C., 2001). If heritage language acquisition and/or non-heritage second language acquisition follows the same stage, one may anticipate that these language learners will acquire the contrastive marker before the topic or the subject marker.

Surprisingly, in a reading study of heritage speakers and non-heritage learners of Japanese and of Korean, Laleko & Polinsky (2013) discovered that heritage language speakers of Korean had more difficulty with the accurate use of the topic marker in its contrastive use and the subject marker in its exhaustive use than their neutral counterparts. Heritage learners of Korean
patterned with the control group with regard to most conditions, with the exception of unacceptable omissions of the nominative case marker in its corrective reading and that of the topic marker in its contrastive reading. They explained that Korean and Japanese heritage speakers were "more accurate on rating acceptable sentences with the descriptive ga [-ka/-i in Korean] than sentences with the exhaustive listing ga [op.cit.]" (p. 15) due to the fact that the non-neutral readings involved discourse-level phenomena (subject marker in its exhaustive use and topic marker in its contrastive use), which pose great difficulty for heritage language speakers compared to sentence-level phenomena (e.g. subject marker in its descriptive use and topic marker in its thematic use).

A subject marker attached to an element receiving contrastive focus and a topic marker attached to an element bearing contrastive topic serve as excellent probes for the investigation of comprehension at the syntax-phonology interface. Their attraction of prosodic prominence (which is sometimes carried over to the DPs to which they are attached) and their obligatory nature distinguish themselves from their neutral counterparts. However, from the results of a pilot study of native speakers of Korean with stimuli constructed as in (77), native speakers of Korean tended to not completely accept the use of the contrastive topic marker (receiving less than 4 points on a 7-point likert-type scale), especially without an explicit "I don't know" qualification preceding the given response, presumably due to the uninformative nature of the response without it.

(77)    *Tamtang*   *yaksa-ka*   *cemsim*   *mek-ule*   *ka-ss-ni*?  
responsibility   pharmacist-NOM lunch-ACC   eat-to   go-PST-Q?  
'Did the pharmacist in charge go for lunch?'

-    *kanhosa-NUN*   *cemsim*   *mek-ule*   *ka-ss-e*.
    nurse-CT   lunch   eat-to   go-PST-DECL.  
'(I don't know about the pharmacist in charge, but) the nurse went for lunch.'

Therefore, only the subject marker with its contrastive focus use is employed in the current experiment.
4.2.4.1 Goal and predictions

While Lee's (2001) first language acquisition data suggest that particles marking focal elements are learned at an earlier stage compared to their neutral uses, Laleko & Polinsky's (2013) heritage language study points in the other direction. Do heritage language learners, then, follow a different order of acquisition when particles carrying special meanings are involved? As subject markers used in a non-neutral sense or the topic marker with a contrastive meaning cannot be dealt with without mention of its phonetic/phonological accent pattern, a listening task, as opposed to a reading task as in Laleko & Polinsky's (2013) study, is performed in the current experiment to examine whether auditory input would facilitate the retrieval of discourse-level grammar governing particles with special meanings.

The purpose of the current acceptability rating experiment with auditory stimuli is (i) to confirm that native speakers of Korean indeed disfavor a contrastive focus reading when the case marker attached to the constituent receiving focus is missing, (ii) to test whether auditory stimuli encoding prosodic information would facilitate the understanding of this phenomenon in all types of non-native speakers of Korean, who have been reported to be less likely to learn this phenomenon at even near-native proficiency levels, as predicted by Sorace & Filiaci's (2006) Interface Hypothesis, and (iii) to test the hypothesis that heritage language learners have an advantage over non-heritage learners of the language.

Predictions

(i) Native speakers of Korean will not accept an utterance when the case marker attached to contrastive focus is omitted.

(ii) If prosody helps non-native speakers to understand the relationship between focused nominal structures and the mandatory state of their case markers, the non-native speakers will pattern in parallel with the control group. If prosodic cues do not help with the understanding of focus structures in Korean for the non-native speakers of Korean, they will
still have difficulty not accepting an utterance when the mandatory subject marker is missing
in a focused nominal structure, as is predicted by Sorace & Filiaci’s (2006) Interface
Hypothesis.

(iii) If there is heritage advantage in language acquisition, heritage speakers, compared to the
non-heritage learners, will pattern closer to, if not the same as, the control group. If there is
no heritage advantage, heritage speakers and non-heritage speakers will exhibit patterns
similar to each another that deviate from that of the control group. In the latter case, heritage
speakers may exhibit a pattern that is even further apart from the control group than the non-
heritage group (=heritage disadvantage).

4.2.4.2 Method

Participants

Three groups of speakers of Korean participated in the current study: Native speakers of
Korean (NK), US-born heritage speakers of Korean (HK), and US-born non-heritage learners of
Korean (L2K).

Thirty native speakers of Korean were recruited as a control group to provide baseline
data. An advertisement for recruitment was uploaded on the online bulletin boards of Ewha
Womans University, Hanyang University, and Korea University in Seoul, Korea. Participants
signed up by providing information on their gender, age, the Korean dialect their parents and they
used (if applicable), along with a contact email address, to which they were sent a link for the
experiment. All the participants were born and residing in Korea at the time of the experiment,
and had no or little experience (less than one year) living in another country.

Seventy-three US-born non-native speakers of Korean from various parts of the US
initially participated in the current experiment. They signed up to take part in the experiment by
providing demographic information in a survey for which the link was provided in the email
advertisements sent to Korean-American Associations and Korean instructors at semi-randomly selected universities across the USA.\(^{13}\)

Based on their answers to the survey questions pertaining to the languages spoken between their parents, the non-native speakers of Korean were then divided into two groups: those whose parents primarily used Korean to communicate to each other were classified as heritage speakers of Korean (HK), and those whose parents primarily used English or another language to communicate to each other were labeled as non-heritage learners of Korean (L2K). All participants in the non-native speakers of Korean groups (HK and L2K) were born in the USA and were living in the USA at the time of the experiment. They had no or little experience (less than 1 year) living in Korea.

Also asked of the non-native groups was the language of communication used by the subjects with their parents, in order to have a better understanding of the home environment in which the language was used, especially of the HK group. Among the thirty participants in the HK group, eighteen communicated with their parents primarily in Korean. The rest varied in the level of exposure to Korean. Three participants used Korean to primarily communicate with the mother, while they used English to primarily communicate with the father. Some participants received Korean input with output in a different language (i.e. English), a pattern peculiar to the heritage language environment: Two had both of their parents speak to them in Korean, to which they responded in English, three were exposed to Korean at home only when their mother spoke the language to them, and one was exposed to Korean at home only when his father spoke the language to her. Three overheard the Korean language being spoken when their parents were primarily using the language to communicate with each other, but the participants used English to communicate with their parents.

\(^{13}\) The contact information of Korean instructors at American universities was taken from the American Association of Teachers of Korean website (http://www.aatk.org).
In order to control for levels of proficiency between the non-native speaker groups, two devices were used. To set the higher boundary, participants with more than four years of Korean education in a classroom setting were eliminated from analyses\(^\text{14}\). In order to set the lower boundary, embedded proficiency fillers were used: To estimate the participant's stage of acquisition, three question and answer pairs with the use of the topic marker -(n)un and the particle -to 'too,' were employed. Participants who missed one or more question out of the three were eliminated from analysis\(^\text{15}\). The demographic information of participants for analyses selected through these two processes included in Experiment 2 (and Experiment 3) is offered in Table 8.

<table>
<thead>
<tr>
<th></th>
<th>NK</th>
<th>HK</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>30 (f=19)</td>
<td>30 (f=22)</td>
<td>26 (f=16)</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>23.13 (sd=2.75)</td>
<td>22.07 (sd=3.55)</td>
<td>20.23 (sd=1.88)</td>
</tr>
<tr>
<td>Born and residing in ...</td>
<td>Korea</td>
<td>USA</td>
<td>USA</td>
</tr>
<tr>
<td>Primary language of communication between parents</td>
<td>(Korean)</td>
<td>Korean</td>
<td>English/Others(^\text{16})</td>
</tr>
<tr>
<td>Proficiency score (out of 16)(^\text{17})</td>
<td>14.8 (sd=1.00)</td>
<td>11.30 (sd=1.91)</td>
<td>7.77 (sd=2.20)</td>
</tr>
<tr>
<td>First exposure to Korean in a classroom setting</td>
<td>n/a</td>
<td>Varies(^\text{18})</td>
<td>Age 18 or above</td>
</tr>
<tr>
<td>Korean classes (in years)</td>
<td>n/a</td>
<td>1.93 (sd=1.11)</td>
<td>1.38 (sd=0.75)</td>
</tr>
</tbody>
</table>

Table 8. Demographic information of participants in Experiments 2 & 3

All participants received a small payment for their participation, and were naive with respect to the purpose of the experiment. Their ages ranged from 18 to 35 years.

As was mentioned earlier, participants who have given appropriate scores for two out of the three filler questions testing the acquisition of -ka 'NOM' and -to 'too' were included in the analyses. This was because the current experiment relied on the assumption that the participants

\(^\text{14}\) Data from seven participants who were originally categorized into the HK group were discarded through this process.

\(^\text{15}\) Data from two participants who were originally categorized into the HK group and from eight participants who were originally categorized into the L2K group were discarded through this process.

\(^\text{16}\) Seven participants reported that their parents primarily used a language other than Korean or English to communicate to each other: Five had Chinese-speaking parents, one had Vietnamese-speaking parents, and the remaining one had Spanish-speaking parents.

\(^\text{17}\) Refer to the Materials section for more information on the proficiency score.

\(^\text{18}\) Between ages 0 and 5: 1, between ages 6 and 12: 9, between ages 13 and 17: 1, age 18 or above: 8, no classroom experience: 1
had already acquired the neutral (descriptive) use of the subject marker, which is mastered at a similar stage as the thematic topic and -to 'too' or -man 'only' (Lee C., 2001). Hence, these three proficiency filler questions acted as simple devices to eliminate from the current analyses those subjects who were deemed not to have acquired the use of the topic marker and the -to, which are acquired at about the stage when children acquire the topic marker, along with -man 'only.'

**Materials**

Participants were prompted to listen to two critical types of question-answer pairs, as exemplified in (78): (a) the response containing a contrastive focus with an overt subject marker, and (b) the (unacceptable) response with a null marker.

(78) An example item for Experiment 2

```
khoyothey-ka sewul tongmwulwen-ey iss-ni?
coyote-NOM Seoul zoo-LOC exist-Q?
‘Is there a coyote in Seoul Zoo?’
```

a. - holangi-ka ku tongmwulwen-ey iss-e.
tiger-NOM that zoo-LOC exist-DECL
‘(No,) it is a tiger that is in the zoo.’

b. - holangi-Ø ku tongmwulwen-ey iss-e.
tiger that zoo-LOC exist-DECL
‘#A tiger is in the zoo.’

Although all of the questions and the responses were grammatical, the response in (b) was unacceptable in this context, as the particle following a constituent receiving contrastive focus may not be covert. However, the same clause would have been acceptable as a response to the following question, for instance, in which the context allowed a neutral topic reading, i.e. the previous conversation had revolved around tigers, and the speaker wanted to provide information about tigers to his or her listeners:
The acceptability rating of the question-answer pair was taken as a measure of acquisition of the contrastive focus. Condition (a) was expected to be significantly more acceptable than condition (b), if the participant had acquired the correct use of contrastive focus.

To compare how language speakers accept certain types of syntactic structures, one may ask a language speaker to rate the acceptability of (78)a and (78)b. And to generalize the findings to sentences sharing certain syntactic/semantic properties, the researcher may construct many more pairs of the same sort and ask the participant to provide acceptability ratings. Then, the average acceptability rating for each of the two conditions could be extrapolated to represent the participant's attitudes toward the two types of conditions.

However, there have been studies claiming that "certain types of sentences that were initially judged ungrammatical begin to sound increasingly acceptable" (Snyder, 2000, p. 575). Hence, in order to prevent judgment fatigue or satiation effects from affecting the acceptability of the items (Snyder, 2000; Goodall, 2004; Crawford, 2012), it was imperative that no participant was exposed to the same sequence of words in a question more than once, and that exposure to a certain type of syntactic structure be minimized.

Therefore, an experimental design that would reduce the satiation effects, while providing a good comparison among different types of syntactic structures, was in order. To reduce lexical satiation effects, the experiment was designed so that a participant, for each item, would see only one of the conditions, which was randomly chosen by the computer. To minimize
syntactic satiation effects, one participant was only exposed to a maximum of eight items per condition. At the same time, all items were carefully matched as closely as possible for construction and length, so that comparison among different conditions would be reasonable across different items. Sixteen question-answer pairs formed the items in this experiment. For each question, two types of answers were formulated by only varying the existence of the subject marker (subject marker vs. null marker). Each question yielded two conditions. The present tense was used both in the question and the answer, although the past tense would have been just as good. The –ka allomorph was chosen to be used as a subject marker. To control for length, the question contained 17 syllables, and the response was 11 syllables for condition (a) but only 10 syllables for condition (b), which did not have any particles attached to the subject. A noun with three syllables was selected as a subject for both the question and the answer. Intransitive verbs were used, as using transitive verbs could have created unintended interpretations for conditions (b). Animate subjects were used instead of inanimate subjects, considering that people prefer sentences with animate entities before possible inanimate entities (Branigan, Pickering, & Tanaka, 2008). With all of these factors taken into account, the following served as the template for each item.

(80) The template of an item in Experiment 2:


A: ZZZ{-ka/-ø} adv. Y(Y)(Y)-e. ZZZ{-NOM/-ø} adv. Y(Y)(Y).PRES-DECL.

The stimuli were normalized in terms of acceptability and the level of vocabulary by three native speakers of Korean.
The normalized stimuli were then recorded by male and female native speakers of Korean, who worked as voice actors and spoke Standard Korean. Half of the stimuli started with a female voice with a reply in a male voice, and the other half started with a male voice with a reply in a female voice. The order of items and selection among the two conditions for each item were randomized for each participant. The same went for fillers, which will be described subsequently.

In addition to the 16 test items constructed in 2 conditions each, 30 filler items were added in order to mask the purpose of the experiment, 16 of which served as test items for Experiment 3\textsuperscript{19}. The remaining 16 fillers were devised as a proficiency test to check the native speaker's attentiveness and to determine the non-native speakers' proficiency. The proficiency filler items consisted of dialogues testing tense, causal/temporal connectives, particles indicating duration, instrumental adverbials, yes/no questions, etc.

As far as scoring of the proficiency fillers is concerned, the following technique was used. For an acceptable item such as in (81), it was counted as "correct" if a participant gave the three highest scores on the 7-point scale (7 totally acceptable, 6 acceptable, 5 slightly acceptable) as their acceptability rating scores. For an unacceptable item as in (82), it was counted as "correct" if a participant gave the three lowest scores on the 7-point scale (1 totally unacceptable, 2 unacceptable, or 3 slightly unacceptable).

\begin{align*}
\text{(81)} & \quad \text{A:} \quad mwues-ulo & \quad kulum-ul & \quad kuly-ess-ni? \\
& \quad \text{what-INS} & \quad \text{drawing-ACC} & \quad \text{draw-PST-Q} \\
& \quad \text{'What did you use to draw/paint (the) drawing?'} \\
\text{B:} & \quad khuleyyong-ulo & \quad kulum-ul & \quad kuly-ess-e. \\
& \quad \text{crayon-INS} & \quad \text{drawing-ACC} & \quad \text{draw-PST-DECL} \\
& \quad \text{'I drew/painted it with crayons.'}
\end{align*}

\textsuperscript{19} Three out of four conditions in the 16 items in Experiment 3 were acceptable question-response pairs.
Half of the proficiency fillers consisted of acceptable question-answer pairs, although all questions and responses were individually grammatical in form.

**Procedure**

The same procedure was followed as in Experiment 1. As the target language was Korean, practice sessions along with feedback contained examples in Korean.

For example, a rating of 7, 6, or 5, for the acceptable pair in (83) would trigger a positive feedback (i.e. *Correct. Thank you for providing an appropriate score.*), while it would trigger a negative feedback for ratings 1, 2, 3, or 4 followed by suggested corrections (i.e. *Incorrect. The response was acceptable, so 7(totally acceptable), 6(acceptable), or 5(slightly acceptable) are appropriate scores. Please re-play the dialogue and confirm your choice.*).

Conversely, an unacceptable pair (84) would generate a positive feedback for the ratings 1, 2, or 3 (i.e. *Correct. Thank you for providing an appropriate score.*), while a negative feedback for ratings 7, 6, 5, or 4 (i.e. *Incorrect. The response was unacceptable, so 1(totally unacceptable), 2(unacceptable), or 3(slightly unacceptable) are appropriate scores.*).
A: *mwues-ul*  *kulim-ul*  *kuly-ess-ni?*
what-INS drawing-ACC draw-PST-Q
'What did you use to draw/paint (the) drawing?'

B: *tohwaci-ey*  *kulim-ul*  *kuly-ess-e.*
drawing.paper-LOC drawing-ACC draw-PST-DECL
'†I drew/painted it on (a piece of) drawing paper.'

### 4.2.4.3 Results

Differences in acceptability ratings between the two conditions were compared for each participant group across subjects. Table 9 represents mean acceptability ratings for the 16 target question-answer pairs in the 2 conditions. The box and whiskers plot for the participants' acceptability ratings by conditions across groups is offered in Figure 6.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>NK (N=30)</th>
<th>HK (N=30)</th>
<th>L2K (N=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. subject marker (bearing contrastive focus)</td>
<td>4.32</td>
<td>4.13</td>
<td>4.27</td>
</tr>
<tr>
<td>b. null marker</td>
<td>1.95</td>
<td>3.17</td>
<td>4.53</td>
</tr>
</tbody>
</table>

Table 9. Mean acceptability ratings in Experiment 2

![Figure 6. Box and whiskers plot for acceptability ratings by conditions in Experiment 2](image)
The box and whiskers plot shows comparable ratings among the three participant groups for the pairs expressing contrastive focus with overt subject markers (condition a), although the median for the NK group is higher (coinciding with the Q3 boundary) than those for the other two groups (HK & L2K). On the other hand, there is a contrast in ratings among the three participant groups for the pairs expressing contrastive focus with null markers (condition b). While the NK group rated this condition unacceptable, the L2K group rated this condition as acceptable as, if not more acceptable than, the condition with the overt marker. The HK group showed variability with the median lying between that of the other two groups.

The independent variables used in the analysis are listed in Table 10. Shown in Table 11 are the fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting a linear model to the data in Experiment 2. The dependent variable is the acceptability rating score from one to seven.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMITTED</td>
<td>0</td>
<td>Subject marker (bearing contrastive focus) (condition a)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Null subject marker (condition b)</td>
</tr>
<tr>
<td>L2</td>
<td>0</td>
<td>Native speakers of Korean (NK)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&amp; Heritage speakers of Korean (HK)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Non-heritage L2 learners of Korean (L2K)</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>0</td>
<td>Non-heritage L2 learners of Korean (L2K)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&amp; Native speakers of Korean (NK)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Heritage speakers of Korean (HK)</td>
</tr>
</tbody>
</table>

Table 10. The levels of factors used for analysis in Experiment 2

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>3.65</td>
<td>0.17</td>
<td>21.87</td>
<td>0.000</td>
</tr>
<tr>
<td>OMITTED</td>
<td>-1.67</td>
<td>0.14</td>
<td>-11.78</td>
<td>0.000***</td>
</tr>
<tr>
<td>L2</td>
<td>0.52</td>
<td>0.23</td>
<td>2.29</td>
<td>0.022*</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>-0.02</td>
<td>0.22</td>
<td>-0.07</td>
<td>0.942</td>
</tr>
<tr>
<td>OMITTED:L2</td>
<td>2.02</td>
<td>0.21</td>
<td>9.80</td>
<td>0.000***</td>
</tr>
<tr>
<td>OMITTED:HERITAGE</td>
<td>1.20</td>
<td>0.20</td>
<td>6.04</td>
<td>0.000***</td>
</tr>
</tbody>
</table>

Table 11. The fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting linear model to the data in Experiment 2
The baseline was set with the native speaker group (NK)'s rating of the pair with the overt subject marker in the subject position of the answer bearing contrastive focus (condition a). The regression outputs of acceptability ratings on the variables (OMITTED, L2, HERITAGE) and their interactions suggest statistically significant explanatory power for the factors OMITTED and L2, and the interactions between OMITTED:L2 and OMITTED:HERITAGE. The factor HERITAGE had no explanatory power.

Compared to the acceptability score of 3.65 (the intercept=NK, condition a), omission caused a drop of 1.67 points in the 7-point acceptability rating scale (OMITTED, p=0.000). L2Ks produced an inflation of 0.52 points from the NK baseline (L2, p=0.022), while the HK group's overall ratings did not differ from those of the control group (HERITAGE). Also, interactions of omission and each of the non-native speaker groups were observed: the omission in the L2Ks caused a hike of 2.02 points from the baseline (OMITTED:L2, p=0.000), an opposite pattern (-1.67+2.02=+0.35) from the control group (-1.67), while the omission in the HKs caused an increment of 1.20 points from the baseline (OMITTED:HERITAGE, p=0.000), a less robust pattern (-1.67+1.20=−0.47) compared to the control group (-1.67).

4.2.4.4 Discussion

As predicted, native speakers of Korean did not accept an utterance when the case marker attached to contrastive focus was omitted. For non-native speakers of Korean, prosodic information did not provide as much assistance in understanding the relationship between focused nominal structures and the mandatory state of their case/topic markers. The L2K group had difficulty with this phenomenon involving the interface of syntax, discourse, and phonology. But heritage speakers, compared to the non-heritage learners, patterned between the NK and the L2K groups.
As a corrective response to a question, the response received a significantly low acceptability rating score from the native speakers of the language when the subject marker was omitted (which I will dub the full omission effect), in which case the subject would have been interpreted as a neutral descriptive subject or a theme, instead of a subject bearing corrective or contrastive focus. Both of the non-native speaker groups diverged from this baseline result.

The L2K group displayed a reverse omission effect, in which the response with the null subject marker received a higher acceptability rating score than the overt subject marker. This does not readily mean the L2K group internalized a grammar in which the utterance without the subject marker was interpreted as carrying contrastive focus, rather than the one with the subject marker. In fact, previous studies reveal that non-native speakers of a language tend to inflate the scores when an acceptability/grammaticality rating task is given to them, as their linguistic uncertainty often causes inflation of rating scores (Benmamoun, Montrul, & Polinsky, 2013). Therefore, the results for the L2K group not exhibiting the omission effect should be interpreted as the L2K group not having learned the mandatory state of the subject case marker when contrastive focus is placed on the subject.

One may disagree with the current interpretation, and raise the issue of modality--that there may not have been enough temporal resources for the subjects to process particles online, and they may have a tendency to ignore functional elements used in speech. If they were presented in a different modality, i.e. writing instead of speech, the subjects might have been able to distinguish the presence vs. the absence of the subject particle and to process their information-structure implications. However, Laleko & Polinsky's (2013) reading experiments demonstrated non-native speakers’ difficulty in their comprehension and use of non-neutral case/topic markers. Moreover, a short post-experiment survey of five randomly selected participants of the L2K group (of which four replied) eliminates this possibility. According to this written survey, in which a representative question-answer pair was embedded along with representative
"proficiency" fillers to check for validity, the acceptability of the answer in the answer-question pair containing the subject marker attached to the item intended to receive contrastive focus received no higher a rating score than one without the subject marker on the item. As in the listening experiment, the participants' acceptability ratings did not deteriorate when the subject marker marking contrastive focus was missing. This carefully excludes the possibility of participants not having enough processing time for markers in our listening experiment.

The current outcome is unexpected, as the most widely used textbook at the university-level, according to the American Association of Teachers of Korean (AATK) website, explicitly explains and exemplifies this phenomenon in the first volume:

We have learned that nominals (nouns, pronouns, numerals, etc.) may be marked with a particle, such as [-ka/-i] for subjects ... and [-l(l)i] for objects ... In conversation, however, particles are frequently omitted. ...[ Nonetheless, even in conversation,] a particle is necessary when the speaker wants to focus on a specific element the speaker assumes the listener is not thinking of. (Cho, Lee, Schulz, Sohn, & Sohn, 2009, p. 87)

On the other hand, the other non-native group (HK) exhibited a reduced omission effect, in which the difference in ratings between the response with and without the overt subject marker was not as robust as the control group, albeit significantly different. The result was predicted by Laleko & Polinsky's (2013) findings that heritage language speakers of Korean still had some difficulty with the accurate use of the subject marker in its exhaustive use in their reading tasks. However, given Lee’s (2001) first language acquisition data, which indicate that particles marking focal elements are learned before those with neutral meanings, the results of the current experiment at first glance look contradictory. However, the current findings do not in fact contradict Lee’s findings. What he found was that the children’s production of particles with
focus merely preceded their production of those with neutral uses. The learning of the focal element marking particles in his data may not have included complete acquisition of their use, including the unavailability of omission. Overgeneralizing the optionality of case- or topic-marking particles, children in his study might as well have produced a result similar to that of the heritage learners in our study. A study of children's ability to recognize the unavailable omission of case/topic markers on focused elements is left to future research.

A heritage advantage over the non-heritage group was observed in the current experiment--although the heritage group did not show a full omission effect, they showed some omission effect. As in Laleko & Polinsky's (2013) reading study, the heritage group stood in between the control group and the L2K group, who were less likely to have learned this relationship.

For non-native speakers of Korean, prosodic information did not provide much assistance in understanding the relationship between focused nominal structures and the mandatory state of their case/topic markers. As was predicted by Sorace & Filiaci's (2006) Interface Hypothesis, both groups of non-native speakers had difficulty with this phenomenon involving the interface of syntax, discourse, and phonology.

Contrastive focus in English and that in Korean are expressed in different ways. While prosodic prominence plays the key role in English in expressing contrastive focus, the attached case- or topic-marking particle, which is otherwise considered optional, is mandatory in Korean. As prosodic prominence plays a secondary role in expressing contrastive focus in Korean, the placement of prosodic prominence in Korean is less rigid--the speaker has the option of placing prosodic prominence on the focused element or on the particle attached to it. While contrastive focus is realized with prosodic prominence in English, it is borne by case particles in Korean, abating the effect of prosodic cues.
4.3 Indefinites and *wh*-words in Korean

It is frequently stated that *wh*-in-situ languages, such as Mandarin Chinese, often use *wh*-words as indefinites and possess question markers (Huang, 1982; Cheng, 1991; Aldridge, 2007; See Bruening, 2007 for refutation). The Korean language is also considered a *wh*-in-situ language, and uses *wh*-words as indefinites. Indefinite pronouns and *wh*-words share the same lexical items, as in (85).

(85)

<table>
<thead>
<tr>
<th>Indefinite pronoun</th>
<th><em>wh</em>-word</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>nwuku</em></td>
<td>'someone' 'who'</td>
</tr>
<tr>
<td><em>mwues</em></td>
<td>'something' 'what'</td>
</tr>
<tr>
<td><em>etten</em></td>
<td>'some kind of' 'which'</td>
</tr>
<tr>
<td><em>encey</em></td>
<td>'sometime' 'when'</td>
</tr>
<tr>
<td><em>eti</em></td>
<td>'somewhere' 'where'</td>
</tr>
<tr>
<td><em>ettehkey</em></td>
<td>'somehow' 'how'</td>
</tr>
</tbody>
</table>

Distribution-wise, indefinite pronouns can be used in declarative sentences (86)a, but *wh*-words cannot (86)b.

(86)  

a. *Nwuka* *ku uyca-lul pely-ess-e.*  
someone that chair-acc dump-PST-DECL  
‘Someone threw away the chair.’

b. *Nwuka* *ku uyca-lul pely-ess-e.*  
who that chair-acc dump-PST-DECL  
‘*Who threw away the chair.’

In interrogative sentences, indefinites, as with any other nouns, trigger yes-no questions (87)a, but *wh*-words trigger *wh*-questions, or constituent questions (87)b. In writing, indefinites or
wh-words used in (Standard Korean) interrogatives generate ambiguity, which can be resolved based on the context in which they were produced.

(87)  

a. **Nwuka ku uyca-lul pely-ess-e?**  
    someone that chair-acc dump-PST-Q?  
    ‘Did someone throw away the chair?’

b. **Nwuka ku uyca-lul pely-ess-e?**  
    who that chair-acc dump-PST-Q?  
    ‘Who threw away the chair?’

This ambiguity is resolved in the Southeastern Korean dialect, or Southern Kyeongsang (SK) dialect, which is a tonal dialect. In this dialect, lexical pitch contrasts have been preserved from Middle Korean (Lee S. O., 1978), lending two different prosodic patterns to the otherwise ambiguous lexical item nwuka 'who/someone'. In addition to the lexical pitch contrasts, this dialect employs two different question markers: -na to mark a yes-no question, and -no to mark a wh-question.

(88)  

a. **Nwuka ku uyca-lul pely-ess-na?**  
    someone that chair-acc dump-PST-Q?  
    ‘Did someone throw away the chair?’

b. **Nwuka ku uyca-lul pely-ess-no?**  
    who that chair-acc dump-PST-Q?  
    ‘Who threw away the chair?’

In the SK dialect, as in Turkish (Choi H.-W., p.c.), there is visible Spec-head agreement of the [+wh] feature in the CP layer, to put it within the Principles and Parameters framework. This is an interesting phenomenon at the syntax-phonology interface, as neutralization of these two question markers into -ni (plain) or -e (intimate), depending on the speech level (plain, intimate, familiar, blunt, polite, and deferential), in the Standard Korean dialect produces ambiguity in writing.
On the other hand, there is no ambiguity between the two structures in speech due to a significant prosodic difference between the two sentences generated by the lexical item, which previous studies have identified as different boundary tones (Martin, 1951; Choe, 1985; Lee H.-Y., 1990), "phonological prominence" of the wh-word (Chang, 1973; Chae, 1985), high pitch of the wh-word (Cho, 1990) (as cited in Jun & Oh, 1996), intonational focus of the wh-word leading to delimitation of the phonological boundary with the following phonological word (Cho, 1990), or the wh-word causing elimination of the Accentual Phrase boundary (Jun & Oh, 1996), which will be further elaborated in the paragraph below.

According to the Korean prosody model (Jun, 1993), there are two tiers above a phonological word, an Accentual Phrase and an Intonational Phrase. An Accentual Phrase "is marked by a phrase-final rising tone" in Standard Korean (the dialect spoken in Seoul) (Jun & Oh, 1996, p. 39) and, according to Jun (1996), has two alternate forms: "If the [phrase initial] segment is either an aspirated or tense obstruent, the [Accentual P]hrase has a HHLH pattern, otherwise the phrase has a LHLH pattern" (as cited in Jun & Oh, 1996, p. 39). Above the Accentual Phrase lies the Intonational Phrase, which consists of one or more Accentual Phrases and "is marked by a boundary tone and a phrase-final lengthening followed by an optional pause" (p. 39). Within this framework, an indefinite pronoun forms one Accentual Phrase, while a wh-word combined with the following verb form one Accentual Phrase (Jun & Oh, 1996).

Although the lexical items do not carry tones or prosody by themselves, for the most part, a wh-word used in a sentence may be phonetically described as ending with a high F0, or bearing a high pitch, and phonologically as triggering de-phrasing of the interrogative clause. The recordings used in the upcoming experiment (Experiment 3) verify these points. Sixteen pairs of wh-questions and yes/no questions (with each pair sharing the same sequence of words) were analyzed. One of the sixteen pairs is given in (87), copied below as (89), with the rest supplied in Appendix A, Stimuli for Experiment 3.
Figure 7 presents the normalized pitch contours of the sixteen pairs of utterances (=32 utterances). As half of the sixteen pairs were recorded by a female voice, and the other half a male voice, Z-scores of the mean F0 values for each syllable were calculated for each utterance.

The F0 contour of the sentence bearing the indefinite interpretation of *nwuka* exhibits three distinct Accentual Phrases (*nwuka*, this/that NP-ACC, and verb-PST-Q). However, in the F0 contour of the sentence with the *wh*-word interpretation, there is a boost of the peak in *nwuka*,...
with a "post-focal compression with the entire S forming one prosodic constituent" (Kenstowicz, p.c.).

The patterns of the two types of sentences resemble those of accented vs. deaccented words in English. Haida (2007) in Chapter 6, surveyed many languages in which \textit{wh}-words carry focus, and concluded that \textit{wh}-words intrinsically carry focus. A similar pattern is observed in Korean: as was observed in sentences with contrastive or correctional focal elements, elements that appear to the right of the \textit{nwuka} fail to carry any pitch accent when \textit{nwuka} is used as a \textit{wh}-word. On the contrary, indefinites are known to avoid accents. Consider the following examples.

(90) What happened?
   a. Daddy bought a CAKE.
   b. Daddy BOUGHT something.

(91) What happened?
   a. Some KID fell.
   b. Someone FELL.

As a response to the question \textit{What happened?}, one may respond with \textit{Daddy bought a cake} in which the natural accent falls on \textit{a cake}, but if the indefinite pronoun \textit{something} is used instead of the direct object \textit{cake}, the accent necessarily falls on the element preceding it. This is due to the accent avoiding falling on indefinite elements (Kenstowicz, p.c.).

4.3.1 Experiment 3: Indefinites and \textit{wh}-words in Korean

4.3.1.1 Goal and predictions

Although the \textit{wh}-word/indefinite paradigm in Korean has attracted quite a bit of research, to my knowledge, the acquisition of their phonological features by non-native learners of the language has not been studied. However, this is an area of research that may tell us more about
characteristics of the acquisition of the syntax-phonology interface, which may further aid practitioners to help students reach more native-like performance of the language.

By studying to what extent non-native speakers of Korean employ phonetic and phonological cues to distinguish the differences in syntactic properties (\(\pm \text{wh}\)) generated by the Korean \textit{nwuka 'who/someone.NOM}', I hope to shed light on the acquisition of the prosodic cues differentiating the syntax-phonology interface by learners of the language, which is predicted to be an area of difficulty even for advanced learners of the language. In the investigation, two different groups of non-native speakers of Korean were the subject of investigation: non-heritage language learners of Korean, who are adult learners of the language as a second language, and heritage speakers of Korean, who have been exposed to Korean in their childhood.

Given the two interpretations of an interrogative clause generated by two homonyms, what type of a response would one produce after processing the distinct meanings? Following a \textit{wh}-question, one would anticipate an answer to the constituent under inquiry (92). On the other hand, a yes/no question asks whether the proposition is true, strictly speaking, but also pragmatically allows a constituent answer, as it provides additional, albeit unasked for, information (93).

\begin{align*}
(92) & \quad \text{Who threw away the chair?} \quad - \text{John did.} \\
& \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \quad \qwertyuiop
a request for information (an appropriate answer for the question *Do you have the time?* in English may be *It’s five o’clock*, instead of *Yes, I have the time.*) or an action (*Could you pass me the salt?* meaning *Pass me the salt, please* instead of a yes/no question). This asymmetry between constituent questions and wh-questions was used to evaluate the listener’s comprehension of the clause as a *wh*-question or a yes/no question in the current experiment.

**Predictions**

(i) The control group will rate a constituent answer to a *wh*-question more acceptable than a yes/no answer to a *wh*-question. At the same time, they will accept to some degree both types of answers to a yes/no question.

(ii) If prosody helps non-native speakers to distinguish a *wh*-word from an indefinite, the non-native speakers will pattern with the control group. If prosodic information does not help them to distinguish the two meanings of the homonym, both heritage speakers of Korean and non-heritage learners of Korean alike will deviate from the control group's pattern.

(iii) If there is heritage advantage in language acquisition, heritage speakers, compared to the non-heritage learners, will pattern closer to, if not the same as, the control group. If there is no heritage advantage, heritage speakers and non-heritage speakers will exhibit patterns similar to each another that deviate from that of the control group. In the latter case, heritage speakers may exhibit a pattern that is even further apart from the control group than the non-heritage group (=heritage disadvantage).

**4.3.1.2 Method**

**Participants**

Participants for the current experiment overlap with those for Experiment 2. To recapitulate, thirty native speakers of Korean living in Korea (NK), thirty non-native speakers of Korean whose parents primarily communicated in Korean at home (HK), and 26 non-native
speakers of Korean whose parents primarily communicated in a language other than Korean at home (L2K) participated in the experiment.

The demographic information of participants for Experiment 3 (and Experiment 2) is offered in Table 8, replicated here as Table 12.

<table>
<thead>
<tr>
<th></th>
<th>NK</th>
<th>HK</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants</td>
<td>30 (f=19)</td>
<td>30 (f=22)</td>
<td>26 (f=16)</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>23.13 (sd=2.75)</td>
<td>22.07 (sd=3.55)</td>
<td>20.23 (sd=1.88)</td>
</tr>
<tr>
<td>Born and residing in</td>
<td>Korea</td>
<td>USA</td>
<td>USA</td>
</tr>
<tr>
<td>Primary language of</td>
<td>Primary language of communication</td>
<td>Primary language of communication</td>
<td></td>
</tr>
<tr>
<td>communication between</td>
<td>(Korean)</td>
<td>Korean</td>
<td>English/Others²¹</td>
</tr>
<tr>
<td>parents</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proficiency score (out</td>
<td>14.8 (sd=1.00)</td>
<td>11.30 (sd=1.91)</td>
<td>7.77 (sd=2.20)</td>
</tr>
<tr>
<td>of 16)²²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First exposure to</td>
<td>n/a</td>
<td>Varies²³</td>
<td>Age 18 or above</td>
</tr>
<tr>
<td>Korean in a classroom</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korean classes (in years)</td>
<td>n/a</td>
<td>1.93 (sd=1.11)</td>
<td>1.38 (sd=0.75)</td>
</tr>
</tbody>
</table>

Table 12. Demographic information of participants in Experiments 2 & 3

Materials

Participants were prompted to listen to four critical types of question-response pairs, as exemplified in (94): (a) a *wh*-question & constituent answer pair, (b) a *wh*-question & yes/no answer pair, (c) a yes/no question & constituent answer pair, and (d) a yes/no question & yes/no answer pair.

(94) An example item for Experiment 3

   who that chair-acc dump-PST-Q? Younghee-NOM dump-PST-DECL
   ‘Who threw away the chair?’ ‘Younghee dumped (it).’

b. - #ung. *nwuka pelyesse.*
   Yes. Someone dump-PST-DECL
   ‘#Yes. Someone dumped (it).’

²¹ Seven participants reported that their parents primarily used a language other than Korean or English to communicate to each other: Five had Chinese-speaking parents, one had Vietnamese-speaking parents, and the remaining one had Spanish-speaking parents.

²² Refer to the Materials section for more information on the proficiency score.

²³ Between ages 0 and 5: 1, between ages 6 and 12: 9, between ages 13 and 17: 1, age 18 or above: 8, no classroom experience: 1
All questions and answers were individually grammatical in form. However, the acceptability of the response differed depending on the type of question that was asked. The acceptability rating of the response was taken as the measure of interpretation of *nwuka* embedded in the question as a *wh*-word or as an indefinite pronoun. If the listener interpreted the question as a *wh*-question as in (94)a and (94)b, the constituent answer (94)a would be acceptable, while the yes-no answer (94)b would not be. If the listener construed the question as a yes-no question as in (94)c and (94)d, both the constituent answer (94)c and the yes-no answer (94)b would be acceptable, to an extent. The experiment was designed with these four critical conditions in mind.

In the current experiment, *nwuku* 'who/someone', among the six entries that are ambiguous between the *wh*-word and the indefinite word as was listed earlier in (85), was selected in its nominative form (=*nwuka* 'who/someone.NOM') as the critical word for each item. In order to control for tense, all questions were constructed in the past tense (although they could have been constructed in the present tense altogether), and in order to control for argument structure, only transitive verbs were used (although intransitive verbs or bi-transitive verbs could have been used instead). The object of the verb was overt in the questions but covert in all of the responses, for repeating each time the object of the verb in the answer would sound clumsy. As for the selection of the NPs serving as subjects of the constituent answers, NPs ending with vowels were chosen, so that the subject allomorph *-ka* would follow rather than the post-consonantal variant *-i*, which is known to cause processing difficulty to heritage language speakers (Benmamoun, Montrul, & Polinsky, 2013; Laleko & Polinsky, 2013). The length of
each item was controlled for by limiting the number of syllables in the question to nine, and the answer to six. The following served as the template for each item.

(95)  Experiment 3. Template of an item

A:  *nwuka*  *i*  *XX-(l)ul*  *Y-(a/e)ss-e?*

who/someone.NOM this NP-ACC verb-PST-Q

B:  *ZZ-ka*  *Y-(a/e)ss-e.*  OR  *Ung.  nwuka*  *Y-(a/e)ss-e.*

NP-NOM verb-PST-DECL.  Yes. Someone verb-PST-DECL

A two-by-two factorial design was used for this experiment. Sixteen items were created with two factors (*wh*-question / constituent question) each taking two levels (constituent answer / yes-no answer). Namely, each of the string of words forming a question yielded four conditions, and sixteen strings of words forming two types of questions (*wh*- and constituent) served as prompts for the two types of response, a constituent answer or a yes-no answer.

(96)  Experiment 3. Four conditions of an item

Condition a. a *wh*-question paired with a constituent answer

Condition b. a *wh*-question paired with a yes-no answer

Condition c. a yes-no question paired with a constituent answer

Condition d. a yes-no question paired with a yes-no answer

The stimuli were normalized in terms of acceptability and the level of vocabulary by three native speakers of Korean. As in the previous experiment, no participant heard the same question more than once, resulting in a participant only being exposed to one of the four conditions for each item.

Among the four conditions, conditions (a) and (d) were recorded by a female native speaker of Korean and a male native speaker of Korean, both of whom spoke standard Korean and worked as voice actors. They were instructed to speak as naturally as possible considering the context (i.e. the preceding question or the following answer). Then, the question parts of
conditions (a) and (d) were spliced with the response parts of conditions (d) and (a), respectively, creating auditory stimuli for conditions (b) and (c). For each item in Experiment 3, half of the items were asked by the female speaker, to which the male speaker replied. The other half of the items were asked by a male speaker, to which the female speaker responded.

The materials used in Experiment 3, together with an equal number of proficiency fillers, served as fillers for Experiment 2.

**Procedure**

The same procedure was followed as in Experiment 2.

**4.3.1.3 Results**

Differences in acceptability among the four conditions were compared for each participant group across subjects. Table 13 presents mean acceptability ratings for the target question-answer pairs in the four conditions and the three participant groups. The box and whiskers plot for the participants' acceptability ratings by conditions across groups is offered in Figure 8.

<table>
<thead>
<tr>
<th>Conditions</th>
<th>NK (N=30)</th>
<th>HK (N=30)</th>
<th>L2K (N=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. <em>wh</em>-Q &amp; constituent A</td>
<td>6.78</td>
<td>6.82</td>
<td>5.49</td>
</tr>
<tr>
<td>b. <em>wh</em>-Q &amp; yes-no A</td>
<td>2.89</td>
<td>2.62</td>
<td>3.22</td>
</tr>
<tr>
<td>c. yes-no Q &amp; constituent A</td>
<td>5.56</td>
<td>6.42</td>
<td>5.43</td>
</tr>
<tr>
<td>d. yes-no Q &amp; yes-no A</td>
<td>5.61</td>
<td>6.00</td>
<td>3.59</td>
</tr>
</tbody>
</table>

Table 13. Mean acceptability ratings in Experiment 3
Figure 8 demonstrates that except for the *wh*-question & constituent answer pair (a), which the NK group and the HK group thought was overwhelmingly "totally acceptable" (=7 points), the rest of the conditions (a *wh*-question & yes-no answer pair (b), a yes-no question & constituent answer pair (c), and a yes-no question & yes-no answer pair (d)) showed variance among the participants. Nonetheless, the median, along with the inter-quartile range, shows that there is a difference among the four conditions.

The independent variables used in the analysis are listed in Table 14. Shown in Table 15 are the fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting a linear model to the data in Experiment 3.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Coding</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WH</td>
<td>0</td>
<td>Yes/no question (conditions c &amp; d)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Wh- question (condition a &amp; b)</td>
</tr>
<tr>
<td>CONSTITUENT</td>
<td>0</td>
<td>Yes/no answer (conditions b &amp; d)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Constituent answer (conditions a &amp; c)</td>
</tr>
<tr>
<td>L2</td>
<td>0</td>
<td>Native speakers of Korean (NK) &amp; Heritage speakers of Korean (HK)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Non-heritage L2 learners of Korean (L2K)</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>0</td>
<td>Non-heritage L2 learners of Korean (L2K) &amp; Native speakers of Korean (NK)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Heritage speakers of Korean (HK)</td>
</tr>
</tbody>
</table>

Table 14. The levels of factors used for analysis in Experiment 3

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>5.60</td>
<td>0.19</td>
<td>29.81</td>
<td>0.000</td>
</tr>
<tr>
<td>WH</td>
<td>-2.70</td>
<td>0.21</td>
<td>-12.90</td>
<td>0.000***</td>
</tr>
<tr>
<td>CONSTITUENT</td>
<td>-0.00</td>
<td>0.22</td>
<td>-0.00</td>
<td>0.998</td>
</tr>
<tr>
<td>WH:CONSTITUENT</td>
<td>3.88</td>
<td>0.30</td>
<td>12.76</td>
<td>0.000***</td>
</tr>
<tr>
<td>L2</td>
<td>-1.97</td>
<td>0.27</td>
<td>-7.38</td>
<td>0.000***</td>
</tr>
<tr>
<td>WH:L2</td>
<td>2.28</td>
<td>0.31</td>
<td>7.25</td>
<td>0.000***</td>
</tr>
<tr>
<td>CONSTITUENT:L2</td>
<td>1.79</td>
<td>0.32</td>
<td>5.65</td>
<td>0.000***</td>
</tr>
<tr>
<td>WH:CONSTITUENT:L2</td>
<td>-3.38</td>
<td>0.45</td>
<td>-7.55</td>
<td>0.000***</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>0.38</td>
<td>0.26</td>
<td>1.47</td>
<td>0.140</td>
</tr>
<tr>
<td>WH:HERITAGE</td>
<td>-0.65</td>
<td>0.30</td>
<td>-2.17</td>
<td>0.030*</td>
</tr>
<tr>
<td>CONSTITUENT:HERITAGE</td>
<td>0.46</td>
<td>0.30</td>
<td>1.53</td>
<td>0.127</td>
</tr>
<tr>
<td>WH:CONSTITUENT:HERITAGE</td>
<td>-0.12</td>
<td>0.43</td>
<td>-0.28</td>
<td>0.777</td>
</tr>
</tbody>
</table>

Table 15. The fixed-effect parameter estimates, standard errors, significance tests, and p-values obtained by fitting linear model to the data obtained in Experiment 3

Holding the native speaker group (NK)'s rating of the yes/no question with yes/no answer pair (condition d) as the baseline, the regression outputs of acceptability ratings on the variables (WH, CONSTITUENT, L2, HERITAGE) and interactions thereof suggest that WH, L2, and the interactions between WH*CONSTITUENT, WH*L2, CONSTITUENT*L2, WH*CONSTITUENT*L2, and WH*HERITAGE have statistically significant explanatory power.

The regression analysis shows that the acceptability ratings are significantly lower by -2.71 for wh-questions (a&b) than for yes/no questions (c&d) (p=0.000), due to the unacceptability of the wh-question and the yes/no answer pair (b) dragging down the mean value. Providing constituent answers (a&c) and providing yes/no answers (b, d) did not trigger any
statistical difference in acceptability by themselves. However, there is an interaction between \textit{wh}-questions and constituent answers: as a response to a \textit{wh}-question, providing a constituent answer (a) significantly improved the ratings by 3.89 compared to providing a yes/no answer (b) (p=0.001). These baseline results confirm the underlying assumption for this experiment--that the acceptability of the \textit{wh}-question and yes/no answer pair would be rated significantly lower than the \textit{wh}-question and constituent answer pair, while both answers following a yes/no question (triggered by \textit{nuukwu} 'who/someone' judged to be an indefinite pronoun) would be rated relatively high.

Compared to the baseline value (Intercept = NK, condition d), the non-heritage learners of Korean (L2K) group's overall rating scores were 1.97 points lower (p=0.000). The L2K group gave 2.28 higher ratings to pairs containing \textit{wh}-questions (a&b) (p=0.000), 1.79 higher scores to pairs containing constituent answers (a&c) (p=0.000), but 3.38 lower scores to the \textit{wh}-question and constituent answer pairs (a) (p=0.000).

While the NK group gave 2.70 lower ratings to pairs with \textit{wh}-questions (a & b) than those with yes/no questions (c & d) (WH, p=0.000), the L2K group gave 2.28 more points to the pairs with \textit{wh}-questions than did the baseline group (WH:L2, p=0.000). Rather, this group awarded 1.79 points more to question and answer pairs with constituent answers (a & c) than to those paired with yes/no answers (b & d) (CONSTITUENT:L2, p=0.000). This was unexpected, as the CONSTITUENT factor had no explanatory power in the baseline. There was an interaction among \textit{wh}-questions, constituent answers, and the L2K group (WH:CONSTITUENT:L2), but in the direction opposite from the equivalent baseline (WH * CONSTITUENT): Compared to the baseline, which suggested an increase of 3.88 for \textit{wh}-question and constituent answer pairs (a), the L2K group showed a decrease of 3.38 for \textit{wh}-question and constituent answer pairs (a).

The HK group, though, displayed a pattern parallel to the baseline. This group produced no significant interaction with the CONSTITUENT factor (CONSTITUENT*HERITAGE) and
its interaction with WH (WH*CONSTITUENT*HERITAGE). Although they did produce an interaction with WH (WH*HERITAGE), it was not as robust (p=0.030) as the others, and the difference was small (-0.65). In other words, the HERITAGE factor hardly interacted with the other factors.

To sum up, the regression analysis across the groups confirmed that the response pattern of the HK was very similar to the control group with regard to the interpretation of nwukwu depending on prosody, while the L2K group exhibited divergent patterns from the baseline.

4.3.1.4 Discussion

The control group rated a constituent answer to a wh-question more acceptable than a yes/no answer to the wh-question. At the same time, the group accepted both types of answers to a yes/no question, as predicted. With regard to how non-native speakers performed, prosody helped heritage speakers to distinguish a wh-word from an indefinite, but it did not help non-heritage learners to distinguish the two meanings. Heritage speakers had a robust advantage on a level very similar to the control group, compared to the non-heritage learners.

Looking more closely at the results, the baseline control group (NK) gave significantly lower acceptability ratings to the question-response pairs when wh-questions were involved than when yes/no questions were involved, presumably because the wh-question and yes/no answer pair brought down the average rating score. Moreover, the wh-question and constituent answer pair received a significantly higher acceptability rating score, with little variance, compared to the wh-question and yes/no answer pair. A yes/no answer to a wh-question was deemed unacceptable due to the failure to provide meaningful information that was sought by the question-asker. This pattern contrasts with the one in which a constituent answer to a yes/no question was acceptable even without a yes/no answer, as long as the yes/no answer could be inferred from the constituent answer which supplied additional information to what was asked. These results indicate that the
control group was accurately distinguishing the two types of prosody triggered by *nwuka* 'who/someone.NOM' embedded in an interrogative sentence.

Contrary to the pattern exhibited by the baseline data, the L2K group exhibited no interaction between the type of question asked and the type of response, not to mention that the different types of questions (*wh*- or yes/no) and the different types of answers (constituent or yes/no) failed to trigger any significant effects on the acceptability. These results indicate that the ambiguous lexical item (*wh*-word/indefinite pronoun) was not distinguished by the participants categorized as the L2K group, regardless of the prosody used by native speakers of the language to distinguish the two uses. Given that the constituent response was more acceptable than the yes/no answer, to a significant degree, it can safely be deduced that the L2K group was parsing the ambiguous lexical item as a *wh*-word in all conditions. In other words, the results in the current experiment showed that the participants in the L2K group interpreted *nwukwu* as the *wh*-word instead of the indefinite, regardless of the prosody attached to it.

Further questions were raised as to whether the modality of the stimuli presented in the experiment deprived the subjects of sufficient resources to process the prosody. Had the stimuli been presented in writing, the participants, perhaps, would have had enough time to correctly parse *nwukwu* as either a *wh*-word or an indefinite, using appropriate prosody at their own pace, and would have interpreted *nwukwu* as what makes more sense in the given context. If the participants still did not distinguish the two uses of *nwukwu* in writing and favored one meaning over the other, it would indicate a strong bias toward one meaning without association with prosody. In order to verify or refute these possible explanations, a short post-experiment survey was sent to five randomly selected participants of the L2K group. All of the four participants who replied had very strong bias towards the interrogative interpretation over the indefinite interpretation of the word *nwuku* in writing. The L2K learners were not prepared to separate *wh*-
words from indefinites, their most likely interpretation being interrogative. This was presumably
reinforced by their insensitivity to prosody in second language learning.

Another potential complication involves whether the L2Ks who were also heritage
speakers of a language which use *wh*-words as indefinites would have performed any better than
the rest of the L2Ks. A follow-up subject-by-subject analysis of the five heritage speakers of
Mandarin Chinese who participated in the experiment reveals that they did not perform any closer
to the baseline group. Considering that all of the speakers in the L2K group had taken Korean
language classes at the university-level, it was also necessary to confirm that they had indeed
acquired the two meanings of *nwukwu*. Not surprisingly, both meanings were taught during the
first year of university-level Korean language classes, although the interrogative meaning is
generally taught prior to the indefinite meaning (Oh, S.-S., p.c.; Cho, Lee, Schulz, Sohn, & Sohn,
2009).

The results for the HK group demonstrated that the acceptability of the *wh*-question and
yes/no answer pair was significantly lower than the *wh*-question and constituent answer pair,
whereas both types of answers were accepted to a high degree as a response to yes/no questions,
as was the case with the NK group. These results indicate that the participants in the HK group
had no difficulties in distinguishing between the homonymous *wh*-word and the indefinite
pronoun, which was signified by different prosodic patterns in the two types of interrogative
questions.

When prosody was the only cue for distinguishing between the two types of questions,
the heritage group had a notable advantage over the non-heritage group. In fact, the pattern of the
heritage group resembled that of the control group, signifying *full acquisition* of the phenomenon
at the syntax-phonology interface. Hence, the results suggest that Sorace & Filiaci's (2006)
Interface Hypothesis may have to be restricted to phenomena at the syntax-semantics/pragmatics interface and does not extend to those at the syntax-phonology interface.

4.4 Summary of Experiments 1, 2, and 3

In phenomena involving prosody, non-heritage learners of the language were less likely to have acquired prosodic information even at advanced stages. Advanced Korean learners of English have not acquired contrastive focus in its corrective use (Experiment 1). American learners of Korean were not aware of the effect of contrastive focus on the attached particle (Experiment 2), and they were insensitive to prosodic cues distinguishing two homonymous lexical items (*who* vs. *someone*) (Experiment 3).

When prosodic cues were accompanied by segmental cues, often rendering prosodic cues less decisive, heritage speakers had advantage over non-heritage speakers but did not reach native-like performance (Experiment 2), as has often been observed in phenomena in syntax and discourse-related domains (Laleko & Polinsky, 2013). However, heritage speakers (of Korean) did achieve native-like mastery of phenomena involving prosody, or a phenomenon at the syntax-phonology interface (Experiment 3). Although the experiments did not include heritage learners of English group in the current study due to their scarcity in Korea, it can be predicted that heritage learners of English will pattern with the control group with regard to contrastive focus in English. Table 16 summarizes the nature and the results of Experiments 1, 2, and 3.

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Experiment 1</th>
<th>Experiment 2</th>
<th>Experiment 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target language</td>
<td>English</td>
<td>Korean</td>
<td>Korean</td>
</tr>
<tr>
<td>Prosody</td>
<td>√</td>
<td>Segment(+√)</td>
<td>√</td>
</tr>
<tr>
<td>L1</td>
<td>Significant distinction</td>
<td>Significant distinction</td>
<td>Significant distinction</td>
</tr>
<tr>
<td>L2</td>
<td>No distinction</td>
<td>No distinction</td>
<td>No distinction</td>
</tr>
<tr>
<td>Heritage</td>
<td>N/A (Prediction: Significant distinction)</td>
<td>Significant but less robust distinction</td>
<td>Significant distinction</td>
</tr>
</tbody>
</table>

Table 16. Summary of results from Experiments 1, 2, and 3
5. Conclusion

In the production study, an analysis of errors with focus on morpho-syntactic phenomena were analyzed, investigating the area of difficulty faced by heritage language speakers of Korean ranging from the lower end to the higher end of the proficiency spectrum. In the comprehension study, listening experiments were conducted to compare heritage speakers to both non-heritage speakers and native speakers of the language. Results indicated that heritage language speakers had complete mastery of the language phenomena involving prosody, although the heritage advantage was not as robust when other aspects of grammar (i.e. omission of particles) were also concerned. The results partially confirm but partially disconfirm the Interface Hypothesis: the interface between syntax and pragmatics gives difficulty to non-native speakers of the language, heritage speakers and non-heritage speakers alike, although heritage speakers show some advantage over non-heritage speakers (Experiment 2); but the interface between suprasegmental phonology and syntax grants a great advantage to heritage speakers over non-heritage speakers (Experiments 1 and 3).

An interesting (open) question concerns why heritage speakers had such an advantage over non-heritage learners with regard to the acquisition of prosody, when heritage speakers often do not demonstrate native-like performance in other aspects of grammar. It is not certain at this point whether heritage speakers' prosody reaches native-like fluency due to their early age of acquisition, the length and volume of exposure to the language, their overhearing of the language during childhood (Au, Knightly, Jun, & Oh, 2002), or their method of acquisition. Heritage speakers are exposed to the language during the critical period, often over a long period of time, whereas the non-native language learners in the current research started learning the language in adulthood, after the critical age. Heritage speakers are exposed to everyday dialogues mostly in speech, whereas non-heritage learners learn the language in a classroom environment in which
dialogues are presented in writing and in speech. These language-external factors may individually or collectively influence the acquisition.

There are also language-internal factors that may influence the acquisition. Among the areas of grammar, phonetics and suprasegmental phonology are acquired passively and susceptible to change and attrition. While the acquisition of syntax involves active engagement in the learning process, phonetics and suprasegmental phonology can be acquired rather passively. Also, as is demonstrated by Linda Godson’s (2003) study of heritage Armenians, both interrupted and uninterrupted heritage language speakers acquire the vowels of their heritage language at very early stages and are influenced by the dominant language (i.e. English) throughout their lifespan. However, despite many studies of heritage language that reveal that heritage language speakers "do not develop uniform native-like competence in all grammatical domains." (Benmamoun, Montrul, & Polinsky, 2013, p. 171), phenomena involving phonetics/phonology or involving the interface of phonology and another part of grammar is an area in which heritage speakers develop native-like competence.

Through this study, I was able to establish that heritage learners successfully acquire prosodic information conveying information structure with native-like mastery of the language, while non-heritage language learners are insensitive to it. It is only by studying heritage language acquisition that one discovers this discrepancy in the phonology-syntax interface. The current study demonstrates how heritage language study may contribute to our understanding of the language faculty that other types of acquisition studies cannot.
References


Appendix A. Stimuli for the experiments

Experiment 1

(1) Does Martie write many letters? - I don't know, but STEVEN writes many letters.
(2) Does Jacob take the bus to work? - I don't know, but ETHAN takes the bus to work.
(3) Does Julie grow her own fruit? - I don't know, but MORGAN grows her own fruit.
(4) Does Anthony speak Chinese? - I'm not sure, but MARIA speaks Chinese.
(5) Does Kimberly have the key? - I'm not sure, but ISABELLE has the key.
(6) Does Nancy learn French in school? - I'm not sure, but KAREN learns French in school.
(7) Does Matilda drive a van? - I don't know, but VANESSA drives a van.
(8) Does Mr. Park know your name? - I don't know, but Mr. KIM knows my name.
(9) Does Ryan enjoy learning? - I don't know, but RONALD enjoys learning.
(10) Does your cat demand your attention? - I'm not sure, but my DOG demands my attention.
(11) Does Lucas shave his beard every day? - I'm not sure, but OWEN shaves his beard every day.
(12) Does Debby like chocolate cookies? - I'm not sure, but KIMMY likes chocolate cookies.
Experiment 2

(1) *swuuysa-ka yeeses si-ey cip-ey ka-ni?*  
veternian-NOM six o'clock-LOC home-LOC go-Q?  
‘Does the veterinarian go home at six o'clock?’

- *kanhosa{-ka/-ø} yeeses si-ey cip-ey ka.*  
nurse{-NOM/-ø} six o'clock-LOC home-LOC go-DECL  
‘(No,) the NURSE goes home at 6 o'clock.’

(2) *khoyothey-ka sewul tongmwulwen-ey iss-ni?*  
coyote-NOM Seoul zoo-LOC exist-Q?  
‘Is a/the coyote in Seoul Zoo?’

- *holangi{-ka/-ø} ku tongmwulwen-ey iss-e.*  
tiger{-NOM/-ø} that zoo-LOC exist-DECL  
‘(No,) it is a/the TIGER that is in the zoo.’

(3) *khayngkelwu-ka namwu wi-eyse cam ca-ni?*  
kangaroo-NOM tree top-LOC sleep sleep-Q?  
‘Does a/the kangaroo sleep on a/the tree?’

- *khoalla{-ka/-ø} namwu wi-eyse cam ca.*  
koala{-NOM/-ø} tree top-LOC sleep sleep-DECL  
‘(No,) a/the KOALA sleeps on a/the tree.’

(4) *kangaci-ka nolithe-eyse no-ni?*  
puppy-NOM playground-LOC play-Q?  
‘Does a/the puppy play in a/the playground?’

- *elini{-ka/-ø} nolithe-eyse nol-a.*  
child{-NOM/-ø} playground-LOC play-DECL  
‘(No,) a/the CHILD plays in a/the playground.’

(5) *yekaswu-ka sisikakkak cal wu-ni?*  
female.singer-NOM moment.to.moment easily cry-Q?  
‘Does a female singer easily cry from moment to moment?’

- *yenkica{-ka/-ø} sisikakkak cal wul-e.*  
actor{-NOM/-ø} moment.to.moment easily cry-DECL  
‘(No,) an/the ACTOR easily cries from moment to moment.’
(6) kayangi-ka  pata-eyse  heyem  chi-ni?  
cat-NOM  sea-LOC  swim  hit-Q?  
‘Does a/the cat swim in the sea?’

- kagency{-ka/-ø}  pata-eyse  heyem  chy-e.  
dog{-NOM/-ø}  sea-LOC  swim  hit-DECL  
‘(No,) a/the PUPPY swims in the sea.’

(7) patheynte-ka  cip-ey  nuckey  tul-e  ka-ni?  
bartender-NOM  home-LOC  late  enter-LK  go-Q?  
‘Does a/the bartender go home late?’

- maynice{-ka/-ø}  cip-ey  nuckey  tul-e  ka.  
manager{-NOM/-ø}  that  late  enter-LK  go.DECL  
‘(No,) a/the MANAGER returns home late.’

(8) cengwensa-ka  ilkop  si-ey  il-e  na-ni?  
gardener-NOM  seven  o'clock-LOC  get.up-LK  grow-Q?  
‘Does a/the gardener wake up at 7 o'clock?’

- sacinsa {-ka/-ø}  ilkop  si-ey  il-e  na.  
photographer{-NOM/-ø}  seven  o'clock-LOC  get.up-LK  grow.DECL  
‘(No,) a/the PHOTOGRAPHER wakes up at 7 o'clock.’

(9) payktaynse-ka  onul  pam-ey  kongyen  ha-ni?  
backup.dancer-NOM  today  night-LOC  performance  do-Q?  
‘{Are backup dancers/Is the backup dancer} performing tonight?’

- yencwuka{-ka/-ø}  onul  pam-ey  kongyen  hay.  
musician{-NOM/-ø}  today  night-LOC  performance  do.DECL  
‘(No,) a/the PERFORMING MUSICIAN is performing tonight.’

(10) sin-cakka-ka  yetelp  si-ey  chwulkun  ha-ni?  
Shin-writer-NOM  eight  o'clock-LOC  go.to.work  do-Q?  
‘Does Writer Shin come/go to work at 8 o'clock?’

- na-phiti{-ka/-ø}  yetelp  si-ey  chwulkun  hay.  
Na-PD{-NOM/-ø}  eight  o'clock-LOC  go.to.work  do.DECL  
‘DIRECTOR NA comes/goes to work at 8 o'clock.’

(11) kim-pise-ka  hangsang  ilccik  thoykun  ha-ni?  
Kim-secretary-NOM  always  early  leave.work  do-Q?  
‘Does Secretary Kim always leave the office early?’
11. i-tayl{-ka/-ø}  hangsang ilccik thoykun hay.
Lee-Ass.Man{-NOM/-ø} always early leave.work do.DECL
‘(No,) ASSISTANT MANAGER LEE always leaves the office early.’

12. lyu-senswu-ka yakwu khaymphu-ey chamka ha-ni?
Ryu-athlete{-NOM} baseball camp-LOC participate do-Q?
‘Does Athlete Ryu participate in the baseball camp?’

- ceng-khochi{-ka/-ø} ku khaymphu-ey chamka hay.
Jung-coach{-NOM/-ø} that camp-LOC participate do.DECL
‘(No,) COACH JUNG participates in the camp.’

13. yengyangsa-ka cwupang-eyse yoli ha-ni?
nutritionist{-NOM} kitchen-LOC cook do-Q?
‘Does a/the nutritionist cook in the kitchen?’

- yolisa{-ka/-ø} cwupang-eyse yoli hay.
chef{-NOM/-ø} kitchen-LOC cook do.DECL
‘(No,) a/the CHEF cooks in the kitchen.’

14. pak-kemska-ka nehuy cip-ey cenhwa ha-ni?
Park-DA-NOM your house-LOC telephone do-Q?
‘Does District Attorney Park call you at your house?’

- choy-hyengsa{-ka/-ø} wuli cip-ey cenhwa hay.
Choi-detective{-NOM/-ø} our house-LOC telephone do.DECL
‘(No,) DETECTIVE CHOI calls me/us at my/our house.’

15. hoykyeysa-ka seymina-ey chamsek ha-ni?
accountant{-NOM} seminar-LOC participate do-Q?
‘Does an/the accountant attend a/the seminar?’

- pyenhosa{-ka/-ø} seymina-ey chamsek hay.
lawyer{-NOM/-ø} seminar-LOC participate do.DECL
‘(No,) a/the LAWYER attends a/the seminar.’

16. khun-nwuna-ka kesil-eyse kongpwu ha-ni?
big-sister{-NOM} livingroom-LOC study do-Q?
‘Does (my/your) big sister study in the living room?’

- khun-oppa{-ka/-ø} kesil-eyse kongpwu hay.
big-brother{-NOM/-ø} livingroom-LOC study do.DECL
‘(No,) (my/your) big BROTHER studies in the living room.’
Experiment 3

    who that chair-acc dump-PST-Q?  Younghee-NOM dump-PST-DECL
    ‘Who threw away the chair?’  ‘Younghee dumped (it).’

    someone that chair-acc dump-PST-Q?  Yes. Someone dump-PST-DECL
    ‘Did someone throw away the chair?’  ‘Yes. Someone dumped (it).’

    who this window-ACC clean-PST-Q?  Jaehee-NOM clean-PST-DECL
    ‘Who cleaned this window?’  ‘Jaehee cleaned (it).’

    someone this window-ACC clean-PST-Q?  Yes. Someone clean-PST-DECL
    ‘Did someone clean this window?’  ‘Yes. Someone cleaned (it).’

    who this coffee-ACC drink-PST-Q?  Minhee-NOM drink-PST-DECL
    ‘Who drank this coffee?’  ‘Minhee drank (it).’

    someone this coffee-ACC drink-PST-Q?  Yes. Someone drink-PST-DECL
    ‘Did someone drink this coffee?’  ‘Yes. Someone drank (it).’

    who this letter-ACC read-PST-Q?  Jihye-NOM read-PST-DECL
    ‘Who read this letter?’  ‘Jihye read (it).’

    someone this letter-ACC read-PST-Q?  Yes. Someone read-PST-DECL
    ‘Did someone read this letter?’  ‘Yes. Someone read (it).’

    who that present-ACC open-PST-Q?  Sangah-NOM open-PST-DECL
    ‘Who opened the present?’  ‘Sangah opened (it).’

    someone that present-ACC open-PST-Q?  Yes. Someone open-PST-DECL
    ‘Did someone open the present?’  ‘Yes. Someone opened (it).’
   *Who this desk-ACC move-PST-Q?* Sehee-NOM move-PST-DECL
   ‘Who moved this desk?’
   ‘Sehee moved (it).’

   *someone this desk-ACC move-PST-Q?* Yes. Someone move-PST-DECL
   ‘Did someone move this desk?’
   ‘Yes. Someone moved (it).’

   *who this box-ACC open-PST-Q?* Youngjoo-NOM open-PST-DECL
   ‘Who opened the box?’
   ‘Youngjoo opened (it).’

   *someone this box-ACC open-PST-Q?* Yes. Someone open-PST-DECL
   ‘Did someone open the box?’
   ‘Yes. Someone opened (it).’

   *who that window-ACC close-PST-Q?* Hyeli-NOM close-PST-DECL
   ‘Who closed the window?’
   ‘Hyeli closed (it).’

   *someone this window-ACC close-PST-Q?* Yes. Someone close-PST-DECL
   ‘Did someone close the window?’
   ‘Yes. Someone closed (it).’

   *who that towel-ACC rent-PST-Q?* Hyesoo-NOM rent-PST-DECL
   ‘Who borrow that towel?’
   ‘Hyesoo borrowed (it).’

   *someone that towel-ACC rent-PST-Q?* Yes. Someone rent-PST-DECL
   ‘Did someone borrow that towel?’
   ‘Yes. Someone borrowed (it).’

    *who that cake-ACC cut-PST-Q?* Yuna-NOM cut-PST-DECL
    ‘Who cut the cake?’
    ‘Yuna cut (it).’

    *someone that cake-ACC cut-PST-Q?* Yes. Someone cut-PST-DECL
    ‘Did someone cut the cake?’
    ‘Yes. Someone cut (it).’

    *who this snack-ACC eat-PST-Q?* Minho-NOM eat-PST-DECL
    ‘Who ate this snack?’
    ‘Minho ate (it).’

135
someone this snack-ACC eat-PST-Q?
‘Did someone eat this snack?’
Yes. Someone eat-PST-DECL
‘Yes. Someone ate (it).’

who that meat-ACC grill-PST-Q?
‘Who grilled the meat?’
Jihye-NOM grill-PST-DECL
‘Jihye grilled (it).’

someone that meat-ACC grill-PST-Q?
‘Did someone grill the meat?’
Yes. Someone grill-PST-DECL
‘Yes. Someone grilled (it).’

who this key-ACC find-PST-Q?
‘Who found this key?’
Taesoo-NOM find-PST-DECL
‘Taesoo found (it).’

someone this letter-ACC find-PST-Q?
‘Did someone find this key?’
Yes. Someone find-PST-DECL
‘Yes. Someone found (it).’

who that bag-ACC sell-PST-Q?
‘Who sold that bag?’
Sungsoo-NOM sell-PST-DECL
‘Sungsoo sold (it).’

someone that bag-ACC sell-PST-Q?
‘Did someone sell that bag?’
Yes. Someone sell-PST-DECL
‘Yes. Someone sold (it).’

who that rose-ACC snap-PST-Q?
‘Who snapped that rose?’
Yumi-NOM snap-PST-DECL
‘Yumi snapped (it).’

someone that rose-ACC snap-PST-Q?
‘Did someone snap that rose?’
Yes. Someone snap-PST-DECL
‘Yes. Someone snapped (it).’

who that phone-ACC take-PST-Q?
‘Who took the phone (call)?’
Sangwoo-NOM take-PST-DECL
‘Sangwoo took (it).’

someone that phone-ACC take-PST-Q?
‘Did someone take the phone (call)?’
Yes. Someone take-PST-DECL
‘Yes. Someone took (it).’
Appendix B. Summaries of the linear mixed model fit

**Experiment 1**

```r
> summary(conmodel)
Linear mixed model fit by REML ['lmerMod']
Formula: response1 ~ NATIVE * PCUE * PMISCUE + (1 | item) + (1 | userCode)
   Data: con

REML criterion at convergence: 2552.1

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.2496 -0.5756  0.1479  0.6854  2.4432

Random effects:
  Groups   Name        Variance Std.Dev.
    userCode (Intercept) 0.87295  0.9343
       item     (Intercept) 0.07368  0.2714
      Residual             2.09013  1.4457
Number of obs: 681, groups:  userCode, 57; item, 12

Fixed effects:
      Estimate Std. Error  t value
(Intercept)  4.755958   0.230245  20.656
  NATIVE      0.151449   0.313938   0.482
     PCUE      0.009946   0.187933   0.053
   PMISCUE    -0.277452   0.187670  -1.478
NATIVE:PCUE  0.713530   0.272037   2.623
NATIVE:PMISCUE -1.010839   0.271909  -3.718

Correlation of Fixed Effects:
                        (Intr)  NATIVE PCUE PMISCU NATIVE:PC
  NATIVE             -0.648
  PCUE                0.410  0.301
  PMISCUE             0.412  0.302  0.503
NATIVE:PCUE         -0.283 -0.434 -0.690 -0.348
```

137
<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t.value</th>
<th>p.z</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>4.755958085</td>
<td>0.2302448</td>
<td>20.65609316</td>
<td>0.0000000000</td>
</tr>
<tr>
<td>NATIVE</td>
<td>0.151449323</td>
<td>0.3139381</td>
<td>0.48241780</td>
<td>0.6295091777</td>
</tr>
<tr>
<td>PCUE</td>
<td>0.009945687</td>
<td>0.1879335</td>
<td>0.05292132</td>
<td>0.9577945947</td>
</tr>
<tr>
<td>PMISCUE</td>
<td>-0.277451612</td>
<td>0.1876702</td>
<td>-1.47839960</td>
<td>0.1393008536</td>
</tr>
<tr>
<td>NATIVE:PCUE</td>
<td>0.713529795</td>
<td>0.2720374</td>
<td>2.6291020</td>
<td>0.0087182247</td>
</tr>
<tr>
<td>NATIVE:PMISCUE</td>
<td>-1.010838685</td>
<td>0.2719088</td>
<td>-3.71756451</td>
<td>0.0002011526</td>
</tr>
</tbody>
</table>
Experiment 2

> summary(omissionmodel2)
Linear mixed model fit by REML ['lmerMod']
Formula: response1 ~ OMITTED * L2 * HERITAGE + (1 | item) + (1 | userCode)
  Data: omission

REML criterion at convergence: 5058.1

Scaled residuals:

                      Min       1Q   Median       3Q      Max
-3.2153  -0.7141   0.0055   0.7367   3.0509

Random effects:

Groups   Name        Variance Std.Dev.
userCode (Intercept) 0.53873  0.7340
item     (Intercept) 0.05745  0.2397
Residual             2.04883  1.4314
Number of obs: 1376, groups: userCode, 86; item, 16

Fixed effects:

                        Estimate Std. Error      t.value          p.z
(Intercept)          3.65184221  0.1669695  21.87130681 0.000000e+00
OMITTED              -1.66808068  0.1415539  -11.7843455 -0.272
L2                   0.52422850  0.2289954   2.2885911  0.199
HERITAGE             -0.01607034  0.2204939   -0.0731314 -0.660
OMITTED:L2           2.01881959  0.2059795   9.7985883  0.481
OMITTED:HERITAGE     1.20202302  0.1991391   6.0365080  0.487

Correlation of Fixed Effects:

                        (Intr) OMITTED L2     HERITAGE OMITTED:L
OMITTED               -0.272
L2                     -0.635  0.199
HERITAGE              -0.660  0.206  0.481
OMITTED:L2            0.187 -0.689 -0.295 -0.141
OMITTED:HERITAGE      0.193 -0.710 -0.141 -0.293  0.487

> coefs

                      Estimate Std..Error      t.value          p.z
(Intercept)          3.65184221  0.1669695  21.87130681 0.0000000e+00
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OMITTED</td>
<td>-1.66807962</td>
<td>0.1415486</td>
<td>-11.7849766</td>
<td>0.000000e+00</td>
</tr>
<tr>
<td>L2</td>
<td>0.52423322</td>
<td>0.2289881</td>
<td>2.28934707</td>
<td>2.205919e-02</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>-0.01607088</td>
<td>0.2204850</td>
<td>-0.07288874</td>
<td>9.418947e-01</td>
</tr>
<tr>
<td>OMITTED:L2</td>
<td>2.01881791</td>
<td>0.2060315</td>
<td>9.79859027</td>
<td>0.000000e+00</td>
</tr>
<tr>
<td>OMITTED:HERITAGE</td>
<td>1.20202713</td>
<td>0.1991422</td>
<td>6.03602324</td>
<td>1.579585e-09</td>
</tr>
</tbody>
</table>
Experiment 3.

> summary(whmodel2)
Linear mixed model fit by REML ['lmerMod']
Formula: response1 ~ WH * CONSTITUENT * L2 * HERITAGE + (1 | item) + (1 | userCode)
Data: wh

REML criterion at convergence: 3249.9

Scaled residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
<td>-3.9069</td>
<td>0.4553</td>
<td>0.5944</td>
<td>3.1930</td>
<td></td>
</tr>
</tbody>
</table>

Random effects:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Name</th>
<th>Variance</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>userCode</td>
<td>(Intercept)</td>
<td>0.30650</td>
<td>0.5536</td>
</tr>
<tr>
<td>item</td>
<td>(Intercept)</td>
<td>0.04338</td>
<td>0.2083</td>
</tr>
<tr>
<td>Residual</td>
<td></td>
<td>1.80577</td>
<td>1.3438</td>
</tr>
</tbody>
</table>

Number of obs: 916, groups: userCode, 86; item, 16

Fixed effects:

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>5.5953464</td>
<td>0.1876952</td>
<td>29.811</td>
</tr>
<tr>
<td>WH</td>
<td>-2.7012253</td>
<td>0.2094634</td>
<td>-12.896</td>
</tr>
<tr>
<td>CONSTITUENT</td>
<td>-0.0006702</td>
<td>0.2164777</td>
<td>-0.003</td>
</tr>
<tr>
<td>L2</td>
<td>-1.9661374</td>
<td>0.2665539</td>
<td>-7.376</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>0.3777027</td>
<td>0.2562215</td>
<td>1.474</td>
</tr>
<tr>
<td>WH:CONSTITUENT</td>
<td>3.8788327</td>
<td>0.3040902</td>
<td>12.756</td>
</tr>
<tr>
<td>WH:L2</td>
<td>2.2772158</td>
<td>0.3173481</td>
<td>7.249</td>
</tr>
<tr>
<td>CONSTITUENT:L2</td>
<td>1.7929129</td>
<td>0.3173481</td>
<td>5.650</td>
</tr>
<tr>
<td>WH:HERITAGE</td>
<td>-0.6496623</td>
<td>0.2990151</td>
<td>-2.173</td>
</tr>
<tr>
<td>CONSTITUENT:HERITAGE</td>
<td>0.4641869</td>
<td>0.3039331</td>
<td>1.527</td>
</tr>
<tr>
<td>WH:CONSTITUENT:L2</td>
<td>-3.3809379</td>
<td>0.4475551</td>
<td>-7.554</td>
</tr>
<tr>
<td>WH:CONSTITUENT:HERITAGE</td>
<td>-0.1217017</td>
<td>0.4288892</td>
<td>-0.284</td>
</tr>
</tbody>
</table>

Correlation of Fixed Effects:

<table>
<thead>
<tr>
<th></th>
<th>(Intr)</th>
<th>WH</th>
<th>CONSTITUENT</th>
<th>L2</th>
<th>HERITAGE</th>
<th>WH:CONSTITUENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WH</td>
<td>-0.565</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

141
CONSTITUENT  -0.550  0.488
L2         -0.652  0.399  0.388
HERITAGE   -0.677  0.414  0.405  0.476
WH:CONSTITUENT  0.386 -0.689 -0.705 -0.272 -0.285
WH:L2        0.379 -0.671 -0.325 -0.588 -0.276  0.460
CONSTITUENT:L  0.379 -0.337 -0.683 -0.585 -0.277  0.479
WH:HERITAGE  0.398 -0.703 -0.347 -0.282 -0.591  0.485
CONSTITUENT:H  0.393 -0.346 -0.716 -0.274 -0.584  0.503
WH:CONSTITUENT:L  0.267  0.473  0.480  0.416  0.195 -0.678
WH:CONSTITUENT:H  0.277  0.489  0.506  0.196  0.413 -0.710
WH
CONSTITUENT
L2
HERITAGE
WH:CONSTITUENT
WH:L2
CONSTITUENT:L  0.497
WH:HERITAGE  0.473  0.239
CONSTITUENT:H  0.226  0.484  0.498
WH:CONSTITUENT:L -0.707 -0.709 -0.336 -0.337
WH:CONSTITUENT:H -0.327 -0.345 -0.698 -0.706  0.483

> coefs

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Std. Error</th>
<th>t.value</th>
<th>p.z</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>5.595346</td>
<td>0.187695</td>
<td>29.8108</td>
<td>0.000000e+00</td>
</tr>
<tr>
<td>WH</td>
<td>-2.701225</td>
<td>0.209463</td>
<td>-12.8959</td>
<td>0.000000e+00</td>
</tr>
<tr>
<td>CONSTITUENT</td>
<td>-0.00067</td>
<td>0.216478</td>
<td>-0.0031</td>
<td>9.975299e-01</td>
</tr>
<tr>
<td>L2</td>
<td>-1.966137</td>
<td>0.266554</td>
<td>-7.3766</td>
<td>1.629807e-13</td>
</tr>
<tr>
<td>HERITAGE</td>
<td>0.377703</td>
<td>0.256221</td>
<td>1.4741</td>
<td>1.404477e-01</td>
</tr>
<tr>
<td>WH:CONSTITUENT</td>
<td>3.878833</td>
<td>0.304090</td>
<td>12.7555</td>
<td>0.000000e+00</td>
</tr>
<tr>
<td>WH:L2</td>
<td>2.277215</td>
<td>0.314135</td>
<td>7.2491</td>
<td>4.194423e-13</td>
</tr>
<tr>
<td>CONSTITUENT:L2</td>
<td>1.792912</td>
<td>0.317348</td>
<td>5.6496</td>
<td>1.607528e-08</td>
</tr>
<tr>
<td>WH:HERITAGE</td>
<td>-0.649662</td>
<td>0.299015</td>
<td>-2.1727</td>
<td>2.980488e-02</td>
</tr>
<tr>
<td>CONSTITUENT:HERITAGE</td>
<td>0.464187</td>
<td>0.303933</td>
<td>1.5272</td>
<td>1.266946e-01</td>
</tr>
<tr>
<td>WH:CONSTITUENT:L2</td>
<td>-3.380961</td>
<td>0.447555</td>
<td>-7.5542</td>
<td>2.188474e-14</td>
</tr>
<tr>
<td>WH:CONSTITUENT:HERITAGE</td>
<td>-0.121701</td>
<td>0.428889</td>
<td>-0.2837</td>
<td>7.765941e-01</td>
</tr>
</tbody>
</table>