



THE UNIVERSITY *of* EDINBURGH

This thesis has been submitted in fulfilment of the requirements for a postgraduate degree (e.g. PhD, MPhil, DClinPsychol) at the University of Edinburgh. Please note the following terms and conditions of use:

- This work is protected by copyright and other intellectual property rights, which are retained by the thesis author, unless otherwise stated.
- A copy can be downloaded for personal non-commercial research or study, without prior permission or charge.
- This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the author.
- The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the author.
- When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given.

Syntax, Interfaces and Processing in Native Language Attrition

Bohye Ko

**A thesis submitted in fulfilment of requirements for the degree of
Doctor of Philosophy**

to

**Linguistics and English Language
School of Philosophy, Psychology and Language Sciences
University of Edinburgh**

2013

To my parents

Declaration

I hereby declare that this thesis is of my own composition, and that it contains no material previously submitted for the award of any other degree. The work reported in this thesis has been executed by myself, except where due acknowledgement is made in the text.

Bohye Ko

Abstract

The linguistic behaviour of bilingual speakers who have had prolonged exposure to a second language (L2) is different from that of monolinguals. This thesis investigates the extent and source of attrition effects by comparing language representation and processing in adult late bilinguals undergoing native language (L1) attrition and their monolingual counterparts. Based on the previous observation that structures that are sensitive to discourse-pragmatic conditions are vulnerable to attrition (Sorace 2011, Sorace & Filiaci 2006), the thesis examines: i) whether the difference between attrited and non-attrited speakers in L1 use is restricted to structures whose distribution is grammatically underspecified; ii) whether the difference is due more to underspecification of mental representation or to on-line processing difficulties; and iii) to what extent the difference is a consequence of transfer from L2.

The case investigated in this study is L1 attrition by Korean immigrants who have lived in an L2 (English or Japanese) environment for a period of 6 to 25 years. Two L2 groups and one monolingual control group were tested on two different types of phenomena in Korean: core binding of the reflexive *caki* whose felicity is determined by grammar (Experiment 1), and the attachment of the plural suffix *tul* whose felicity is underspecified by grammar (Experiment 2). Experimental data were collected using an on-line methodology (a self-paced reading task) as well as an off-line one (acceptability judgement task) in order to identify the locus of any non-convergence between attrited and non-attrited speakers with respect to the investigated phenomena.

Results from the experiments showed that attrition had an impact on both grammatically specified and underspecified structures, but to a different degree. With respect to core binding of *caki*, attrited Korean speakers diverged from the monolingual norm in the on-line reading task but not in the off-line judgement task,

indicating that their representation of *caki*-binding was intact. With respect to *tul*-attachment, on the other hand, the attriters displayed divergence in both the off-line and on-line tasks, indicating that their representation of appropriate conditions for *tul*, as well as their real-time processing of the conditions was affected due to long-term exposure to L2. In both *caki*-binding and *tul*-attachment, the attriters' non-native performance was largely attributable to influence from their L2. However, the attriters' divergence also seemed to be attributable, at least in part, to inefficient executive control of two languages.

Regarding *tul*-attachment, the results demonstrated that the distribution of *tul* in unattrited Korean is regulated by several factors, including animacy, number-specificity and distributivity, and thus the acceptability of *tul* is largely gradient, rather than categorical. The results also provided evidence for an ongoing change in the distribution of *tul* and suggested that the change is accelerated by attrited speakers living in an L2 English environment.

Acknowledgements

I have been indebted to many people throughout my PhD. My first thanks goes to my supervisors, Professor Antonella Sorace and Professor Caroline Heycock. I am very grateful to them for their support, encouragement and insightful feedback. Without their help, the completion of this thesis would not have been possible.

I would like to thank all members of the Developmental Linguistics Research Group at the University of Edinburgh for their discussion and comments at different stages of this project. I am particularly thankful to John-Sebastian Schutter, Frances Wilson and Francesca Filiaci for their help and advice. I would also like to thank the members of the Syntax and Semantics Research Group, in particular Kaori Miura for her help with Japanese structures.

Many people gave me invaluable help with collecting data for this work. I would like to express my deepest thanks to all of the Korean speakers in Seoul, Tokyo and Boston who willingly gave their time and participated in my experiments. I am very thankful to Professor Maria Polinsky at Harvard University for kindly inviting me to Boston and for offering help in various ways. I would also like to thank Professor Sun-Hee Lee at Wellesley College for offering venues for my experiments and helping me to recruit participants effectively.

My years in Edinburgh are more memorable because of the great people I have spent time with. I am thankful to Mijeong Cho, Jeong-yang Park, Matt Soper, Stepan Gorbachev, Hyejin Shin, Elizabete Rancāne, Philip Solovjov and William and Sue Robb for making my life here fun and exciting. I would like to thank my fantastic flatmates, Dorothy Lee, Minjung Son, Seti Mahmoudi and Olga

Kapetanou. It was a great blessing that I was able to share evenings and weekends with them. I am very thankful to Linda Tym for her support and encouragement, not to mention help with proofreading.

Finally, I would like to thank my parents and sister for their endless love and support, and also my two lovely little nieces who sang for me whenever I felt discouraged.

List of Abbreviations

The following abbreviations are used to label the linguistic terms used in this thesis.

ACC	Accusative marker
COP	Copular
CL	Classifier
CNJ	Conjunctive suffix
COMP	Complementizer
DAT	Dative marker
DEC	Declarative marker
GEN	Genitive marker
HON	Honorific suffix
IN	Indicative mood suffix
LOC	Locative marker
NOM	Nominative marker
NP	Noun phrase
PAS	Passive suffix
PL	Plural suffix
PRS	Present tense suffix
PST	Past tense suffix
QT	Quotative particle
RL	Relativizer
TOP	Topic marker

Contents

Declaration	ii
Abstract	iii
Acknowledgements	v
List of Abbreviations	vii
Chapter 1 Introduction	1
1.1 Background and aims of the thesis	1
1.1.1 The Interface Hypothesis	2
1.1.2 Research questions	3
1.2 Experiments	5
1.2.1 Hypotheses	7
1.3 Findings	8
1.4 Broader significance	10
1.5 Organisation of the thesis	11
Chapter 2 Theoretical approaches to L1 attrition	12
2.1 Introduction	12
2.2 First language attrition	13
2.2.1 Definitions	13
2.2.2 General patterns	14

<i>CONTENTS</i>	ix
2.3 Linguistic approaches to attrition	19
2.4 Psycholinguistic approaches to attrition	23
2.5 The Interface Hypothesis	25
2.5.1 The extent of attrition	29
2.5.2 The source of attrition	31
2.5.3 The role of L2	33
2.6 Summary	34
Chapter 3 The attrition of reflexive binding	36
3.1 Introduction	36
3.2 Theories of reflexive binding	37
3.3 Reflexive binding in Korean	40
3.4 Crosslinguistic differences	42
3.4.1 Reflexive binding in English	42
3.4.2 Reflexive binding in Japanese	42
3.5 The acquisition of reflexive binding	43
3.6 The attrition of reflexive binding	46
3.7 Summary	50
Chapter 4 The attrition of plural marking	52
4.1 Introduction	52
4.2 Theories of plural marking	53
4.3 Plural marking in Korean	54
4.3.1 The plural <i>tul</i>	54
4.3.2 Approaches to the semantics of <i>tul</i>	55
4.3.3 Factors contributing to <i>tul</i> -attachment	65
4.3.4 Changes in the use of <i>tul</i>	72

4.4	Crosslinguistic differences	73
4.4.1	Plural marking in English	73
4.4.2	Plural marking in Japanese	74
4.5	The acquisition of plural marking	78
4.6	The attrition of plural marking	80
4.7	Summary	82
Chapter 5 Methodology		84
5.1	Introduction	84
5.2	An overview of the methodology	84
5.2.1	Method	84
5.2.2	Design and procedure	86
5.2.3	Materials	86
5.3	Tasks	87
5.3.1	Magnitude Estimation	88
5.3.2	Self-paced reading	89
5.4	Participants	90
5.4.1	The attrition groups	91
5.4.2	The control group	92
5.5	Extralinguistic variables	92
5.6	Summary	101
Chapter 6 Experiments and results		103
6.1	Introduction	103
6.2	Experiment 1: Core binding of <i>caki</i>	103
6.2.1	Aims and research questions	103
6.2.2	Design and materials	104

6.2.3	Predictions	107
6.2.4	Data analysis	108
6.2.5	Results of the off-line task	109
6.2.6	Results of the on-line task	114
6.2.7	Discussion	118
6.3	Experiment 2: <i>tul</i> -marking	124
6.3.1	Aims and research questions	124
6.3.2	Design and materials	124
6.3.3	Predictions	125
6.3.4	Data analysis	125
6.3.5	Results of the off-line task	125
6.3.6	Results of the on-line task	127
6.3.7	Discussion	129
6.4	Experiment 2a: Animacy in <i>tul</i> -marking	132
6.4.1	Aims and research questions	132
6.4.2	Design and materials	133
6.4.3	Predictions	135
6.4.4	Data analysis	136
6.4.5	Results of the off-line task	136
6.4.6	Results of the on-line task	142
6.4.7	Discussion	145
6.5	Experiment 2b: Number-specificity in <i>tul</i> -marking	149
6.5.1	Aims and research questions	149
6.5.2	Design and materials	150
6.5.3	Predictions	152
6.5.4	Data analysis	153

6.5.5	Results of the off-line task	153
6.5.6	Results of the on-line task	159
6.5.7	Discussion	162
6.6	Experiment 2c: Distributivity in <i>tul</i> -marking	167
6.6.1	Aims and research questions	167
6.6.2	Design and materials	169
6.6.3	Predictions	172
6.6.4	Data analysis	173
6.6.5	Results of the off-line task	174
6.6.6	Results of the on-line task	176
6.6.7	Discussion	179
6.7	Summary	185
Chapter 7	Discussion and conclusions	186
7.1	Introduction	186
7.2	Summary of the theoretical and methodological discussions	187
7.3	Summary of the experimental results	188
7.4	General discussion of the experimental results	192
7.4.1	The extent and source of attrition	192
7.4.2	Extralinguistic variables in attrition	195
7.4.3	The distribution of <i>tul</i>	199
7.4.4	Attrition and language change	204
7.4.5	L2 influence	205
7.5	Contribution	206
7.5.1	Theories of L1 attrition	207
7.5.2	Methodologies for attrition research	208

<i>CONTENTS</i>	xiii
7.5.3 The distribution of <i>tul</i>	209
7.6 Limitations of the present study and directions for future research .	209
7.7 Summary	210
Appendix A Consent form for experimental participants	212
A.1 Korean version	213
A.2 English translation	214
Appendix B Questionnaire for the monolingual group	215
B.1 Korean version	216
B.2 English translation	218
Appendix C Questionnaire for the L2 English group	220
C.1 Korean version	221
C.2 English translation	225
Appendix D Questionnaire for the L2 Japanese group	229
D.1 Korean version	230
D.2 English translation	234
Appendix E Test materials	238
E.1 Experiment 1: Core binding of <i>caki</i>	238
E.1.1 The off-line task	238
E.1.2 The on-line task	240
E.2 Experiment 2a: Animacy in <i>tul</i> -marking	243
E.2.1 The off-line task	243
E.2.2 The on-line task	245
E.3 Experiment 2b: Number-specificity in <i>tul</i> -marking	248

<i>CONTENTS</i>	xiv
E.3.1 The off-line task	248
E.3.2 The on-line task	250
E.4 Experiment 2c: Distributivity in <i>tul</i> -marking	253
E.4.1 The off-line task	253
E.4.2 The on-line task	254
References	257

List of Tables

1.1	Outline of experiments	6
2.1	Studies on (morpho)syntactic attrition	16
3.1	Crosslinguistic difference in reflexive binding	43
4.1	The denotation of common nouns in Korean and English (Jun 2004)	59
4.2	The frequency of <i>tul</i> by animacy	67
4.3	The relative frequency of <i>tul</i> -marked nouns by modifier type	69
4.4	The frequency of <i>tul</i> -nouns in Korean	72
5.1	Subjects of the experiments	91
5.2	Sociolinguistic questionnaire	93
5.3	Sociobiographical background of the participants	94
6.1	Mean acceptability of core binding sentences (Experiment 1)	110
6.2	Correlation between sociolinguistic variables and the L2E speakers' acceptability of TSC-violating <i>caki</i>	113
6.3	Mean residual RT for the reflexive region (Experiment 1)	114
6.4	Correlation between sociolinguistic variables and the L2E speakers' RT of TSC-violating <i>caki</i>	118
6.5	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2)	126
6.6	Correlation between sociolinguistic variables and subjects' overall preference for <i>tul</i> in the off-line task	127
6.7	Mean residual RT for the noun region (Experiment 2)	128
6.8	Correlation between sociolinguistic variables and subjects' overall preference for <i>tul</i> in the on-line task	129

6.9	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2a) . . .	137
6.10	Correlation between sociolinguistic variables and the L2E speakers' preference for <i>tul</i> on inanimate nouns	140
6.11	Mean residual RT for the noun region (Experiment 2a)	143
6.12	Correlation between sociolinguistic variables and the L2E speakers' preference for <i>tul</i> on inanimate nouns	144
6.13	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2b) . . .	153
6.14	Correlation between sociolinguistic variables and the L2J speakers' preference for <i>tul</i> on 'many + N'	157
6.15	Mean residual RT for the noun region (Experiment 2b)	160
6.16	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2c) . . .	175
6.17	Mean residual RT for the VP region (Experiment 2c)	177
7.1	Summary of non-monolingual performances of attriters	189
7.2	Summary of significant sociolinguistic variables	196
7.3	Summary of age effects in <i>tul</i> -attachment	202

List of Figures

6.1	Mean acceptability of core binding sentences (Experiment 1)	110
6.2	The L2E speakers' acceptability of TSC-violating <i>caki</i> by length of residence	113
6.3	The L2E speakers' acceptability of TSC-violating <i>caki</i> by L2 proficiency	113
6.4	Mean residual RT for the reflexive region (Experiment 1)	114
6.5	Mean residual RT for the post-reflexive region (Experiment 1)	116
6.6	The attrited speakers' RT for proper nouns by frequency of L1 use	117
6.7	The L2E speakers' RT for TSC-violating <i>caki</i> by length of residence	118
6.8	The L2E speakers' RT for TSC-violating <i>caki</i> by L2 proficiency	118
6.9	The L2E speakers' acceptability of TSC-violating <i>caki</i> by language preference	123
6.10	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2)	126
6.11	The preference for <i>tul</i> by level of education	127
6.12	Mean residual RT for the noun region (Experiment 2)	128
6.13	Subjects' preference for <i>tul</i> by age	129
6.14	Attriters' preference for <i>tul</i> by age at migration	130
6.15	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2a)	137
6.16	Mean acceptability of human nouns by group	139
6.17	The preference for <i>tul</i> on inanimate nouns by age	141
6.18	Mean acceptability of inanimate nouns by age group	141
6.19	Mean residual RT for the noun region (Experiment 2a)	142

6.20	The L2E speakers' preference for <i>tul</i> by length of residence	145
6.21	The L2E speakers' preference for <i>tul</i> by amount of L1 input	145
6.22	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2b)	154
6.23	The acceptability of bare/ <i>tul</i> -nouns in 'a few' contexts by age group	155
6.24	Mean acceptability of bare/ <i>tul</i> -nouns modified by 'many'	156
6.25	The L2J speakers' preference for <i>tul</i> on 'many' + N by amount of L1 use	157
6.26	The attriters' preference for <i>tul</i> on numeral + N by frequency of L1 use	157
6.27	The preference for <i>tul</i> on 'a few' + N by age	158
6.28	Mean residual RT for the noun region (Experiment 2b)	160
6.29	Mean residual RT for the noun region by number-specificity and <i>tul</i> -marking (Experiment 2b)	161
6.30	Mean acceptability of bare/ <i>tul</i> -marked nouns (Experiment 2c)	174
6.31	Mean residual RT for the VP region (Experiment 2c)	177
6.32	The L2E speakers' preference for <i>tul</i> in intensional contexts by at- titude toward the L2	179

CHAPTER 1

Introduction

1.1 Background and aims of the thesis

Bilingual speakers who have had prolonged exposure to a second language (L2) experience a decrease in their first language (L1) proficiency. This L2-induced erosion of L1, which is typically found among long-term immigrants in an L2 environment, is referred to as 'L1 attrition'. In this thesis, I investigate the nature of L1 attrition in adult late bilinguals. More specifically, I investigate the extent and source of attrition effects on adult L1 grammar, by comparing potential attrited speakers of Korean living in two different L2-speaking environments (USA and Japan) with their monolingual counterparts living in Korea, and examining non-convergence between the speakers at the representational level of syntax and interfaces and at the processing level.

The general impression of L1 attrition from previous research is that L1 grammar, once it is fully developed, remains surprisingly stable even after several decades in an L2 context (Köpke & Schmid 2004). Adult immigrants, especially those who maintain strong ties with other speakers of the L1 community and use L1 on a regular basis tend to show what appears to be full fluency in L1, despite their prolonged exposure to L2. However, a number of studies (de Bot & Clyne 1994, Ribbert & Kuiken 2010, Tsimpli et al. 2004, and many others) have demonstrated that even speakers who are still fluent in their L1 may display non-native linguistic behaviour with respect to certain grammatical structures of the L1. The findings from the studies have confirmed the generalisation from earlier research that attrition is a 'selective' process (Seliger 1991, p. 228). That is, attrition does

not affect the entire L1 grammar system, but it may have an impact on particular areas of grammar that are more vulnerable than others.

The selectivity of attrition has long been one of the main interests of attrition research, and a fairly large number of studies have investigated what kinds of structures are susceptible to attrition and why. However, findings to date are, to a large extent, inconclusive on the issue (c.f. Köpke 2004), which seems to be due, in part, to methodological limitations. Early attrition research was often conducted by examining grammatical ‘errors’ in attrited speakers’ oral or written production, but the methodology was not always useful for investigating attrition effects on syntax because in many cases potential attriters rarely produced ungrammatical structures. Moreover, as there has been little comparative analysis of attrition effects across languages, there has been difficulty in determining whether observed errors are item- or language-specific, or whether they can be generalised to other language combinations. In the last few years, many researchers (e.g. Gürel 2002, Keijzer 2007, Schmid 2002, Tsimpli et al. 2004) have presented data obtained using more systematic methodologies and have greatly contributed to the knowledge of the scope and cause of attrition. Nevertheless, there still is a dearth of data (especially on-line data), and a number of questions are open for further investigation regarding the selective nature of morphosyntactic attrition. Based on the Interface Hypothesis (Sorace & Filiaci 2006), this thesis identifies some of those questions and presents empirical data that can help to answer the questions.

1.1.1 *The Interface Hypothesis*

The ‘Interface Hypothesis’ (henceforth, IH) is one of the frameworks that provide an approach to the selectivity of morphosyntactic attrition. The original version of the IH states the following concerning L2 acquisition:

- *The Interface Hypothesis* (Sorace 2011, Sorace & Filiaci 2006):
Language structures involving an interface between syntax and other cognitive domains are less likely to be acquired completely than structures that do not involve this interface.

This hypothesis provides an account for non-native linguistic behaviour displayed by highly proficient L2 speakers. Sorace & Filiaci (2006) have observed that late L2 learners who achieved near-native proficiency fail to converge on native speakers and that their non-convergence is found at the interfaces of syntax and other cognitive components (e.g. syntax-discourse interface). These findings led Sorace & Filiaci (2006) to propose that the syntactic interfaces cause increased difficulty for language learners and, thus, may not be acquired completely in adult L2 acquisition. Sorace and Filiaci argued that this hypothesis is applicable to various types of language development, in particular L1 attrition, based on their earlier observation of attrited speakers (Tsimpli, Sorace, Heycock & Filiaci 2004). The attrition version of the IH is that structures involving an interface between syntax and other cognitive domains are more likely to be affected by attrition than those that do not involve the interface (Sorace 2005, 2011). The IH is a good starting point for the investigation of attrition, as it provides a unified approach to language acquisition and attrition (Sorace 2011). However, as many researchers including Sorace herself have noted (c.f. Sorace 2012), the current IH is too broad and its predictions for attrition need to be revisited. This thesis, therefore, does not test the IH itself but examines the following three questions that arise regarding the prediction of the IH for attrition.

1.1.2 *Research questions*

The first question concerns the *extent* of attrition: whether attrition is restricted to particular structures, in other words, whether any structures remain unaffected by attrition. An initial assumption of the IH was that at least some grammatical structures do not involve the interfaces between syntax and other cognitive domains and that those structures are not liable to attrition. However, a more recent approach is that no structures are completely immune to interfaces, since all structures are eventually processed at interfaces (Montrul 2011, Sorace 2012). From this view, the prediction of the IH that attrition only affects so called 'interface structures' is problematic. Therefore, this thesis assumes that all grammatical phenomena are interface phenomena and, upon the assumption, investigates whether attrition is manifested selectively in different types of structures: i) structures whose distribution is determined by grammar and ii)

structures whose distribution is underspecified by grammar and is sensitive to discourse-pragmatic conditions.

The second question is about the *source* of attrition effects: if attrition is manifested in grammatically underspecified structures only, what is the underlying cause of its manifestation? Broadly, the IH allows two different approaches (Sorace 2011, Sorace & Serratrice 2009). The ‘representational account’ is that instability at interfaces exhibited by attrited speakers is due to underspecification of the speakers’ mental representation. Attrited speakers may not have the same kind of knowledge of grammatical properties that non-attrited speakers have because their representation has been altered or deteriorated. However, non-convergence between attriters and non-attriters might not always be due to the difference in mental representation. Under the ‘processing resources account’, the non-convergence can also result from on-line processing difficulties. It is assumed that attrited speakers have less efficient access to appropriate knowledge due to reduced use of L1, or that they have difficulty in coordinating different types of information in real time due to cognitive resource limitations, etc. As Sorace (2012, p. 215) notes, it is not useful to take a dichotomous approach that an attrition effect is ‘due to *either* linguistic *or* to processing factors’ since any attrition effect is likely to be an interaction between the two. However, the investigation of whether particular grammatical phenomena are more unstable at the level of representation or at the level of processing allows a better understanding of the nature of morphosyntactic attrition. Therefore, this study probes the cause of attrition effect at both the levels of representation and processing.

The third question, in connection with the second, is also concerned with the source of attrition: to what extent is attrition effect a consequence of crosslinguistic influence? In other words, how much is attrition determined by L2? Although there is no doubt that L2 plays an important role in attrition, transfer from L2 is not the only source of attrition (Köpke & Schmid 2004, p. 17). From the representational view, changes in L1 grammar might be induced not only *language-externally* (through transfer), but also *language-internally* (through reduction or simplification) (Seliger & Vago 1991, p. 10). Also, from the processing point of view, attrition is not always attributable to interference from L2. According to Sorace (2011) and Sorace & Serratrice (2009), attriters’ (or bilinguals’) instability in the processing of particular structures is, at least to a certain extent, a general

effect of bilingualism itself, i.e. ‘executive control limitations in handling two languages in real time’ (Sorace & Serratrice 2009, p. 199). Therefore, this thesis examines the extent of L2 influence in order to identify the source of any attrition effects observed.

The questions addressed so far can be summarised as follows:

- What is the *extent* of L1 attrition? Is attrition restricted to structures whose distribution is underspecified by grammar? Or is attrition manifested in grammatically specified structures as well?
- What is the *source* of L1 attrition? If attrition is manifested in grammatically underspecified structures only, is its effect due more to underspecification of grammatical representation or to real-time language processing difficulties?
- To what extent is attrition a result of L2 transfer? Is the effect due partly to bilingualism itself?

1.2 Experiments

In order to explore the research questions above, I examine the case of L1 attrition in adult Korean immigrants who have had a long-term exposure to two different L2s, English or Japanese. In two experiments, I test a total of 70 native speakers of Korean who have lived in an L2 environment (USA or Japan) for an average of 12 years and compare them with unattrited monolingual speakers of Korean who reside in Korea. English and Japanese are chosen as L2s since they are typologically different from each other. English is different from Korean in terms of the properties of the grammatical structures investigated (i.e. reflexive binding and plural marking), whereas Japanese is similar to Korean. By testing attriters under the influence of different L2s, I examine the role of L2 in attrition.

Table 1.1 provides an overview of the experiments of this study. Experiment 1 investigates core binding of the reflexive *caki*¹ in attrited grammar. In prior studies on reflexive binding, it has been claimed that core binding, as opposed to exempt binding, is constrained grammar-internally and is not sensitive to

¹All examples in this thesis are transcribed according to the Yale Romanization. See <List of Abbreviations> (p. vii) for the description of linguistic terms used.

discourse-pragmatic conditions (Kim 2008, Pollard & Sag 1992). Therefore, by examining attriters' acceptability and processing of core binding of *caki*, I investigate the effect of attrition on a phenomenon that is grammatically specified.

Experiments	Investigated phenomena	Distributional properties
1	Core binding of <i>caki</i>	Specified by grammar
2	<i>Tul</i> -attachment a. Animacy b. Number-specificity c. Distributivity	Underspecified by grammar

Table 1.1: Outline of experiments

In Experiment 2, I examine a phenomenon that is underspecified by grammar, namely the attachment of the Korean plural suffix *tul*. In Korean (also in Japanese), the morphological realisation of the [+PL] feature is not always obligatory (Kim 2003), unlike in English. Therefore, the Korean plural suffix *tul*, different from the English plural *-s*, is not required to attach to all NPs that are construed as plural. Since the distribution of *tul* is not completely specified by grammar, the production or omission of *tul* is constrained by various grammar-external factors. In order to examine whether attrition affects *tul*-attachment, I first compare general patterns of *tul*-attachment of the monolingual group and the two L2 groups. Then, I divide the experiment into three parts, Experiments 2a through 2c, focusing on three specific factors that influence *tul*-attachment: the semantic property of the host noun (i.e. animacy), the specificity of plurality-indicating expressions (i.e. number-specificity) and the semantic and pragmatic constraint of the predicate (i.e. distributivity). Since these factors involve different types of linguistic and non-linguistic information, the investigation of the factors allows one to identify the locus of any non-convergence between attrited and non-attrited speakers.

Investigating the effect of attrition on *tul*-attachment also allows the achievement of two important goals. The first is to contribute to the theoretical discussion on *tul*. Although there has long been a debate on *tul* in the research, its status and function has not yet been established, partly due to the complexity of its distribution and also due to limited research methodologies. Studies on *tul*, to date, have depended mainly on a few individual speakers' acceptability judgements, but the judgements were not always agreed upon by others. Moreover, there has

been little empirical data as to how Korean speakers actually perceive and produce *tul*. In this study, therefore, there was a need to set the baseline knowledge of unattrited Korean speakers before examining attrition. This study presents experimental data obtained from 49 monolingual speakers of Korean using two different linguistic tasks. The data is expected to make a contribution to the discussion on *tul*.

Another goal of investigating *tul* is to give light to the relationship between individual attrition and societal language changes. Recent studies on *tul* have reported that there is an ongoing change in the usage of *tul* in Korea (Noh 2008, Suh 2008). Language change has always been considered as a factor that must be controlled in measuring attrition, as any difference between attriters and non-attriters may be in fact a consequence of language change in the home country, rather than of attrition. Therefore, relatively little attention has been given as to how changes in individuals lead to language change at the societal level. This study extends the discussion of this matter by comparing attrited speakers with two monolingual groups of different generation.

For the purpose of this study, data in each experiment is obtained from two tasks: an off-line acceptability judgement task and an on-line self-paced reading task, which provide different types of data. While a judgement task presents the final outcome of language processing, a non-cumulative self-paced reading task, in which stimuli are presented on a word-by-word basis, shows the results of temporal processing. As the on-line task taps into real-time syntactic processing, unlike the off-line task (Marinis 2003, 2010), comparison of the off- and on-line data can help identify the source of any non-convergence between attrited and non-attrited speakers.

1.2.1 Hypotheses

In the two experiments described above, I test the following hypotheses regarding the nature of L1 attrition:

- **Hypothesis 1:** L1 attrition is restricted to structures whose distribution is grammatically underspecified. Therefore, the difference between attrited

Korean speakers and non-attrited monolingual Korean speakers is manifested in *tul*-marking, but not in core binding of *caki*.

- **Hypothesis 2:** Attrition effect on grammatically underspecified structures is due not only to underspecification of mental representations, but also to on-line processing limitations. Therefore, the difference between attrited Korean speakers and the monolingual controls is attested in both on-line and off-line data.
- **Hypothesis 3:** Attrition effect on grammatically underspecified structures is not always a consequence of L2 transfer, but is also an effect of bilingualism. Therefore, attrition is exhibited not only by L2 English-speaking attriters, but also by L2 Japanese-speaking attriters whose L2 properties are similar to those of L1.

1.3 Findings

The results from the two experiments show that non-convergence between monolingual and bilingual speakers is exhibited in both core binding of *caki* and *tul*-attachment, unlike the assumption that only grammatically underspecified structures are vulnerable to attrition. Attrited speakers, particularly those who had been exposed to L2 English, failed to perform within the monolingual range in the off-line acceptability judgement of *tul* as well as in the on-line reading of it, suggesting that attrition affected both the representation and real-time processing of *tul*. The attriters also displayed divergence in the on-line reading of *caki*; however, they did not differ from the monolinguals in the off-line judgement of *caki*, suggesting that attrition affected the real-time processing of constraints for *caki*-binding, but not the representation of the constraints. These results lead to the conclusion that attrition has an impact on both grammatically specified and underspecified structures, but to a different degree: attrition is better exhibited in grammatically underspecified structures than in grammatically specified ones.

The observed attrition effects on grammatically underspecified structures were due to both representational and computational problems, whereas the effects on grammatically specified structures were due to computational issues. In Experiment 1, attrited speakers displayed non-monolingual behaviours in the on-line reading of *caki* and proper nouns, but they did not show divergent patterns

in the off-line judgement of *caki*. The discrepancy in their on-line and off-line performances suggested that their divergence from the monolingual norm was computational in nature. In Experiment 2, on the other hand, attriters' divergence was attributable to both representational and computational causes. The L2 English speakers (L2E speakers, hereafter) generally showed a higher acceptability for *tul*-marked nouns (or a lower acceptability for bare nouns) than the L2 Japanese speakers (L2J speakers, hereafter) and the monolinguals. The L2E speakers' high preference for *tul* in the off-line judgement attested the influence of English on the representation of *tul*. The L2E speakers occasionally showed a high preference for *tul* in the on-line reading as well, while performing within the monolingual range in the off-line judgement. Such a result indicated the effect of attrition on the temporal processing of *tul*.

The results also give evidence, although inconclusive, that non-convergence between attriters and non-attriters in the on-line processing of grammatical structures is not due entirely to L2 influence, but due partly to bilingualism itself, as proposed in Sorace (2005, 2011) and Sorace & Serratrice (2009). In the present study, attrited speakers of both L2 groups failed to show sensitivity to different types of predicates in the real-time processing of *tul*, unlike the monolinguals, even though the L2J speakers had crosslinguistic advantages over the L2E speakers. This result is in support of the processing account for developmental instability, according to which the non-native linguistic behaviour found among language learners or attriters is due, in part, to bilingualism itself that causes inefficiency in cognitive resource allocation or in executive control of two languages (Sorace & Serratrice 2009, Wilson 2009).

With respect to Korean plural marking, the results demonstrate that acceptability judgements involving *tul* are mostly gradient rather than categorical because the distribution of the plural suffix *tul* is underspecified by grammar and is largely influenced by several semantic and pragmatic factors, such as animacy, number-specificity and distributivity. A particularly meaningful result regarding distributivity is that both attrited and non-attrited speakers accepted *tul*-marked nouns with non-distributive predicates, as the result is against one of the existing views on *tul* that *tul* is a distributive marker (e.g. Jun 2004, Park 2008)². It

²Note that the discussion of this thesis is limited to *tul* that attaches to nominal categories. The non-nominal *tul*, so called the 'extrinsic plural marker (EPM)' *tul*, is not covered here. See 4.3.1 for examples of the EPM *tul*.

is proposed that the participants' acceptance of *tul* in non-distributive contexts may be a recent tendency in the Korean language.

1.4 Broader significance

The major contribution of this thesis is that it enhances the understanding of the nature of L1 attrition in adult late bilinguals. On the basis of the empirical data obtained from a fairly large number of attrited speakers, this study demonstrated that structures whose distribution is fully specified by grammar are not immune to attrition, mainly at the level of processing. This finding raises a question toward the strong version of the IH that attrition only affects structures that are sensitive to discourse-pragmatic conditions. The finding, therefore, highlights the need for further investigation of attrition effects on morphosyntactic structures that have previously been considered to be stable.

This study is a particularly meaningful addition to the body of literature because it presents data from L1-L2 pairings (i.e. Korean-English, Korean-Japanese) which have been little investigated thus far in the field of attrition. Although many studies have examined the combination of English and European languages, there has been relatively little data from other language combinations. Data from this thesis allows findings from prior studies on morphosyntactic attrition to be generalised crosslinguistically.

From methodological perspectives, this thesis shows that attrition research can develop further by adopting a broader range of methodologies. Attrition research to date has tended to depend on limited sets of data collection methods, such as off-line judgement tasks or interviews. However, those conventional methods have not been most useful in probing attrition effects at the processing level. This thesis uses an on-line self-paced reading task that has rarely been used in previous studies and, by doing so, emphasises the importance of on-line data in attrition research. Furthermore, as one of the very few attrition studies that used a combination of on-line and off-line methodologies, this study demonstrates that such a combination can be useful for the investigation of attrition effects on morphosyntax.

This thesis also contributes to the theoretical discussion on the Korean plural suffix *tul* by presenting experimental data from a large group of monolinguals. The data from this thesis has implications for different theories on the semantics of *tul*, in particular the ‘distributive marker’ view, because it suggests that *tul* may not be associated with distributivity. The data also provides evidence for language change in the distribution of *tul* and emphasises the need for more up-to-date empirical data for further research on *tul*.

1.5 Organisation of the thesis

This thesis is structured as follows: Chapter 2 gives an overview of findings from previous research on attrition and examines various theoretical frameworks that have been used to account for the patterns of attrition. The chapter then discusses the IH and its assumptions for attrition that provide the research questions for this thesis. Chapters 3 and 4 present the theoretical background of the experiments on reflexive binding (Experiment 1) and on plural marking (Experiment 2), respectively: Chapter 3 reviews prior studies on the acquisition and attrition of reflexive binding and discusses possible effects of attrition on the core binding of *caki*. Chapter 4 reviews various theoretical approaches to the plural suffix *tul* and discusses attrition effects on the distribution of *tul*. Since the two experiments of this study were conducted in one session with the same participants using the same methodology, Chapter 5 presents the common methodology used in the experiments and gives details on participants and their sociolinguistic background. Chapter 6 presents the details of the experiment (aims, materials and predictions) and analyses results from the experiments. Finally, Chapter 7 gives a summary of findings and a general discussion of the findings and their implications.

CHAPTER 2

Theoretical approaches to L1 attrition

2.1 Introduction

For the past thirty years, a number of studies have been devoted to the investigation of the attrition phenomenon. However, not many of them have dealt specifically with the attrition of mature L1 grammar, presumably because changes in L1 proficiency are far less obvious in adult speakers than in children. In fact, several studies (e.g. Gürel 2007, Kim et al. 2010) that tested adult bilinguals who had been away from their home country for several years found no evidence of attrition in the speakers' L1 grammar. Yet many other studies (e.g. Gürel 2002, 2004, Schmid 2002, Tsimpli et al. 2004) did observe signs of attrition in adult migrants with respect to various grammatical phenomena, such as word order, pronominal binding, relative clauses, etc. Their findings have demonstrated that a fully developed L1 grammar, as well as developing grammar, is susceptible to attrition under extensive exposure to L2.

In this chapter, I first review previous studies on adult L1 attrition and, based on their findings, I examine general patterns of attrition. Then I review various theoretical models that account for the patterns, focusing on the IH that provides the background of the present study.

This chapter is organised as follows: Section 2.2 gives a brief overview of attrition research of the past and examines findings of studies on adult L1 attrition. Sections 2.3 and 2.4 review different models of attrition from linguistic and psycholinguistic perspectives, respectively. Section 2.5 examines the assumptions of the IH and discusses main issues relevant to the hypothesis.

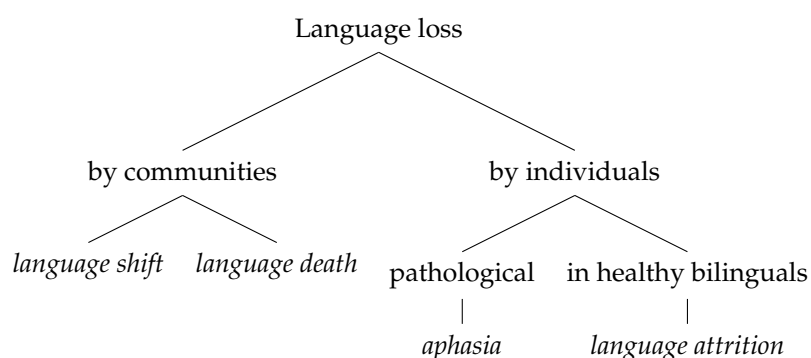
2.2 First language attrition

2.2.1 Definitions

Among different forms of language loss, attrition refers specifically to a ‘non-pathological decrease in proficiency in a language that had previously been acquired by an individual, i.e. intragenerational loss’ (Köpke & Schmid 2004, p. 5). More specifically, attrition is ‘the loss of, or changes to, grammatical and other features of a language’ in an individual speaker that occurs ‘as a result of declining use by speakers who have changed their linguistic environment and language habits.’ (Schmid 2011). These definitions imply that attrition is characterised as follows:

First, attrition takes place in healthy bilingual speakers, thus it is distinguished from pathological language loss such as aphasia or dementia (Schmid 2011, p. 3). Second, attrition is an *individual* language loss that takes place within a single generation. Therefore, it is different from societal language contact phenomena that are typically intergenerational, such as language shift, change or death (Köpke 2004, Yağmur 2004), although those phenomena are not irrelevant to attrition in that they are often driven or accelerated by attrition in individual speakers (Seliger 1996). The following diagram shows the difference between attrition and other types of language loss:

(1) Language loss (Schmid 2011, p. 3)



Attrition is further divided into two types, depending on what language is affected: a speaker’s first language (L1) or a second/foreign language (L2/FL).

While research on L1 attrition has often been conducted from sociolinguistic perspectives, research on L2 attrition has been done mainly from educational perspectives with a focus on the retention of L2 proficiency¹. The scope of this thesis is limited to the discussion of L1.

An important implication of the definition of attrition is that attrition can only affect what had been ‘acquired’ (Sorace 2004). In early attrition research, the distinction was not made clearly between L1 attrition in adults and in children (or incomplete learners, including heritage speakers²). However, there now is an agreement on the view that attrition in adult speakers who had completed the acquisition of L1 before exposure to L2 must be distinguished from attrition in young, incomplete speakers whose exposure to L2 sets in before puberty, as there is a significant difference between the two (Köpke & Schmid 2004, Schmid 2011). Therefore, as Sorace (2004) emphasizes, it is crucial in an attrition study to establish subjects’ state of knowledge before the onset of attrition, because what appears to be ‘lost’ might not have been acquired in the first place’ (Yağmur 2004, p. 140).

2.2.2 *General patterns*

As Köpke & Schmid (2004, p. 1) states, one of the major questions in L1 attrition research has been ‘whether a first language in which a certain level of proficiency has been reached can ever undergo significant attrition’. Findings from previous studies suggest that this is extremely unlikely. In child L1 attrition, there have been reports of the most extreme case of attrition, where the L1 system completely disappeared from the speakers’ mind: Pallier (2007) observed that young Korean speakers who were adopted to French-speaking families in childhood and spent several years in complete isolation from the L1-speaking community show no traces of the L1. However, such cases of entire L1 loss have never been documented for speakers who had passed puberty (around age 12) when L1 input was reduced (Köpke & Schmid 2004, p. 10). On the contrary, several studies

¹For the discussion of L2 attrition, refer to Hansen (1999), Weltens & Cohen (1989), Weltens et al. (1986).

²Heritage speakers are ‘simultaneous bilinguals who are exposed to two languages from birth — a heritage (“home”) language and the official (“society”) language of the country they are raised in’ (Suh 2008). By ‘heritage speakers’, I refer to the second-generation immigrants only, in order to distinguish them from the first-generation immigrants (late bilinguals).

observed that fully-developed L1 grammar remains almost unchanged even after several decades in an L2 context. For example, in a longitudinal study of Dutch immigrants in Australia, de Bot & Clyne (1994) found very little evidence of attrition in their informants' L1 grammar for a 16-year period³. Hutz (2004) also found that a German immigrant who had spent more than 57 years in the US showed remarkable stability in L1 morphology and syntax.

Nevertheless, these findings do not imply that adult L1 grammar is not affected by attrition. A number of observational and experimental studies have observed signs of attrition with respect to various types of grammatical phenomena in different L1-L2 pairings. Some of the grammatical phenomena that have been reported to be affected by attrition are word order (Altenberg 1991, de Bot & Clyne 1994, Hutz 2004, Schmid 2002, Waas 1996), gender assignment/plural marking (Altenberg 1991, Keijzer 2007), pronominal binding (Gürel 2004), anaphora resolution (Tsimpli et al. 2004, Wilson 2009), relativisation (Yağmur 2004), etc. Table 2.1 gives an overview of studies in which morphosyntactic attrition has been documented⁴.

Altenberg (1991) is among the few studies of the 1990s that investigated the attrition of mature L1 grammar specifically. She observed two German immigrants who had lived in the US for over 40 years, focusing on different aspects of grammar: word order, verb usage and gender assignment/plural marking. She predicted that her informants, a married couple, would show only mild attrition since they spoke German to each other and to their friends on a daily basis. A grammaticality judgement task on word order revealed evidence of attrition which seemed to be due to L2 influence: both of the informants displayed less secure knowledge with respect to sentences whose word order was ungrammatical in German but grammatical in English (they judged German sentences with non-standard word order as acceptable). Interestingly, however, when the subjects were presented with the same sentences a few weeks later, they were surprised at their own judgements and corrected themselves, stating that the sentences (except one) were unacceptable. Another interesting fact was that there was a great

³As the speakers had already spent several years in Australia at the time of data collection, their length of residence was actually longer than 16 years.

⁴The list only includes studies that involved late bilinguals who were immersed in L2 around or after puberty. However, de Bot & Clyne (1994) might be an exception, as the informants' age at immigration was not clearly specified in the study.

Study	L1-L2	Type of data	Grammatical structures
Altenberg 1991	German-English	Acceptability judgement, fill-in task	Word order, plural marking, etc.
de Bot & Clyne 1994	Dutch-English	Interview, picture description	Word order (adverbial placement)
Cuza-Blanco 2008	Spanish-English	Truth-value/acceptability judgement, elicited production	Aspectual properties
Gürel 2002, 2004	Turkish-English	Written interpretation, truth-value judgement	Pronominal binding
Hutz 2004	German-English	Written corpus analysis	Word order
Jarvis 2003	Finnish-English	Free speech, grammaticality judgement, etc.	Preposition selection, etc.
Keijzer 2007	Dutch-English	Film-retelling, grammaticality judgement	Word order (V2, subordination), etc.
Laleko 2010	Russian-English	Sentence construction, acceptability judgement, etc.	Imperfective aspect
Pavlenko 2003	Russian-English	Film-retelling	Tense/aspect, subcategorisation, etc.
Ribbert & Kuiken 2010	German-Dutch	Grammaticality preference task	Use of complementizer
Schmid 2002	German-English	Spoken corpus analysis	Word order, etc.
Tsimpli et al. 2004	Greek/Italian-English	Headline production, picture verification	Pronominal anaphora resolution
Wilson 2009	German-English	Visual-world paradigm	Anaphora resolution
Yağmur 1997	Turkish-English	Relativisation production	Relativisation

Table 2.1: Studies on (morpho)syntactic attrition

deal of inter-subject variability in judgements, even though the informants used L1 predominantly with each other. In another grammaticality judgement task and a fill-in task, there were also signs of deterioration with respect to verb usage and gender/plural morphology, demonstrating that those aspects of grammar were also subject to attrition.

de Bot & Clyne (1994) presented a longitudinal study on L1 attrition in Dutch immigrants living in Australia. They selected a group of Dutch-English bilinguals who were once tested in a prior study in 1971 (reported in Clyne (1977)) and re-tested them in 1987, in order to examine whether their L1 changed for over the 16 year-period. Attriters' speech data collected in 1971 contained several non-standard forms with respect to different types of syntactic structures, including word order in subordinate clauses, adverbial placement and overgeneralisation of articles, etc.⁵ After 16 years, de Bot & Clyne (1994) select subjects who showed fluency in the earlier study and test them again. A comparison of data from the different time points showed that attriters' L1 grammar had not undergone a significant change: there was evidence of attrition in adverbial placement, but not in other aspects of grammar. Based on the result, de Bot & Clyne (1994) suggested that L1 might be attrited in the first decade after migration as claimed by Waas (1993), but 'the language skills which are still present after this period are fairly stable' (p. 27).

More recently, many studies have attempted to find out patterns of syntactic attrition by testing specific linguistic or psycholinguistic models such as Minimalism or the Activation Threshold Hypothesis, with a focus on a specific grammatical phenomenon including anaphora resolution, reflexive binding, etc. Tsimpli, Sorace, Heycock & Filiaci (2004) conducted an experimental study on the use of overt/null subjects with a group of Greek and Italian speakers who had a long-term exposure to L2 English and attained near-native proficiency. Within the Minimalist framework (Chomsky 1995), Tsimpli et al. (2004) hypothesised that *interpretable* features, which are "read" by the conceptual/intentional systems of cognition, are vulnerable to attrition, whereas *uninterpretable* features which are relevant to parametric variation across languages remain intact. Greek-English bilinguals of Tsimpli et al. (2004)'s study exhibited attrition in a production task

⁵As the data were from not only first-generation speakers but also second-generation speakers, it is possible that the non-standard forms were produced by incomplete learners rather than attriters.

involving pre-/post-verbal subjects, by showing a significantly stronger preference for preverbal subjects than monolingual control speakers. Italian-English bilinguals also behaved differently from their monolingual counterparts in the interpretation of overt pronouns in subordinate clauses: while the monolingual speakers strongly preferred a new referent (i.e. a referent other than the matrix subject or complement), the Italian-English bilinguals did not show any preference. Both of the Greek or Italian groups, however, did not show signs of attrition regarding formal (uninterpretable) aspects of subjects. These results were in support with Tsimpli et al.'s hypothesis that attrition affects only grammatical phenomena that are regulated by interpretable features.

Gürel (2004) investigated attrition effect on pronominal binding in Turkish immigrants living in North America. Gürel (2004)'s hypothesis based on the Activation Threshold Hypothesis (Paradis 1997) was that only the L1 properties that have corresponding forms in the L2 are affected by attrition because they are in competition with the L2 options in attriters' mind. In a series of interpretation and judgement tasks, Gürel found evidence of attrition with respect to binding properties of the overt pronoun *o*, which is an equivalent of the English pronouns *he/she*: attrited Turkish speakers accepted the ungrammatical coindexation of *o* and the matrix subject, to a significantly higher degree compared with the unattrited control speakers, demonstrating that L2 had an impact on L1 binding. The attriters, however, did not exhibit attrition with respect to binding of the overt pronominal *kendisi* and the null pronoun *pro*, which was, in Gürel (2004)'s claim, due to the fact that the two pronouns do not have competing elements in the L2 and thus are not inhibited by the L2 system.

Findings from the studies above lead to the following generalisations about the attrition of L1 grammar:

- Mature L1 grammar is resistant to attrition overall, despite extensive influence from L2. However, particular grammatical structures are susceptible to attrition.
- Attrition is typically manifested as increased variability or instability in the use of grammatical structures, rather than the loss of the structures.

Altenberg (1991), de Bot & Clyne (1994), Gürel (2004), Tsimpli et al. (2004) (and also other studies listed in Table 2.1) all have demonstrated that there are areas of grammar particularly vulnerable to attrition. They also have shown that the consequence of attrition is not necessarily the loss of grammatical structures. In both Tsimpli et al. (2004) and Gürel (2004), attriters had not completely lost their knowledge of overt/null subjects and pronouns, respectively: however, they exhibited increased variability or instability⁶ in the interpretation or production of subjects and pronouns. The variability within an individual speaker results in a large variability between speakers as well, as observed in Altenberg (1991).

The next question to consider is then, in what structures such variability is attested in attrition and why the structures are more unstable than others. In the following two sections, I review various linguistic and psycholinguistic models that give light to those questions.

2.3 Linguistic approaches to attrition

Several different theories or models have been used to explain patterns of morphosyntactic attrition. The following frameworks provide approaches to linguistic aspects of attrition:

- (2) Frameworks for attrition research (Köpke & Schmid 2004, Schmid 2002)
 - a. The regression hypothesis
 - b. The interlanguage (or crosslinguistic influence) hypothesis
 - c. The language change (or Simplification) hypothesis
 - d. Universal Grammar (UG)

The regression hypothesis, proposed by Jakobson (1941/1968), is one of the oldest theories that have been used to account for attrition. The hypothesis, to put it simply, is that language loss mirrors language acquisition. That is, what is acquired late is first to be lost. The hypothesis was originally formulated based on a symmetry between child language acquisition and language loss in aphasia. However, there has been a claim that the regression hypothesis is not likely

⁶Sorace (2003, 2005) and Sorace & Filiaci (2006) also use the term 'optionality', which refers to 'the coexistence within an individual grammar of two or more variants of a given construction' Sorace (2000, p. 93).

to hold with respect to aphasia, since pathological language disorder is typically non-progressive in nature and is generally characterised as partial impairment rather than across-the-board deterioration (de Bot & Weltens 1991, Köpke & Schmid 2004). Therefore, many studies have instead focused on parallels between acquisition and non-pathological language loss, i.e. attrition.

Keijzer (2007) presents one of the most extensive empirical studies on regression. She compares adult attrited speakers of Dutch living in Canada with adolescent Dutch speakers in the Netherlands who are at advanced stages of L1 acquisition, by testing them on various morphological and morpho-syntactic features. The results of the experiments revealed considerable similarity between the language attriters and acquirers in the domain of morphology in particular, providing evidence consistent with the regression hypothesis. While arguing that the regression hypothesis allows insights into language development, Keijzer (2009) also notes that the hypothesis alone cannot serve as a theoretical framework for attrition, since it does not provide an account as to why there are regression patterns. She argues that the patterns can be explained in the light of other linguistic theories, such as generative approaches and Dynamic Systems Theory. As Hansen (1999) states, the next goal of research on regression would be 'no longer *whether* regression is operative in the loss of grammatical structure (in some cases it appears to be, in others not), but rather *when* and *under what conditions* its predictions hold true, and what the causal mechanisms are' (p. 150).

Another framework for attrition is the interlanguage (or crosslinguistic influence) hypothesis, according to which attrition is a consequence of L2 transfer. In other words, the assumption of the hypothesis is that modifications in L1 system is 'entirely or in parts due to the second language 'taking over'' (Schmid 2002, p. 14). Hypothetically, attrition may take place in the absence of L2 input, such as in the 'desert island' situation (Sharwood Smith & van Buren 1991, p. 22). However, as attrition in real life occurs mostly in language contact situations, and therefore transfer from L2 is indeed a crucial factor in L1 attrition, as demonstrated in most, if not all, attrition studies to date.

Nevertheless, the interlanguage hypothesis itself is not sufficient to account for attrition, since attrition effects are not always attributable to L2 influence. Some

changes in the L1 system may be induced language-internally, rather than externally (Seliger & Vago 1991, p. 10), often leading to a reduction in registers and morphological complexity (e.g. loss of case-marking and allomorphs) (Schmid 2002). The language change hypothesis, or the 'Simplification' framework, is an approach that focuses on such internally-induced changes in L1. Its assumption is that 'the loss of a particular structure or linguistic feature is determined by that item's complexity' (Köpke & Schmid 2004, p. 16). In other words, linguistic structures with high complexity are more likely to be simplified in the course of attrition than structures with low complexity. As Köpke & Schmid (2004) notes, the problem of the language change hypothesis is that it lacks explanatory power in itself. It does not provide the definition of *complexity*, making it impossible to determine which structures are more complex. Moreover, it does not account for why complex structures are more vulnerable to attrition. Therefore, to be used as a theoretical framework for attrition research, the hypothesis needs to be further specified.

Various approaches based on UG and generative frameworks provide more systematic accounts for attrition than the interlanguage hypothesis or the language change hypothesis. The common assumption of the UG-based approaches is that attrition is not a random loss of language, but is a systematic process guided by a set of rules, i.e. Universal Grammar. Seliger & Vago (1991) were among the first who adopted the theory of UG into attrition research. They assumed that change in L1 competence is 'governed by the laws of universal grammar which define the limits of possible grammars (and also degrees of markedness)' (p. 51). According to the markedness theory, linguistic rules that belong to UG are distinguished from language-specific ones: the former are unmarked (*u*) while the latter are marked (*m*). Seliger & Vago (1991) proposed that marked rules are more likely to be affected by attrition and accordingly the outcome of attrition is predictable depending on the type of the linguistic relationship between L1 and L2: attrition is likely to take place in the relationship (3a) where L1 has a marked form and L2 has an unmarked form, since marked forms are easily replaced with unmarked ones. On the other hand, attrition is not expected to occur in the relationship (3b) where L1 has a unmarked form and L2 has marked form, as unmarked forms are hardly replaced with marked ones.

- (3) Types of linguistic relationships (Seliger & Vago 1991, p. 13)

- a. L1 (m) and L2 (u) \rightarrow L1 (u) : attrited
- b. L1 (u) and L2 (m) \rightarrow L1 (u) : unattrited

Seliger (1996) further argued that the process of attrition is driven by the Redundancy Reduction Principle. He stated that, ‘when the input data in the L2 contains a comparable grammatical form that is *more universal* and *less marked* than competing grammar in the primary language, that form in the L2 input will be preferred’ and eventually it replaces the redundant form in the L1 (Seliger 1996, p. 618).

A more recent approach within generative frameworks is that of Tsimpli, Sorace, Heycock & Filiaci (2004), as introduced earlier. Focusing on the distinction between uninterpretable and interpretable features, Tsimpli et al. (2004) proposed that only interpretable features that are regulated by the conceptual/intentional system are liable to attrition. Uninterpretable features that determine parametric differences across languages were claimed to be unaffected by attrition. This ‘interpretability’ hypothesis, similarly to Seliger & Vago (1991)’s prediction based on the markedness theory, has an implication on the directionality of attrition: attrition is likely to take place only when L1 has less “economical” syntactic options than L2 (Tsimpli et al. 2004, p. 263). For example, English has more economical options than Italian and Greek with respect to subjects, as it does not have interpretive options. Therefore, native speakers of English are not likely to be influenced by subject options of L2 Italian or Greek, even when they are exposed to those languages for a prolonged period. On the contrary, native speakers of Italian or Greek are likely to be affected by English options, since their L1 has more interpretative properties than L2.

In this section, I have reviewed four different frameworks that provide an approach to linguistic aspects of attrition. However, manifestations of attrition are not always linguistic in nature. As shown in the case from Altenberg (1991) where attriters self-corrected their grammatical errors after a certain period of time, attrition is often attested as temporary divergences from the native norm, rather than permanent loss of grammatical structures. This raises the problem of defining attrition. As Schmid (2011, p. 48) asks, what do we mean by ‘vulnerable’ when we say certain structures are vulnerable to attrition? Does attrition refer to a full restructuring of L1 grammar only (i.e. entire deletion or replacement),

or does it also refer to occasional digressions from standard forms with intact grammatical representations? The next section explores this issue in reviewing psychological models of attrition.

2.4 Psycholinguistic approaches to attrition

Non-native-like language use does not always result from the deterioration of linguistic knowledge. It has long been acknowledged that attrition might take place ‘psychologically (at the regulatory level) but not linguistically’ (Jiménez 2004, p. 76). Sharwood Smith (1983*a,b*) was among the first who incorporated the competence-performance dichotomy into attrition models. He proposed the three putative stages of language loss in (4), according to which *performance attrition* precedes *competence attrition*. Under this model, it is assumed that linguistic competence remains unaffected at early stages of attrition but it eventually declines at more advanced stages.

(4) Stages of language loss (Sharwood Smith 1983*a*):

Stage I: systematic deviations in performance alone

Stage II: transitional stage

Stage III: the emergence of a new competence (or loss of L1 structure)

Although this performance-competence approach seems to be a convenient way to account for attrition, it raises several questions, one of which is whether an attriter can actually lose ‘or even able to lose ... underlying mental representation of his or her first language that may be referred to as L1 competence (Sharwood Smith & van Buren 1991, p. 17)’. As Schmid (2011) states, ‘the assumption that L1 attrition can ever affect underlying linguistic structures has not been validated’ for adult migrants. I noted earlier (Section 2.2.2) that non-standard use of L1 documented in the literature, in most cases, seems to indicate increased indeterminacy, possibly resulting from temporary loss of syntactic restrictions or on-line processing difficulty, rather than from complete loss of grammar. This suggests that permanent loss of grammatical competence, which is characterised by ‘inability to produce, perceive, or recognise particular rules, lexical items, concepts, or categorical distinctions due to L2 influence’ (Pavlenko 2004, p. 47), is highly unlikely to take place in adult L1 attrition.

An alternative to the performance-competence approach is the assumption that grammatical knowledge remains intact in attrition and only on-line processing of grammar becomes increasingly effortful. Paradis (1997)'s Activation Threshold Hypothesis (ATH) posits that attrition is neither the restructuring nor loss of grammar, but is the inability to activate L1. In Paradis (1997)'s claim, the frequency of a certain linguistic item determines the threshold for the activation of the item. Therefore, less frequently activated items have a higher threshold than more frequently activated ones, and thus are less accessible. When L1 use is reduced in an L2 environment, elements of L2 that are frequently used replace the counterparts of L1, since the activation of L1 is inhibited by its heightened threshold. With continued influence from L2, L1 eventually 'becomes inaccessible because of its overly high activation threshold'; however, L1 competence remains unaffected in adult bilinguals (Paradis 2007, p. 130).

Gürel (2004)'s study on the attrition of Turkish pronominals presents experimental results consistent with the ATH. Gürel observed that attrition affects L1 structures that have a corresponding linguistic element in the L2 (e.g. the Turkish pronoun *o* corresponding to English pronouns *he/she*), but does not affect structures that do not have an analogous form in the L2 (e.g. the Turkish nominative reflexive *kendisi*). Gürel argued that these results were in support for the ATH, as they have demonstrated that attrition takes place only when L1 structures are in competition with L2 structures (because L1 options become less accessible than L2 options due to their high activation threshold). When there is no competition between L1 and L2, attrition is not expected to occur.

Findings from Altenberg (1991) also provide support for the ATH, as they provided evidence that the frequency of linguistic items is a significant factor in attrition. In a study on German plural marking, Altenberg (1991) observed that attrited speakers produced more plural marking errors with low frequency words than with high frequency ones. Such a frequency effect is predicted by the ATH: low frequency items have a higher activation threshold than high frequency ones and thus are more easily affected by attrition.

Many other findings give further support for the general assumption of the ATH that attrition is a consequence of processing difficulty. Yağmur (1997, 2004), for

example, found that attrited speakers' performance often varies greatly depending on the type of tasks. He observed that attrited Turkish speakers experience a great deal of difficulty producing relative structures when they were asked to use certain words and phrases only. However, the same speakers did not show much difficulty in relativisation when they were asked to tell a story using words of their choices. Yağmur (2004) argued that the task effect on attriters' performance is indicative of 'processing difficulties rather than the loss of relative clause structures' (p. 160).

The findings discussed so far suggest that 'L1 attrition among adults is, in most cases, an issue of processing difficulties', as noted by Köpcke & Schmid (2004, p. 22). However, as few attrition studies have been done from processing perspectives thus far, there is only limited data as to how attriters' processing of L1 grammar differs from that of non-attrited monolinguals. More research on psycholinguistic aspects of attrition will help to account for the patterns of attrition that cannot be explained by linguistic models alone. The IH is a promising framework for attrition research in this regard, as it allows both linguistic and psycholinguistic approaches to the attrition phenomenon.

2.5 The Interface Hypothesis

Recall that the original version of the Interface Hypothesis (IH) states that:

Language structures involving an interface between syntax and other cognitive domains are less likely to be acquired completely than structures that do not involve this interface (Sorace 2011).

This hypothesis was formulated by Sorace & Filiaci (2006) in an attempt to account for residual optionality observed at near-native stages of adult L2 acquisition. Sorace & Filiaci (2006) tested a group of L2 speakers who achieved near-native proficiency in Italian and examined whether the speakers converge on native speakers of Italian in the resolution of anaphors. Since Italian is a null subject language that allows subjects to be null or overt depending on pragmatic conditions, the comprehension and production of subjects involves the interfaces between syntax and pragmatics (Belletti et al. 2007, Tsimpli et al. 2004). As shown in the following example (5), the null subject (*pro*) of an embedded clause is

typically interpreted as coreferential with the subject of the matrix clause ('the mother'), whereas the overt subject pronoun (*lei*) is considered as a new topic and is interpreted as coreferential with a non-subject antecedent ('the daughter' or a third referent).

- (5) Mentre $lei_{k/l}/pro_i$ si mette il cappotto, la mamma_i dà un bacio
 while she wears the coat, the mother gives a kiss
 alla figlia_k.
 to the daughter.
 'While she/*pro* is wearing her coat, the mother kisses her daughter.'
 (Sorace & Filiaci 2006, p. 352)

Sorace & Filiaci (2006)'s experiment showed that near-native L2 speakers did not differ from native speakers in the interpretation of null subjects, indicating that the speakers had successfully acquired the syntactic conditions for the licensing of null subjects. However, when asked to select a possible antecedent of overt subject pronouns, the L2 speakers showed a significantly higher preference for the subject of the matrix clause, compared with native speakers, who showed a preference for non-subject referents. Sorace & Filiaci (2006) argued that the L2 speakers' non-convergence in the interpretation of overt subjects attests 'residual indeterminacy' at the interface between syntax and discourse-pragmatics. The authors further proposed that such indeterminacy at interfaces is found in other domains of language development as well (i.e. L1 attrition and simultaneous bilingual acquisition), emphasizing the similarities between the domains.

The assumptions underlying the IH are based on Minimalism. According to the Minimalist Program (Chomsky 1995), the language faculty consists of a computational system (C_{HL}), a lexicon and two 'external' systems — the articulatory-perceptual system (A-P) and the conceptual-intentional system (C-I). The computational system maps lexical information into the two external systems at interface levels of Phonetic Form (PF) and Logical Form (LF), respectively, through operations Merge, Move and Agree. Within this framework, formal (morphosyntactic) features are divided into two types — *interpretable* and *uninterpretable* features — depending on whether they are readable at PF and LF. LF-interpretable features, such as person and number, have semantic content. On the other hand,

uninterpretable features, such as case and agreement, have purely syntactic functions and they regulate parametric variation across languages. Tsimpli et al. (2004) and Tsimpli (2007) argued that, since uninterpretable features cannot be accessed by other systems unlike interpretable features, syntactic options (i.e. parameter values) that are regulated by those features are unaffected by attrition. In other words, attrition, in their view, is ‘a process that cannot affect syntax proper and parametric choices of the computational domain’; it can only affect features that are interpretable at either PF or LF (Tsimpli 2007, p. 85). The IH focuses on this distinction between grammatical structures that involve uninterpretable, syntactic features only and those that involve interpretable features, which must be read at interfaces.

The concept of ‘interface’ under the IH is wider than it is under the generative model. Sorace (2011, p. 6), following Ramchand & Reiss (2007), notes that ‘interface’ can refer to both i) the components that link sub-modules of language (i.e. *internal* interfaces) and ii) the link between language and non-linguistic cognitive systems (i.e. *external* interfaces). She states that:

the term ‘interface’ refers to syntactic structures that are sensitive to conditions of varying nature: the meaning of the term therefore denotes the fact that these conditions have to be satisfied in order for the structure to be grammatical and/or felicitous. Thus, the interface between the structure and the domain that defines the conditions on its grammaticality and/or felicity is critical for its appropriate use (Sorace 2011, p. 6).

According to this definition, the production and interpretation of subject pronouns in Italian discussed above are so called “interface phenomena” as their felicity is determined at the crossroads of multiple interfaces, such as the syntax-semantics and the syntax-discourse interfaces.

The IH has gained much attention over the last few years, especially because of its potential ‘applicability in other domains of language development such as bilingual L1 acquisition, L1 attrition, language breakdown and diachronic change’ (Sorace & Filiaci 2006, p. 340). In fact, before the formulation of the IH, interface difficulties have long been observed in various types of language

development, as listed below. The IH is an attempt to provide ‘a unifying framework’ for these traditionally separate research areas, focusing on the parallelism found in them (Sorace 2011).

- (6) Interface difficulties in language development:
 - a. Monolingual L1 acquisition (Schaeffer 2000)
 - b. (Simultaneous) bilingual L1 acquisition (Lleó 2006, Müller & Hulk 2001, Paradis & Navarro 2003, Serratrice et al. 2004, Sorace & Serratrice 2009)
 - c. L2 acquisition (Belletti et al. 2007, Hopp 2007, Wilson 2009)
 - d. Heritage language acquisition (Kim 2007, Laleko 2010, Montrul 2002, 2006)
 - e. L1 attrition (Sorace 2005, Tsimpli 2007, Tsimpli et al. 2004, Wilson 2009)

A general framework for bilingual language development such as the IH can greatly benefit the field of attrition. Attrition research thus far has not been in close connection with other fields of developmental linguistics, and it has often been considered an isolated topic of research. Now with the increasing attention to interfaces, however, more attrition research is being conducted from interdisciplinary perspectives. Tsimpli et al. (2004) opened up the new direction of research by presenting evidence for interface problems in L1 attrition. Recently, other studies (e.g. Cuza-Blanco 2008, Laleko 2010) have presented further empirical evidence for the similarities between L1 attrition and late L2 acquisition and incomplete L1 acquisition, confirming that the IH is a fruitful line of research in attrition.

However, as Sorace (2011, p. 6) acknowledges, the current proposal of the IH is problematic in many ways: it needs to be more specific regarding several issues in order to constitute a theoretical framework for bilingual development. Some of the issues that this thesis focuses on within the domain of attrition are: i) whether attrition is restricted to particular structures that are underspecified by grammar; ii) if attrition is manifested in certain types of structures only, whether the source of attrition effect is more representational or computational in nature; and iii) to what extent the attrition effect is attributable to L2 influence.

2.5.1 *The extent of attrition*

The first question that needs to be examined regarding the IH is whether attrition is restricted to particular structures of L1. Based upon the distinction between so called ‘narrow syntax’ versus interfaces, the initial version of the IH posited that attrition only affects structures that require mapping of information at interfaces and that structures that require computation within syntax remain unaffected. Recently, however, Sorace (2011) and many other researchers (e.g. Gurel 2011, Montrul 2011) have noted that such a dichotomous approach, despite its convenience, is problematic since it is unclear whether ‘structures that require only syntactic computations’ exist at all (Sorace 2011, p. 9). According to Montrul (2011), it is inappropriate to assume that there are any structures constrained solely by syntax, since ‘ultimately, every single utterance we utter involves discourse and must be read off at all linguistic interfaces’ (p. 592). If we assume that no structures are completely immune to interfaces as Montrul argues, there is a need to modify the prediction of the IH that attrition only affects interface structures, since all grammatical structures, after all, are interface structures. This, however, does not mean that any distinction between different types of grammatical structures is unnecessary for the investigation of acquisition or attrition. The developmental difference between the structures that are dependent mainly on formal syntactic features and other structures that are regulated by discourse/pragmatic conditions still seems worth investigating, considering that there has been a great deal of evidence for the instability of interfaces across different types of language development.

In this thesis, under the assumption that all structures eventually require mappings at interfaces, I investigate whether attrition is manifested unequally in two different types of structures: i) structures that are fully specified by grammar and ii) those that are underspecified by grammar and thus are sensitive to grammar-external conditions. Findings to date seem to converge on the conclusion that the former is not likely to be affected even under extensive L2 influence: most cases of attrition that were reviewed earlier report attrition effects with respect to grammatical phenomena that are known to be sensitive to pragmatic conditions, for example, word order, anaphora resolution, etc. (refer to Table 2.1). For structures that are less sensitive to discourse-pragmatic conditions, such as core binding of reflexives, there has been no conclusive evidence of attrition (e.g. Kim

et al. 2010). To date, there have been only a small number of empirical studies that allow the comparison of attrition effects on the two different types of grammatical structures. Therefore, this study will help to determine whether attrition is exhibited unequally in those structures.

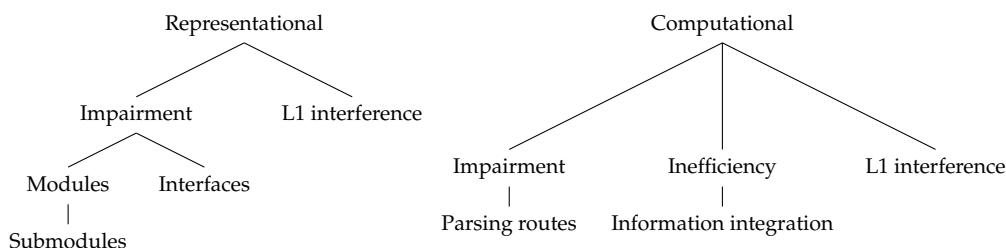
If attrition indeed manifests selectively in structures that are underspecified by grammar, an additional question to examine is whether particular interface conditions are more unstable than others, since several prior studies (e.g. Sorace & Serratrice 2009, Sorace et al. 2009, Tsimpli & Sorace 2006) argue for developmental inequality in *internal* interfaces (e.g. syntax-semantics) and *external* interfaces (e.g. syntax-pragmatics). Tsimpli & Sorace (2006) observed that advanced L2 learners of Greek exhibit non-target behaviour with respect to a grammatical phenomenon involving contextual factors (i.e. pronominal subjects), but not with respect to a phenomenon involving only semantic features whose operations are within syntax and LF (i.e. Focus). This finding led Tsimpli & Sorace (2006) to propose that external interfaces are more problematic than internal interfaces in bilingual acquisition, with the assumption that ‘the syntax-discourse interface is a ‘higher’ level of language use, integrating properties of language and pragmatic processing, whereas syntax-semantics involve formal properties of the language system alone’ (p. 653). Further supporting evidence for Tsimpli & Sorace’s (2006) proposal is presented by Sorace & Serratrice (2009), who investigated the acceptability of pronominal subjects and plural noun phrases in bilingual children. Sorace & Serratrice (2009) found that the children show far more non-target-like intuitions with respect to pronominal subjects that are regulated by the syntax-discourse interface, than with respect to plural nouns phrases that are constrained by the syntax-semantics interface, similarly to what was observed in Tsimpli & Sorace (2006). Findings from these studies suggest that all interfaces may not be equally unstable, not only in language acquisition, but also in language attrition, highlighting the need to examine whether external interfaces are more susceptible to attrition than internal interfaces and whether ‘attrition effects manifest themselves initially at the syntax-pragmatics interface and at a later stage at the syntax-semantics interface’, as Sorace & Serratrice (2009, p. 207) proposed. Data from this study will contribute to the investigation of the question.

2.5.2 *The source of attrition*

If attrition is a selective process as predicted by the IH, the next question to examine is what the cause for the selectivity is. The current IH predicts that interface structures are vulnerable to attrition, but it does not provide an explanation on why those structures are more unstable than others. According to Sorace (2005, 2011), the possible causes for developmental instability at interfaces are broadly of two types: *representational* or *computational*. Under the ‘representational account’, the source of interface problems is located at bilingual speakers’ mental representation of syntactic knowledge. Bilinguals undergoing L1 attrition may not have the same knowledge representation of interface conditions as monolinguals, because their representation has become altered or underspecified under L2 influence. The representation of interface conditions is likely to be neutralised when L2 does not have a similar constraint as in L1 for licensing of the same syntactic structure (Sorace 2011, Tsimpli et al. 2004). However, it is also possible that bilinguals’ grammatical knowledge remains intact despite L2 influence. The ‘processing resources account’ is that emerging instability at interface in attrition is due to computational problems that result from inefficiency in integrating different types of syntactic and contextual information in real-time.

The source of any developmental instability can be further categorised using Hopp’s (2007) approach. Hopp (2007) investigated whether near-native L2 speakers converge on target grammar and processing at different interfaces. He proposed that, if L2 speakers behave differently from monolingual native speakers, the loci of their non-convergence can be specified as shown in (7). First, the non-convergence may be either representational or computational in nature. The non-convergence at the level of representation is due either to impairment of representation or to transfer from L1. Similarly, the non-convergence at the level of processing is attributed to the impairment of parsing routes, inefficiency in information integration or interference of L1. This approach can also be used to specify non-monolingual behaviour of attrited speakers.

- (7) Approaches to non-convergence at L2 ultimate attainment (Hopp 2007)



Findings from recent studies suggest that bilingual speakers' non-target behaviour is, to a large extent, due to on-line processing limitation, rather than representational underspecification. Hopp (2007), for example, demonstrated that residual instability at interfaces in advanced or near-native L2 learners can be, in large part, explained by processing limitation. He tested L2 learners of German from different L1 backgrounds in a series of experiments on scrambling, and found that the L2 speakers experience difficulty at various interfaces, such as syntax-morphology and syntax-discourse. However, the L2 learners' performance differed quantitatively, rather than qualitatively, from that of native speakers, and their performance varied considerably depending on task demands. These results indicated that the L2 speakers' non-convergence on native performance resulted mainly from computational limitations in accessing and mapping information at interfaces.

Wilson (2009) also presented empirical evidence that processing limitation is responsible for L2 speakers' (also attrited speakers') non-target behaviour at interfaces. In experiments on anaphora resolution in German, she found that L2 learners of German behave differently from native speakers when processing the dependencies of demonstratives that are discourse based, showing no clear preference for the correct antecedent. This result suggested that L2 learners' real-time processing at the syntax-discourse interface is not as efficient as that of native speakers. She further examined whether the L2 speakers' processing difficulty was due to a limitation of cognitive resources or the inability to deploy the resources effectively, by testing native speakers of German with an extra processing load. As an additional processing load reduces cognitive resources available to speakers, if native German speakers display similar patterns with L2 speakers, it would confirm that L2 speakers suffer from a processing resource limitation. The result, however, showed that processing load did not have a clear effect on

the antecedent preferences of demonstratives, suggesting that L2 speakers' non-native performance was due more to a resource allocation difficulty, rather than a resource limitation.

In the field of attrition, it has long been acknowledged that attrited speakers' non-convergence on monolingual performance is a matter of on-line processing limitation, not just representational underspecification. For example, Seliger (1996, p. 614) noted that a 'language attriter often substitutes material from the L2 for missing information in the L1, either because of on-line retrieval problems or problems in the underlying grammar of the language.' However, due to a dearth of research conducted using on-line methodologies, there is insufficient evidence that processing difficulty is responsible for attrited speakers' non-target use of L1 structures. The on-line data of this study will help determine to what extent attrition effect on grammatical structures can be explained by computational causes.

2.5.3 *The role of L2*

An important point to consider when investigating the source of attrition effects is to what extent those effects are attributable to L2 influence. Although transfer from L2 is an important factor in attrition from both of the representational and computational point of views, it surely is not responsible for all patterns of non-convergence between attrited and non-attrited speakers. At the level of representation, attriters' non-convergence can be driven language internally through the process of simplification (Seliger & Vago 1991). At the level of processing, the non-convergence can be caused by L2 interference when, according to the Activation Threshold Hypothesis, L2 options prevent the activation of L1 options and override them. At the same time, however, the non-convergence may also be due to other causes, i.e. general consequences of bilingualism.

Sorace (2005, 2011) and Sorace & Serratrice (2009) point out possible reasons why bilingual speakers (both L2 learners and L1 attriters) might exhibit more instability at interfaces than monolinguals. Firstly, bilinguals might be less efficient than monolinguals in integrating different types of linguistic/contextual information in real-time. Processing at and across interfaces is typically more costly than processing within the domain of syntax, as it requires the access and integration of

representation of different levels (Burkhardt 2005, Piñango & Burkhardt 2005). Bilinguals, then, may experience increased difficulty at interfaces because their access to knowledge representations is less automatized, or their integration of the representations is less optimal (Sorace 2011, p. 15). Secondly, bilingual processing might be less efficient due to ‘bilingualism *per se*, including executive control limitations in handling two languages in real time’ (Sorace & Serratrice 2009, p. 199). Bilinguals might not have sufficient cognitive resources, unlike monolinguals, because of an additional language they have acquired. Also, as Wilson (2009) proposed, bilinguals may have difficulty in allocating resources effectively because of competition between the constraints of two languages. An effort to ‘inhibit the language not in use’ also may reduce processing resources available to bilinguals (Sorace 2011).

An effective way to determine whether attriters’ non-target performance is due more to L2 influence or bilingualism itself is to test speakers with different L1-L2 combinations (e.g. Hopp 2007). If attrited speakers exposed to typologically distant L2s display similar patterns of divergence, it can be concluded that their indeterminacy with respect to particular grammatical structures is, to a great extent, a general consequence of bilingualism. In the current attrition literature, there are only a few studies that present a comparison of speakers of different L1-L2 pairings, particularly pairings of non-European languages. This study will contribute to the investigation of the issue by presenting data from two L1-L2 combinations in which the L2s are typologically different.

2.6 Summary

In this chapter, I have presented an overview of previous findings on attrition. I have examined general patterns of the attrition of mature grammatical system observed in prior studies and have reviewed different theoretical models that have been used to account for those patterns, focusing on the IH.

I have proposed that the IH is a promising framework for attrition research in that it provides a consistent explanation for different types of language development, as Sorace (2011) argued. However, as Sorace (2012) and others (e.g. Gurel 2011, Montrul 2011) have noted, I have argued that the IH needs to be refined in order to be used as a formal model for attrition research because its

current version is too broad. Then I discussed three questions that arise regarding the IH, which are the research questions of this thesis: i) whether attriters' non-convergence on monolingual performance is restricted to particular grammatical structures, i.e. structures whose distribution is underspecified by grammar; ii) what the underlying cause for their non-convergence is; and iii) to what degree their non-convergence is attributable to L2 influence or to bilingualism itself.

In the next two chapters, I examine two grammatical phenomena that this thesis focuses on: reflexive binding and plural marking. I compare the properties of those phenomena in the three languages investigated — Korean, English and Japanese — and, based on the difference between the languages, I formulate predictions for the effect of attrition on the phenomena.

CHAPTER 3

The attrition of reflexive binding

3.1 Introduction

The purpose of this chapter is to provide the theoretical background for Experiment 1 which investigates the attrition of binding properties of the Korean reflexive *caki*. Reflexive binding is one of the grammatical phenomena that has been most widely discussed in language development research. Binding has received much attention especially in the field of L2 acquisition, due to the fact that languages differ from each other with respect to the domain within which reflexives are bound. As this crosslinguistic difference in binding may cause problems in L2 acquisition, a number of studies (e.g. Finer 1991, Hirakawa 1990, Kim 2007, Yuan 1998) have been devoted to the investigation of how much L1 binding properties are transferred to L2 and whether L2 binding can be successfully acquired by language learners despite L1 interference. Those studies have provided converging evidence that, although L2 binding is greatly affected by L1 at early stages of acquisition, target binding properties are eventually acquired by learners at more advanced stages. Within the field of L1 attrition, on the other hand, binding has only recently been investigated in a small number of studies (e.g. Gürel 2004, 2007, Kim et al. 2010), and it remains largely underinvestigated whether L1 binding can be attrited under the influence of L2 and, if so, to what extent. In this chapter, I review previous research on binding in both L2 acquisition and L1 attrition. Then, on the basis of the findings from the research, I predict possible effects of attrition on binding properties of L1.

This chapter is structured as follows: the next section (3.2) examines general theories of reflexive binding and their assumptions for crosslinguistic variation

across languages. Section 3.3 focuses on reflexive binding in Korean and examines the properties of the reflexive *caki*. Then, in Section 3.4, I compare the binding properties of the three languages investigated in this thesis: Korean, English and Japanese. Section 3.5 presents an overview of prior studies on reflexive binding in L2 acquisition and discusses findings from the studies. Section 3.6 reviews previous research on binding in L1 attrition and makes predictions for the effect of attrition on the binding properties of *caki*. Section 3.7 presents a summary of the chapter.

3.2 Theories of reflexive binding

An anaphor or a reflexive is an expression whose reference is determined by its antecedent. According to Condition A of the standard Binding Theory (Chomsky 1980, 1981)¹, an anaphor must be bound in a local domain, as shown in the examples below:

- (8) a. John_i likes *himself*_i.
 b. *John_i said [Mary likes *himself*_i].

An initial assumption regarding the binding principle was that the local domain, also known as Governing Category (GC), is uniform across languages. However, it was found that this assumption was problematic for some languages, such as Chinese, Japanese and Korean, because they allow anaphors to be bound outside the local domain, as shown in the Chinese example in (9):

- (9) Zhangsan_i renwei Lisi_j xiangxin ziji_{i/j}.
 Zhangsan think Lisi trust self
 ‘Zhangsan_i thinks [Lisi_j trusts self_{i/j}].’ (Yuan 1998, p. 324)

¹Binding Theory (Chomsky 1980, 1981) specifies a set of syntactic conditions that constrain referential dependency between NPs, as follows:

- Condition A: An anaphor must be bound in a local domain.
 Condition B: A pronoun must be free in a local domain.
 Condition C: An r-expression must be free.

As an attempt to incorporate this crosslinguistic variation in binding, Wexler & Manzini (1987) proposed the Governing Category Parameter (GCP), which hypothesises that the size of GC varies from one language to another. The assumption of the GCP was that languages which do not permit long-distance (LD) binding of anaphors (e.g. English) have a smaller GC than languages that allow LD binding (e.g. Chinese). This approach, however, also became problematic, due to the observation that languages with a smaller GC occasionally allow LD binding. As shown in (10), the English reflexive *herself* can be bound outside the local domain:

- (10) The picture of *herself_i* on the front page of the Times confirmed the allegations *Mary_i* had been making over the years.
(Pollard & Sag 1992, p. 4)

In order to account for such exceptional cases of binding, Pollard & Sag (1992) and Reinhart & Reuland (1993) put forward the distinction between *core binding* and *exempt binding*. According to their claims, anaphors in core binding are licensed by grammar-internal principles. In exempt binding, on the other hand, anaphors can be ‘exempt’ from syntactic constraints and bound outside the local domain, if there are felicitous discourse-pragmatic conditions. Anaphors in exempt binding, therefore, are constrained by grammar-external principles. Exempt anaphors (or logophors) are distinguished from core anaphors (or grammatical anaphors) by the following properties (Kim & Yoon 2009):

- (11) Exempt anaphors
- may be unbound (or discourse-bound).
 - do not need c-commanding antecedents.
 - may be LD bound.
 - allow strict readings in contexts of ellipsis/proforms.

One way of distinguishing exempt anaphors from core anaphors is to examine the interpretation of a sentence containing an elliptical VP (Cole et al. 2001, Huang & Liu 2001, Kim & Yoon 2009). In exempt binding, the strict reading is readily acceptable for an elided VP: the missing VP in (12a) can have the interpretation that John remembered Bill’s photo having been printed. In core binding,

on the other hand, it is difficult to obtain the strict reading for an elliptical VP: as shown in (12b), the sloppy reading is much preferred to the strict reading:

- (12) a. **Exempt binding:** strict > sloppy reading
 Bill_i remembered that the Times had printed a picture of *himself*_i in its Sunday edition.
 So did John. (= John remembered that the Times had printed **Bill**'s (>John's) picture.)
- b. **Core binding:** sloppy > strict reading
 Bill_i defended *himself*_i against the committee's accusations.
 So did John. (= John defended **John** (>?*Bill).)
 (Kim & Yoon 2009)

Under the core versus exempt binding approach, one might assume that all LD anaphors are exempt anaphors, in order to account for the crosslinguistic difference in binding, illustrated in (8) and (9). Then, it would be unnecessary to hypothesize that the size of GC varies across languages (Kim et al. 2010). Huang & Liu (2001) have extended this line of research. They found that the Chinese reflexive *ziji* displays different properties when it is LD-bound and when it is locally bound. This observation led Huang & Liu (2001) to argue that the LD-bound *ziji* is a logophor, while the locally bound *ziji* is a core anaphor.

However, Kim et al. (2010) argue that this 'invariant GC' approach is questionable for the following reasons. Firstly, LD anaphors do not always behave as exempt anaphors. Despite the fact that exempt anaphors can only be licensed under appropriate pragmatic/logophoric conditions, Pollard & Xue (2001) have found examples where LD-bound *ziji* does not require logophoric conditions to be licensed. Secondly, the GC for core binding in some languages is not constrained by the two Opacity Conditions (Chomsky 1973) that define the GC in other languages. The GC in many European languages, for example in English, is constrained by both of the Opacity Conditions: the Specified Subject Condition (SSC) and the Tensed Sentence Condition (TSC). On the other hand, in languages such as Chinese and Korean, the TSC is not effective in defining the GC for core binding: their GC is constrained by the SSC only (Kim 2007, Kim et al. 2010). Therefore, as Kim et al. (2010) argue, it is untenable that the GC for core

anaphors is invariant across all languages. In this thesis, I follow Kim et al.'s (2010) view and adopt the 'parameterisation of GC' theory (Pollard & Xue 2001), which assumes that the domain of GC for core binding differs across languages. Using this theoretical background, I examine the properties of core binding in Korean, English and Japanese in the next two sections.

3.3 Reflexive binding in Korean

Korean has several reflexives, which can be divided broadly into two types: the monomorphic reflexives (e.g. *caki*, *casin*, *susulo*) and the polymorphic ones (e.g. *cakicasin*, pronoun + *casin*, *caki susulo*) (Kim 2000). These reflexives, despite their similar functions, differ from each other in terms of frequency of use, possible antecedents and binding preferences. Among the reflexives, *caki* is most frequently used² and it has been most widely discussed in the literature with respect to binding. This study focuses on this particular reflexive.

Different from other Korean reflexives, *caki* mostly takes third-person antecedents, although it occasionally takes first or second-person antecedents as well³. *Caki* is known as a typical long-distance reflexive that can be bound across finite clause boundaries. As shown in (13), *caki* can be bound either locally or long-distance, while the English reflexive *himself* can be bound only locally.

- (13) a. John_i-un [Bill_j-i *caki*_{i/j}-lul pyenhoha-ess-ta]-ko
 John-TOP Bill-NOM self-ACC defend-PST-DEC-COMP
 malha-ess-ta.
 say-PST-DEC
 'John_i said that [Bill_j defended *self*_{i/j}].'
 b. John_i said that [Bill_j defended *himself*_{*i/j}].

²According to Kang (1998, p. 195), *caki* has a slightly lower token-frequency than *casin* in a corpus of written Korean, but it has a much higher type/token ratio. It is also more commonly used in spoken Korean than *casin*.

³*Caki* is often marginal with a first or second-person antecedent, as shown in the following example:

- ?? Na-nun *caki*-lul mit-nun-ta.
 I-TOP self-ACC believe-PRES-DEC
 'I believe in myself.'

One of the main properties of *caki* is that it is strongly subject (or topic)-oriented. In other words, *caki* displays a strong preference for LD binding over local binding. When there are more than one possible antecedents in a neutral context⁴, *caki* is typically interpreted as coreferential with the subject of the matrix sentence, as demonstrated in several empirical studies (e.g. Choi & Kim 2007, Kim & Choi 2003). In the example in (13), *John*, the topic of the sentence, is more likely to be interpreted as the antecedent of *caki* than *Bill*.

According to Kim et al. (2010), Korean differs from English in that its GC for core anaphors is not constrained by the TSC, but by the SSC only. Their claim is based on the observation that *caki* that violates the TSC behaves as a core anaphor, rather than as an exempt anaphor in the VP-ellipsis test. As shown in (14), TSC-violating *caki* does not permit the strict reading in VP-ellipsis contexts: it only allows the sloppy reading, the same as a core anaphor in English (see 12b). *Caki* that violates the SSC, in contrast, behaves as an exempt anaphor: as shown in (15), it displays a preference for the strict reading over the sloppy one, same as an exempt anaphor in English (see 12a). This contrast between the two cases of *caki*-binding suggests that *caki* with TSC-only violation is a core anaphor, whereas *caki* with SSC-violation is an exempt anaphor.

(14) *Caki* with TSC-violation:

John-un [*caki*-ka ttokttokhata]-ko sayngkakha-n-ta. Bill-to kulehkey
 J-TOP self-NOM be-smart-COMP think-IN-DEC B-too so
 sayngkakha-n-ta.
 think-IN-DEC

‘John thinks that *self* (= John) is clever. Bill thinks so too.’

(= Bill thinks that **Bill** (> John) is smart.): **sloppy** > strict reading

(Kim et al. 2010, p. 77)

(15) *Caki* with SSC-violation:

⁴In non-neutral contexts, predicates are semantically biased for a certain antecedent, as in the following example:

Chelswu_i-nun [Yengswu_j-ka *caki*_{??i/j}-lul ppomnay-ess-ta]-ko malha-ess-ta.
 Chelswu-TOP Yengswu-NOM self-ACC boast-PST-DEC-COMP say-PST-DEC
 ‘Chelswu_i said that Yengswu_j boasted self_{??i/j}.’

John-un [Mary-ka *caki*-lul silheha-n-ta]-ko sayngkakha-n-ta.
 J-TOP M-NOM self-ACC hate-IN-DEC-COMP think-IN-DEC
 Bill-to kulehkey sayngkakha-n-ta.
 B-too so think-IN-DEC

‘John thinks that Mary hates *self* (= John). Bill thinks so too.’
 (= Bill thinks that Mary hates **John** (> Bill).): **strict** > sloppy reading
 (Kim et al. 2010, p. 77)

3.4 Crosslinguistic differences

Under Kim et al.’s (2010) assumption that the size of the GC for core binding varies across languages, the two L2s investigated in this study are in contrast: while the GC in English is defined by both of the TSC and SSC, the GC in Japanese is defined by the SSC only.

3.4.1 Reflexive binding in English

As shown in the examples below, anaphors that violate the TSC are typically unacceptable in English (16a), unlike in Korean (16b). However, TSC-violating anaphors in English can also become acceptable, when they are remedied by appropriate discourse-pragmatic (or logophoric) factors, as in (16c).

(16) TSC-violating anaphor in English and Korean:

- a. *John_i thinks [that *himself*_i is clever].
- b. John_i-un [*caki*_i-ka ttokttokhata]-ko sayngkakhanta.
 J-TOP self-NOM clever-COMP think
 ‘John_i thinks that *self*_i is clever.’
- c. John_i believes that [no one but *himself*_i] is clever.

3.4.2 Reflexive binding in Japanese

In Japanese, core binding is constrained by the SSC only, the same as in Korean. In fact, the Japanese reflexive *zibun* and Korean *caki* have several characteristics in common. Some of the notable similarities between the reflexives are as follows (Kang 1988, p. 419):

- There is no gender agreement with respect to reflexives.
- The antecedent can be indefinitely far away from the reflexive, i.e. unbounded.
- The antecedent should be, mainly, a subject.

Zibun that violates the TSC is acceptable without discourse-pragmatic conditions, similarly to *caki*, since core binding of anaphors in Japanese is constrained by the SSC only. An example presented below is the equivalent of the Korean example in (16b):

(17) TSC-violating anaphor in Japanese:

John_i-wa [*zibun*_i-ga kashikoi]-to omotteiru.
 J-TOP self-NOM clever-COMP think
 ‘John_i thinks that self_i is clever.’

The difference in core binding between the three languages discussed so far is summarised in Table 3.1:

Opacity Conditions	Korean	Japanese	English
No violation	Core binding	Core binding	Core binding
TSC-only violation	Core binding	Core binding	Exempt binding
SSC-violation	Exempt binding	Exempt binding	Exempt binding

Table 3.1: Crosslinguistic difference in reflexive binding

3.5 The acquisition of reflexive binding

Because there is variation as to how binding principles are applied in each language, the learnability of the principles has been a popular topic in the research of L2 acquisition. Early works on the acquisition of binding were conducted on the basis of Wexler & Manzini’s (1987) proposal that the crosslinguistic variation in binding can be captured by a set of parameters, namely the Governing Category Parameter and the Proper Antecedent Parameter. The Governing Category Parameter, which was introduced earlier, is concerned with the size of the local domain within which an anaphor must be bound: it distinguishes languages that do not allow anaphors to be bound across clausal boundaries (e.g. English)

from languages that permit anaphors to be bound long-distance (e.g. Japanese). The difference between the languages is presented below in (18). The Proper Antecedent Parameter, on the other hand, is concerned with the selection of antecedents of anaphors: it captures the difference between languages that allow subject and non-subject antecedents for anaphors (e.g. English) and languages that allow subject antecedents only (e.g. Chinese). The contrast is shown in (19).

(18) a. English:

Mary_i thought [Susan_j blamed *herself*_{*i/j}].

b. Japanese:

Mary_i-ga [Susan_j-ga *zibun*_{i/j}-o semeta]-to omotta.
Mary-NOM Susan-NOM self-ACC blamed-that thought

'Mary_i thought that Susan_j blamed *self*_{i/j}.'

(White 2003, p. 44)

(19) a. English:

John_i gave Bill_j a photograph of *himself*_{i/j}.

b. Chinese:

Zhangsan_i gei le Lisi_j yi zhang *ziji*_{i/*j} de zhaopian.
Zhangsan give PFV Lisi one CL self DE photograph

'Zhangsan_i gave Lisi_j a photograph of *self*_{i/*j}.'

(Yuan 1998, p. 325)⁵

The main interests of the studies that investigated these parameters in L2 acquisition (e.g. Broselow & Finer 1991, Finer 1991, Hirakawa 1990) were as follows: i) to what extent parametric values of L1 are transferred to L2; ii) whether L2 learners' interlanguage grammar observe the Subset Principle (proposed in Berwick 1985); and iii) whether L2 learners can reset the binding parameters successfully (White 1989, 2003). Those studies have provided empirical evidence that L2 learners apply L1 binding properties to L2 at early stages of acquisition and that the learners, despite the L1 influence, eventually succeed at resetting of the parameter values at more advanced stages of acquisition and display target-like performance.

⁵PFV: perfective aspect marker, DE: modifying marker that occurs at the end of a pronominal modifier (Yuan 1998).

These findings have been confirmed in later studies (e.g. Kim 2007, Kim et al. 2009, Yuan 1998) that employed more up-to-date theories of binding, such as the LF-movement approach (Cole et al. 1990, Cole & Sung 1994) or the exempt anaphor approach (Pollard & Sag 1992, Reinhart & Reuland 1993). For example, Kim (2007) and Kim, Montrul & Yoon (2005, 2009, 2010), who investigated core versus exempt binding in L2 acquisition, found empirical evidence for a strong L1 influence in L2 binding. In a series of experiments on the binding interpretations of Korean reflexives, Kim, Montrul and Yoon demonstrated that binding properties of L1 (or the dominant language in heritage language acquisition and in L1 attrition) have a significant effect on binding in L2 (or the less dominant language). Kim et al. (2005) tested a group of simultaneous Korean-English bilinguals (US-born heritage language speakers) and a group of English-speaking L2 learners of Korean in a truth value judgement task involving *caki*-binding. In the task, subjects were presented with a short story and, subsequently, a sentence containing *caki*, as shown in (20). The subjects were asked to judge whether the given sentence is a true description of the story. If a subject accepted the possibility of the binding presented in the sentence, he/she would judge the sentence as 'true' and, if not, 'false'.

(20) Context:

Mary thinks she is very ugly. To make her feel better, her boyfriend Paul took her in front of a mirror and said, "Look, how pretty you are."

Question:

Paul-i Mary-eykey *caki*-lul poye-cwu-ess-ta.
 Paul-NOM Mary-DAT self-ACC show-give-PST-DEC
 'Paul showed Mary herself.' (Kim et al. 2005, p. 5)

In their experiment, Kim et al. (2005) found that both the heritage speaker group and the L2 speaker group performed differently from the native control group: both groups showed a significantly lower acceptance rate than the controls for the sentences that contained long-distance bound *caki*, demonstrating that their binding interpretation of *caki* was influenced by the properties of English. The results from Kim et al. (2005) and those from earlier studies (e.g. Eckman 1994, Hirakawa 1990, Lakshmanan & Teranishi 1994, Yuan 1998) provide evidence that

binding properties of L1 or the dominant language greatly influence binding in L2 or the less dominant language.

3.6 The attrition of reflexive binding

Findings from attrition research on reflexive binding are less conclusive than those from acquisition research, mainly due to the little amount of data available. Despite the recent contributions to the body of research (e.g. Gürel 2002, 2004, 2007, Kim et al. 2009, 2010), how and to what extent L1 binding is affected by attrition remains largely underinvestigated.

Gürel (2004) is among the few studies that present evidence of attrition on L1 binding. Gürel (2004) investigated the attrition of pronominal binding among Turkish immigrants who lived in an English-speaking environment for a prolonged period. According to her claim, embedded clauses in Turkish are structurally DPs, rather than IPs. Since DPs do not function as governing domains in Turkish, unlike in English, the Turkish overt pronoun *o* in an embedded clause cannot be bound with a matrix subject: the pronoun must be free in the governing category, as posited by Principle B of Binding Theory (Chomsky 1981). The reflexive pronominal *kendisi* and the null pronoun *pro*, on the other hand, can be bound with a matrix subject. The example in (21) presents the difference in the binding of the pronominals:

- (21) Burak_i [o-nun_{*i/j}/kendi-si-nin_{i/j}/pro_{i/j} zeki
 Burak s/he-GEN/self-3SG-GEN/pro intelligent
 ol-duğ-u]-nu düşün-üyor
 be-NOM-3SGPOSS-ACC think-PRG
 ‘Burak_i thinks that [he_{*i/j}/self_{i/j}/pro_{i/j} is intelligent].’
 (Gürel 2004, p. 58)

In her study, Gürel (2004) examined whether Turkish immigrants’ knowledge of pronominal binding was affected by attrition by testing the speakers in two different types of tasks: a written interpretation task and a truth-value judgement task. Results from her experiment revealed a contrast among the pronominals in terms of their vulnerability to attrition. Whereas the attriters did not display

divergence from the monolingual norm with respect to the binding of the non-native reflexive *kendisi* and the null pronoun *pro*, they showed a non-native behaviour with respect to the binding of the overt pronoun *o*. In a judgement task, the attriters allowed the joint reading of embedded *o* and the matrix subject significantly more often than their monolingual peers did (30% versus 4%, in the context of referential antecedents). Gürel (2004, 2008) argued that this result indicates the restructuring of the L1 binding properties.

Different from Gürel (2004), Kim et al. (2009, 2010) did not find clear evidence for the attrition of L1 binding. In Kim et al. (2009), the researchers extended their previous study of the binding of the Korean reflexive *caki* (Kim et al. 2005). This time they examined the binding interpretation of three different reflexives, *caki*, *casin* and *cakicasin*, by testing a group of monolinguals and two groups of bilinguals: US-born simultaneous bilinguals (heritage language speakers, or early bilinguals) and late Korean-English bilinguals who were immersed in English around the age of puberty, after their immigration to the US (potential attriters).

Kim et al. (2009) employed a truth value judgement task, as they did in their study of 2005, but used visual stimuli instead of stories. In the task, subjects were presented with a sentence containing a reflexive that had two possible antecedents (as shown in (22)), along with a picture instantiating either local binding or LD binding of the reflexives. The subjects were, then, asked to judge whether the given sentence was a true description of the picture. If a subject accepted the binding relation of a reflexive in the sentence as it was presented in the photo, he/she would respond ‘true’; otherwise, ‘false’.

- (22) Cheli_i-nun [Minswu_j-ka *caki*_{i/j}-lul kuli-ess-ta]-ko
 Cheli-TOP Minswu-NOM self-ACC draw-PST-DEC-COMP
 malhay-ss-ta.
 say-PST-DEC
 ‘Cheli_i said that Minswu_j drew self_{i/j}.’ (Kim et al. 2009, p. 17)

The results for the binding of *caki* were in accord with those of Kim et al. (2005) in that the simultaneous bilinguals accepted LD-binding of *caki* significantly less than the monolingual control speakers did. Although the bilingual speakers demonstrated that they had the basic knowledge of the binding properties of *caki*, they diverged from the monolinguals by showing a lower acceptance of

LD-bound *caki* and a higher acceptance of locally bound *caki*. Kim et al. (2009) argued that the speakers' non-target behaviour was attributable to transfer from English or to incomplete acquisition (p. 20).

In contrast with the simultaneous bilinguals, the late bilinguals, who were potential attriters, did not show any evidence of L2 interference: they displayed the same patterns of binding interpretations as the monolinguals. Based on this result, Kim et al. proposed that:

invariant syntactic notions underlying binding, such as the distinction between overt and null pronouns, anaphors and pronouns, long-distance versus local anaphors, seem to be integral parts of the knowledge of adults' native grammar as provided by universal grammar and thus are apparently not vulnerable to significant degrees in L1 attrition" (Kim et al. 2009, p. 30).

Kim et al.'s (2009) claim was further supported by the results of their later experiment (Kim et al. 2010). In 2009, the researchers tested immigrant speakers whose lengths of residence in an L2 setting were relatively short (an average of 8.9 years). Accordingly, there was possibility that their subjects did not exhibit attrition because they had not yet undergone attrition. In the follow-up experiment, therefore, Kim et al. tested late bilinguals who had a longer length of residence in the US with a minimum of 10 years. The results of the experiment showed that the potential attriters performed in the range of their monolingual peers, in contrast with other bilingual groups (i.e. heritage language speakers, English-speaking L2 learners of Korean). Regarding this result, Kim et al. (2010, p. 82) suggested that the absence of attrition in the late bilinguals might be due to the speakers' frequent use of L1. According to Kim et al., Korean first-generation immigrants tend to maintain strong ties with other Korean speakers in the immigrant societies and to use the L1 on a daily basis. Therefore, Kim et al. conjectured that it was likely that the late bilinguals tested in their experiment still kept Korean as the dominant language. Kim et al. pointed out that the result of their experiment resembles that of Gürel (2007), in which L1 English speakers living in an Turkish environment did not exhibit significant attrition, possibly due to sociolinguistic reasons. At the same time, however, Kim et al. (2010, p. 84) noted that the absence of attrition in their late bilinguals might also indicate that the

particular grammatical knowledge examined in their study, i.e. the knowledge of core binding of *caki*, is not susceptible to attrition.

To summarise the findings from attrition research, there is evidence that properties of L1 binding are subject to attrition to a certain degree. Gürel (2002, 2004) has demonstrated that syntactic restrictions of L1 binding can be 'loosened' (Gürel (2007)'s expression) under extensive influence of L2. The effect of attrition, however, seems to be restrictive in that there has not been an indication of complete loss of L1 binding constraints or resetting of parameter values. Although attrited speakers in Gürel (2004) accepted non-target binding of pronouns significantly more than the control speakers did, the attriters' error rates (for example, 30% in the context of referential antecedents) do not seem to suggest that the speakers completely abandoned L1 options and switched to L2 options. Rather, the result seems to indicate that the L2 speakers became more indeterminate in their judgements with respect to the restrictions of L1 binding.

As far as reflexive binding is concerned, both Gürel (2004) and Kim et al. (2009, 2010) did not find evidence of attrition, which suggests that properties of reflexive binding may be, in general, resistant to attrition. Gürel and Kim et al., however, provide slightly different accounts for the stability of the binding properties. Gürel (2004) argues that attrition was not exhibited in her Turkish speakers regarding the nominative reflexive *kendisi*, since the L2 English did not have a linguistic element that corresponded to the particular reflexive. Gürel (2004)'s proposal, which is based on the Activation Threshold Hypothesis (Paradis 1997), is that attrition takes place when there is competition between L1 and L2 structures and when L1 options become less accessible as a consequence of infrequent activation. In her view, therefore, binding within the domain of syntax may be susceptible to attrition. Kim et al. (2009, 2010), on the other hand, propose that a certain type of grammatical knowledge of reflexive binding is not subject to attrition. They draw a distinction between core binding and exempt binding of reflexives and suggest that the constraints for core binding may not be affected by attrition, presumably because the knowledge of the constraints is rooted in Universal Grammar. Kim et al.'s (2009, 2010) view is in common with the IH which predicts that core binding is not vulnerable to attrition because it does not involve the interface between syntax and other cognitive domains.

In Experiment 1 of this thesis, I extend Kim et al.'s (2010) experiment and investigate whether the grammatical representation or the processing of core binding of reflexives can be affected by attrition. Core binding of reflexives, like all other grammatical phenomena, involves external interfaces, as it is eventually read off at those interfaces (Montrul 2011). Therefore, as discussed earlier in Chapter 2, it is problematic to assume that core binding is constrained solely by syntax and is not susceptible to attrition. However, core binding is distinguished from exempt binding in that anaphors in core binding do not require discourse-pragmatic conditions to be licensed. The distribution of core anaphors are specified by grammar, unlike that of exempt anaphors: therefore, core binding may be resistant to attrition. Previously, Kim et al. (2010) have shown that the constraints for core binding are not liable to attrition, but their findings need further empirical support, as their data was from a small number of subjects (N=10) who seemed to have used L1 frequently. In the present study, I test a larger group of Korean immigrants from different sociolinguistic backgrounds, using two tasks that were not used in Kim et al. (2010). The experimental results will help to determine whether the representation or the processing of core binding of reflexives is affected under prolonged influence from L2.

3.7 Summary

In this chapter, I have presented the research background for Experiment 1 that investigates the effect of attrition on core binding of *caki*. First, I have reviewed general theories of binding, focusing on the 'core versus exempt binding' approach (Pollard & Sag 1992, Reinhart & Reuland 1993). Then, I have examined the crosslinguistic difference in reflexive binding in Korean, English and Japanese. Following the 'parameterisation of GC' theory (Kim et al. 2010, Pollard & Xue 2001), I have assumed that the GC for core binding in English is defined by both of the TSC and SSC of the Opacity Conditions (Chomsky 1973), whereas the GC in Korean and in Japanese is defined by the SSC only. Next, I have reviewed findings from previous research on binding in L2 acquisition and L1 attrition. The findings from attrition research suggest that properties of reflexive binding, especially those of core binding, may be resistant to attrition. However, as there is insufficient evidence for the hypothesis, this thesis further

examines whether attrition can have any impact on the grammatical representation or processing of reflexive binding. In the next chapter, I discuss another grammatical phenomenon that this thesis focuses on, i.e. plural marking.

CHAPTER 4

The attrition of plural marking

4.1 Introduction

This chapter provides the theoretical background for Experiment 2 which investigates the effect of attrition on Korean plural marking. Korean is a classifier language in which number marking is non-obligatory. It has the plural suffix *tul*, a rough equivalent of the English plural *-s*, but *tul* has a peculiar distribution that distinguishes it from the English *-s* or from other plural markers. *Tul* does not obligatorily attach to all nouns that are construed as plural, unlike typical plural markers. The attachment of *tul* is, instead, constrained by the interplay of several linguistic and non-linguistic factors, such as animacy, number-specificity, etc. Since the distribution of *tul* is underspecified by grammar and is dependent heavily on discourse-pragmatic information, it is a better candidate for attrition than core binding of reflexives that is specified by grammar. Bilingual speakers who are undergoing attrition may use *tul* differently from monolingual speakers, perhaps because their mental representation of felicitous conditions for *tul* is underspecified under L2 influence or because their real-time processing of appropriate conditions for *tul* is less efficient than that of monolinguals. Experiment 2 of this thesis, therefore, investigates attrition effects on *tul*-attachment by examining attrited speakers' acceptability judgements and on-line processing of *tul*, in comparison with those of unattrited monolinguals.

Findings from previous research show that plural marking in general is apparently one of the grammatical phenomena that are vulnerable to attrition. Several studies (e.g. Altenberg 1991, Keijzer 2007, Schmid 2002) have observed that attrited speakers whose L1 has a relatively complex plural system (e.g. Dutch,

German) tend to regularise irregular plurals or overgeneralise particular plural suffixes, after a long-term exposure to L2. In this chapter, I first investigate the distributional properties of the Korean plural *tul* in detail and then examine how those properties may be affected by attrition. In doing so, I aim to contribute not only to attrition research but also to the theoretical discussion on *tul*, since there is an ongoing debate on the distribution of *tul* in the research.

This chapter is organised as follows: Section 4.2 briefly examines theories of plural marking and general characteristics of classifier languages in which plural marking is non-obligatory. Section 4.3 investigates the properties of *tul* in detail: I first review various approaches to the semantics of *tul*. Then, I describe the distribution of *tul* by examining semantic/pragmatic factors that influence the choice of production or omission of *tul*. Section 4.4 investigates plural marking in English and Japanese and discusses crosslinguistic difference between the languages. In Section 4.5, I review the research on the acquisition of plural marking. In Section 4.6, I examine previous findings on the attrition of plural marking and make predictions for the effect of attrition on *tul*-attachment. Section 4.7 summarises the discussion of the chapter.

4.2 Theories of plural marking

The common characteristic of so-called classifier languages, such as Chinese, Japanese and Korean, is that they lack obligatory plural marking. A well-known proposal that provides an account for the absence of an obligatory plural marker in those languages is the Nominal Mapping Parameter (NMP) (Chierchia 1998). The NMP assumes that there is typological variation across languages with respect to the denotation of NPs. In some languages, NPs are predicative ([+pred]) and thus they cannot occur as arguments without a DP projection. In other languages, on the other hand, NPs are argumental ([+arg]), hence they can be mapped directly into arguments. According to Chierchia (1998), classifier languages have the [-pred, +arg] setting: therefore, classifier languages allow bare NPs to occur freely as arguments, unlike other languages that have the [-arg] setting.

(23) The Nominal Mapping Parameter (Chierchia 1998):

- a. [-pred, +arg]: e.g. Chinese
- b. [+pred, +arg]: e.g. Germanic
- c. [+pred, -arg]: e.g. Italian

Under the NMP, it is assumed that all nouns in classifier languages denote kinds. Since the extension of kind-denoting nouns is mass, nouns in classifier languages require a classifier in counting contexts. Accordingly, classifier languages are characterised by ‘the obligatoriness of classifiers and the absence of ‘true’ plural marking’ (Chierchia 1998, p. 355). In other words, plural suffixation is undefined in classifier languages, under the NMP.

However, as many researchers have pointed out, the account of the NMP is not satisfactory for plural marking of several classifier languages, such as Chinese, Japanese, Korean, Indonesian, etc., since overt plural suffixes of those languages are, in fact, obligatory in certain contexts, contrary to the prediction of the NMP (Chung 2000, Nakanishi & Tomioka 2004, Nemoto 2005, Nomoto 2010, Zhang 2008). Although the plural markers of the classifier languages have more restricted distributions than those of number-marking languages, the occurrence the plurals in classifier languages is not simply optional, as it is assumed by the NMP. Especially, Korean *tul* is fairly productive in that it combines not only with animate nouns but also with inanimate ones, unlike the plurals of other classifier languages (e.g. Chinese *-men*, Japanese *-tati*). *Tul* has a complex distribution that is not well captured by the NMP, as we will see in the next section.

4.3 Plural marking in Korean

4.3.1 *The plural tul*

The Korean plural marker *tul* is distinguished from typical plural markers for its unique distribution. The distribution of *tul* is characterised as follows. First, the presence of *tul* is non-obligatory in plural contexts. In Example (24a), the attachment of *tul* on the noun *haksayng* (student) is optional, and the presence or absence of *tul* does not affect the grammaticality of the sentence. Second, *tul*-attachment is not always acceptable in all plural contexts. Whereas *tul* is required or strongly preferred in some contexts, it is not preferred in others, as shown in

(24b) and (24c), respectively. The reason that the acceptability of *tul* greatly varies depending on the context is that the attachment of *tul* is not determined by the distinction between singular versus plural or mass versus count nouns only. The felicity of *tul* is affected by various semantic/pragmatic factors, such as animacy of the host noun to which *tul* is attached, number-specificity of the expressions that modify the host noun, etc. Third, *tul* attaches not only to nominal categories, but also to non-nominal categories, such as verbs and adverbs. In (24d), *tul* is attached to an adverb to indicate that the omitted subject of the sentence is plural. Non-nominal *tul* in such an example is distinguished from *tul* that attaches to nominal categories and is referred to as ‘extrinsic plural marker (EPM)’. As the EPM *tul* is known to have different semantic functions from nominal *tul* (c.f. An 2007, Kim 2005, Yim 2002), the present study discusses nominal *tul* only.

- (24) a. Manun haksayng-(*tul*)-i seymina-ey chamsekha-ess-ta.
 Many student-(PL)-NOM seminar-LOC attend-PST-DCL
 ‘Many students attended the seminar.’
- b. (Context: The family has three children.)
 Ku ai-*(*tul*)-un coyongha-ta.
 the child-PL-TOP quiet-DCL
 ‘The children are quiet.’
- c. ? Ku cip-un ai-*tul*-i sey myeng-i-ta.
 the family-TOP child-PL-NOM three CL-be-DCL
 ‘The family has three children.’
- d. Cosimhi-*tul* ka.
 carefully-PL go
 ‘Go back safely, you all.’

4.3.2 Approaches to the semantics of *tul*

Although this study refers to *tul* as a plural suffix, not everyone agrees that *tul* marks plurality. Broadly, there are three different approaches to the function of *tul* and the semantics of *tul*-marked NPs. One line of research is that *tul* is simply a plural suffix and that *tul*-marked NPs are semantically similar to plural NPs of English (e.g. Kim 2005). Another line of research is that *tul* is a distributive marker, rather than a plural marker and that *tul*-marked NPs are different from plural NPs of English in they cannot have a collective reading (e.g. Jun 2004). An

alternative to these theories is that *tul* is a non-inflectional plural marker which is essentially different from inflectional plural markers, hence *tul*-marked NPs are semantically distinct from plural NPs of English or other number-marking languages, such as French (e.g. Kwon & Zribi-Hertz 2004).

Tul as a simple plural marker

The claim that *tul* is an optional plural marker is based on the observation that a plural interpretation of NPs can be obtained without *tul*. Kang (1994) argues that Korean bare nouns (i.e. nouns without *tul*) provide a general semantic domain that includes both singular and plural individuals, thus bare nouns, similarly with *tul*-nouns, are compatible with a plural interpretation, as shown in (25). Kang (1994) claims that the only difference between a bare noun (e.g. *sakwa*) and a plural noun (e.g. *sakwa-tul*) is that the former implies one or more entities, while the latter implies more than two entities.

- (25) a. *Sakwa-ka chayksang wui-ey issta.*
 apple-NOM desk top-at exist
 'There is/are (an) apple(s) on the desk.'
- b. *Sakwa-tul-i chayksang wui-ey issta.*
 apple-PL-NOM desk top-at exist
 'There are apples on the desk.' (Kang 1994, p. 6)

In Kang (1994, 2007)'s view, the denotation of a *tul*-marked noun is not different from that of a bare noun construed as plural. Kang (2007, p. 25) argues that, since *tul* expresses plurality explicitly, *tul*-marked nouns are simply 'more informative' than bare nouns. He proposes that the choice of *tul*-attachment is made pragmatically, depending on the amount of information required in the context. For example, bare nouns are acceptable in plural contexts when there are other expressions implying plurality (e.g. numerals) or when number marking is considered unimportant, as in (26):

- (26) *Salam-i wa-ss-e-yo.*
 person-NOM come-PST-IN-POL
 Lit. 'A person has come.'
 'Someone/some people have come.' (Kang 2007, p. 25)

In line with Kang (1994), Kim (2003, 2005) argues that Korean bare nouns are number-neutral and thus they are interpreted as either singular or plural, depending on the context. In Kim's view, *tul* is similar to the English plural *-s*, as *tul*-marked nouns allow all interpretational possibilities that English bare plurals do. For example, Kim claims that a kind reading is available with *tul*-nouns, as shown below in (27):

- (27) Konglyong-*tul*-i myelcong toyessta.
 dinosaur-PL-NOM extinct became
 'Dinosaurs are extinct.' (Kim 2003, p. 1)

According to Kim (2003), the optional property of *tul* is tied to the absence of an agreement system in Korean: while the number presupposition feature [+PL] must be projected for agreement in English, the projection of the feature is not required in Korean, since Korean lacks an agreement system. Therefore, it is a speaker's decision whether to mark plurality by projecting [+PL], which is realised as *tul*, or by using other means (e.g. numerals).

Tul as a distributive marker

Some researchers maintain that *tul* cannot be considered an optional plural suffix, since *tul*-attachment is restricted in some plural contexts. Jun (2004, 2007) and Park (2008) claim that *tul* is not acceptable in certain contexts, exemplified in (28) and (29)¹:

- (28) a. Swuhakkwa-nun kyoswu-ka ney myeng-ita.
 math dept.-TOP professor-NOM four CL-be
 'The professors in the Mathematics department are a group of four.'
 b. ?? Swuhakkwa-nun kyoswu-*tul*-i ney myeng-ita.
 math dept.-TOP professor-PL-NOM four CL-be
 'The professors in the Mathematics department are a group of four.'
 (Park 2008, p. 283)
- (29) a. Konglyong-en myelcongha-ess-ta.
 dinosaur-TOP extinct-PST-DEC
 'Dinosaurs became extinct.'

¹The interpretations and judgements of the examples are of the original authors.

- b. Konglyong-*tul*-en myelcongha-ess-ta.
 dinosaur-PL-TOP extinct-PST-DEC
 ‡‘Dinosaurs became extinct.’
 ‘(Some) dinosaurs became extinct.’
 (Jun 2007, p. 329)

The proposal formulated on the basis of these examples is that *tul* is not a plural marker, but a distributive marker. Jun (2007), Park (2008) and many other researchers (e.g. Baek 2002, Kim 2009, Kwak 2003) argue that *tul* marks distributivity, thus it is not compatible with collective predicates that lack a distributive property, such as *be extinct* or *be a very big group*.

Park’s (2008) claim is that *tul* is not acceptable with a particular type of collective predicates: predicates that do not have the property of ‘distributive sub-entailment’. Based on Brisson’s (2003) classification of collective predicates, Park (2008) assumes that only collective verbs that express activities or accomplishments involve distributive quantification, as they have an implication that individual members of a set ‘take part’ in some action (p. 287). On the other hand, verbs that express states or achievements lack such a ‘partake-in’ implication. These verbs cannot yield a distributive reading and thus are not compatible with *tul*. The predicate *be a group of four* in (28b) is an example of those non-distributive verbs.

Similarly to Park (2008), Jun (2004, 2007) also argues that *tul* marks distributivity. Jun disagrees with Kim (2003), who claims that *tul*-marked nouns allow a kind reading (see (27)), and maintains that *tul*-nouns do not permit a kind reading, as presented in (29) above. Elaborating the proposals of Baek (2002) and Kwak (2003), Jun (2004) argues that the denotation of *tul*-marked nouns differs from that of bare nouns that are interpreted as plural. His assumption is that Korean has an extra plural marker in addition to *tul*, namely the zero (\emptyset) plural, which is morphologically and phonologically null. Thus, bare nouns that yield a plural interpretation are not singulars, but in fact \emptyset -marked plurals. Zero (\emptyset)-marked plurals and *tul*-marked nouns differ in their function: the former corresponds to a *group* interpretation, while the latter to a *sum* interpretation. Since a *group* is formed by applying the group formation function (\uparrow) to a *sum* (cf. Link 1984), a

group of entities (e.g. *haksayng-∅*, ‘student’) lacks distributivity, unlike a *sum* of entities (e.g. *haksayng-tul*, ‘student+PL’), as shown in (30). Table 4.1 (from Jun 2004) presents the denotation of singular and plural nouns of Korean in comparison with those of English.

- (30) a. $\llbracket \text{haksayng (student)} \rrbracket = \{a, b, c\}$
 b. $\llbracket \text{haksayng-tul} \rrbracket = \{a+b, a+c, b+c, a+b+c\}$
 c. $\llbracket \text{haksayng-}\emptyset \rrbracket = \{\uparrow(a+b), \uparrow(a+c), \uparrow(b+c), \uparrow(a+b+c)\}$

	Singular	Plural	
		Group	Sum
Korean	<i>haksayng</i>	<i>haksayng-∅</i>	<i>haksayng-tul</i>
English	student		students

Table 4.1: The denotation of common nouns in Korean and English (Jun 2004)

Jun’s (2004, 2007) approach provides an account for the question why (morphologically) singular nouns are not compatible with distributive expressions, such as *kakca* and *ssik*, meaning ‘each’, as shown in (31): if bare nouns can be interpreted as either singular or plural depending on the context, as argued by Kang (1994), there is no reason why bare nouns are not acceptable with the distributive expressions. This problem is solved, if we adopt Jun’s (2004, 2007) approach and assume that bare nouns are \emptyset -plurals that can only have a group interpretation: since \emptyset -plurals lack distributivity, they are not compatible with distributive expressions.

- (31) ‡ *Haksayng-i kakca sensayngnim-eykey cilmwun-ul ha-ess-ta.*
 student-NOM each teacher-DAT question-ACC ask-PST-DEC
 ‘Each student asked a question to the teacher.’ (Jun 2004, p. 30)

However, some researchers argue that Jun’s (2004, 2007) approach does not precisely capture the distribution of *tul*. Kang (2007), for example, argues against the idea of associating *tul* with distributivity, pointing out the fact that *tul*-marked nouns are frequently found in collective contexts and that bare nouns (which are supposedly \emptyset -marked plurals) are found in distributive contexts. For example, the bare noun *wutungsayng* (honour student) in (32) is acceptable in a distributive

context. Kang (2007) also finds *tul* fairly acceptable with non-distributive predicates, as shown in (33), contrary to Park (2008) who claims the opposite (see (28)). In Kang's (2007) view, *tul* is associated with the concept of 'individuality', i.e. the perceptual salience of an entity as an individual, and individuality is no different from plurality.

- (32) Kyocang-i wutungsayng-eykey sangpwum-ul *hana-ssik*
 principle-NOM honour student-DAT present-ACC one-each
 cwu-ess-ta.
 gave
 'The principle gave a present to each honour student.'
 (Kang 2007, p. 9; gloss and translation added)
- (33) (Ku tayhakkyo-eynun) kyoswu-*tul*-i payk myeng-ita.
 the university-LOC professor-PL-NOM 100 CL-be
 'The professors (at the university) are a group of 100.'
 (Kang 2007, p. 13; gloss and translation added)

Noh (2008) also raises questions about the 'distributivity' view. She proposes that the existing theories on *tul* are unsatisfactory because they are based on the common assumption that bare nouns can be interpreted as either singular or plural. This assumption, Noh (2008) argues, is problematic in that there is little evidence for it. In a corpus of written/spoken Korean (the Sejong corpus), Noh found few cases where (animate) count nouns were construed as plural on their own. Bare nouns were interpreted almost exclusively as singular, unless they appeared with other expressions indicating plurality. For example, the bare noun *haksayng* in (34) is interpreted not as a group of students, but as a single student. Noh's findings pose a problem to the proposal of Jun (2004, 2007) and others that bare nouns are a 'group' plural and *tul*-nouns are a 'sum' plural.

- (34) I *haksayng*-i ku-kwacey-lul ceychwulha-ess-ta.
 this/these student-NOM the-assignment-ACC submit-PST-DCL
 'This student submitted the assignment.'
 * 'These students submitted the assignment.'
 (Noh 2008, p. 52; gloss added)

Noh (2008) notes that bare nouns can be interpreted as plural, when they appear with modifying expressions that indicate plurality. In other words, *tul* can

be omitted when plurality is expressed through non-nominal categories, such as verbs and adverbs. Examples in (35) show that the bare noun *haksayng* (student) is interpreted as plural, due to other plurality-indicating expressions. In Noh's (2008) claim, the option of expressing plurality without plural suffixation is available in Korean, since Korean lacks number agreement.

- (35) a. Chamka sincheng-ul nay-n *haksayng-i*
 participation application-ACC submit-RL student-NOM
man-ass-ta.
 many-PST-DCL
 'There were many students that submitted an application for participation.'
- b. Chamka sinchengse-lul nayci an-un *haksayng-i*
 participation application form-ACC submit NEG-RL student-NOM
mani chamsekha-ess-ta.
 many present-PST-DCL
 'Many students, who did not submit an application for participation, were present.'
- (Noh 2008, p. 57; glosses and translations added)

Tul as a non-inflectional plural marker

An alternative approach to the 'simple plural marker' theory or the 'distributive marker' theory is found in Kwon & Zribi-Hertz (2004). Kwon & Zribi-Hertz present a comparative analysis of plural marking in Korean and French and propose that Korean *tul* is a lexical (or non-inflectional) plural marker, which is distinguished from inflectional plural markers of French. Kwon & Zribi-Hertz's (2004) claim is that *tul* triggers a 'rigidity' effect, which forces an *extensional* (closed) interpretation of an NP. *Tul*-marked NPs, therefore, can only be construed as denoting a closed set of entities, not *intensional* (open) kinds. To illustrate, the NP in (36a), *payndekom-tul* (panda-PL), is interpreted either as i) a pre-identified set of pandas or as ii) an indefinite group of pandas (the various members of the world's panda species): the NP cannot refer to the entire class of pandas, as *tul* causes rigidity. In contrast, the plural NP of French in (36b), *les pandas*, can have a kind reading.

- (36) a. *Payndekom-tul-un* cwulo taynamwu-lul mek-nun-ta.
 panda-PL-TOP mainly bamboo-ACC eat-PRS-DEC
 (i) 'The pandas mainly eat bamboo.'
 (ii) 'The members of the panda species mainly eat bamboo.'
- b. *Les pandas* mangent principalement du bambou.
 DF.PL pandas eat mainly de.DF.M bamboo
 (i) 'The pandas mainly eat bamboo.'
 (ii) 'Pandas mainly eat bamboo.'
 (Kwon & Zribi-Hertz 2004, p. 145)

Kwon & Zribi-Hertz (2004) point out several differences between *tul*-NPs and plural NPs of French or English: one of which is that *tul*-NPs can only take wide scope over a modal operator when they have a discourse-new (indefinite) referent. In Example (37), the pluralised object *cengchiin-tul* (politician-PL) only allows a wide-scope reading in (37iii). Kwon & Zribi-Hertz's claim disagrees with Kim's (2003) view that *tul*-marked NPs allow a narrow-scope reading in (37ii), as bare plurals of English do.

- (37) Chelswu-nun cengchiin-*tul*-ul manna-ko sipeha-n-ta.
 C-TOP politician-PL-ACC meet-COMP want-PRS-DEC
 (i) 'Chelswu wants to meet the politicians.'
 (ii) 'Chelswu wants to meet politicians.' (Kim's (2003) translation)
 (iii) 'There are some politicians that Chelswu wants to meet.' (Kwon & Zribi-Hertz's (2004) translation)

Kwon & Zribi-Hertz's (2004) proposal is in line with the 'distributive marker' view in that it assumes that *tul*-nouns denote a sum (or a closed set) of individual entities. However, Kwon & Zribi-Hertz's proposal can incorporate examples that are problematic under the 'distributivity' view (e.g. (32)), as their proposal does not necessarily prohibit the occurrence of bare nouns in distributive contexts.

To summarise the discussion of this section, there has not been a consensus on the function of *tul* and the denotation of *tul*-nouns in the research. Therefore, I have reviewed three different theories that assume, respectively: i) *tul* is a simple plural marker; ii) *tul* is a distributive marker; and iii) *tul* is a non-inflectional plural marker that has a unique semantic effect. The analysis so far suggests that

tul-marked nouns may be semantically distinct from plural nouns of number-marking languages, such as English and French, since *tul*-nouns are not always felicitous in all plural contexts, as several researchers argued (e.g. Jun 2007, Park 2008).

The gradient acceptability of tul

One of the reasons for the disagreement on the function of *tul* seems to be that judgements involving *tul* are gradient, rather than categorical. The gradient acceptability of *tul* results from the fact that *tul*-attachment is determined by semantic and pragmatic constraints, rather than by syntactic constraints only. It is often observed in the studies on *tul* that researchers make different judgements on the same structure. Consider the following examples: while the sentence in (28) (repeated in (38a)) was rated unacceptable in Park (2008), the same structure in (33) (repeated in (38b)) was judged acceptable in Kang (2007). Such a disagreement in judgements of plural marking is not found in English, in which the presence/absence of the plural *-s* leads to categorical judgements, as shown in (38c).

- (38) a. ?? Swuhakkwa-nun kyoswu-*tul*-i ney myeng-ita.
 math dept.-TOP professor-PL-NOM four CL-be
 ‘The professors in the Mathematics department are a group of four.’
 (Park 2008, p. 283)
- b. (Ku tayhakkyo-eynun) kyoswu-*tul*-i payk myeng-ita.
 The university-LOC professor-PL-NOM 100 CL-be
 ‘The professors (at the university) are a group of 100.’
 (Kang 2007, p. 13; gloss and translation added)
- c. The *professor/professors in the Mathematics department are a group of four.

The varying judgements on *tul* suggest that the distribution of *tul* can be better understood using the notion of gradient or relative acceptability, rather than the notion of categorical, binary grammaticality. To illustrate, although there is a disagreement upon whether or not *tul* is acceptable in (38a) and (38b), it is apparent that a *tul*-noun is ‘less’ felicitous than a bare noun in the contexts.

An example of gradient acceptability is found in Duffield (2003). Duffield presents a set of sentences whose varying acceptability cannot be explained by syntactic conditions: the acceptability of the sentences in (39) (originally from Chung & McCloskey 1983) varies from (almost) completely acceptable to strongly unacceptable (the symbol '>' means 'more acceptable than'). Duffield (2003, p. 2) notes that these varying 'degrees of acceptability are a function, not of syntactic structure, but of a semantic factor'.

- (39) This is the paper that we really need to find *someone* who understands
 > This is the paper that we really need to find *a linguist* who understands
 > This is the paper that we really need to find *the linguist* who understands
 > This is the paper that we really need to find *his advisor* who understands
 > This is the paper that we really need to find *John*, who understands.

It has recently been argued that such varying degrees of acceptability are also found with respect to the use of classifiers in classifier languages. Nomoto (2010) shows that classifiers may be omitted in a variety of counting contexts, contrary to the assumption of the Nominal Mapping Parameter (Chierchia 1998) that the use of classifiers is obligatory for classifier languages. Nomoto's proposal is that the omission of classifiers depends on various semantic and pragmatic factors, such as animacy, abstractness of nouns, specificity of numbers, etc. For example, the production of classifiers in Japanese is optional with large and vague numbers, whereas it is more obligatory with small and specific numbers, as shown in (40). This pattern is also found in Korean, but in the opposite direction, as in (41).

- (40) san*(-ko) / kyuu?(-ko) / zyuu-go(-ko) -no gengo
 three(-CL) / nine(-CL) / fifteen(-CL) -LINK language
 'three/nine/fifteen languages'

Nomoto (2010, p. 10)

- (41) sey(-kay) / tases?(-kay) / sumwu*?(-kay) -uy en.e
 three(-CL) / five(-CL) / twenty(-CL) -GEN language
 'three/five/twenty languages'

The gradient acceptability shown in the examples above suggests that the acceptability *tul* may also vary greatly depending on extra-syntactic factors. In the next section, I examine the factors that play a role in *tul*-attachment and propose that the production or omission of *tul* is not fully determined by grammar but is influenced by a function of various semantic and pragmatic factors.

4.3.3 Factors contributing to *tul*-attachment

Various factors that affect *tul*-attachment can be divided into the following categories:

- Properties of the host noun
- Properties of plurality-indicating expressions
- Properties of predicates

Properties of the host noun

Duffield (2003) argues that the acceptability of a grammatical structure may vary depending on the semantic properties of lexical items. The acceptability of *tul*-nouns is indeed greatly influenced by the semantic properties of the host noun that *tul* attaches to. Those properties can be described in terms of the degrees of animacy, individuality and generality.

Animacy: Plural suffixation in many classifier languages is known to follow the ‘animacy hierarchy proper’ in which human nouns outrank non-human animates, which in turn outrank inanimates, as shown in (42) (Corbett 2000, Croft 2003). For example, the Chinese plural *-men* and the Japanese plural *-tati* attach freely to [+human] nouns and personal pronouns, but they almost never attach to inanimate nouns.

- (42) The animacy hierarchy:
 human > animate > inanimate

Animacy is one of the most important factors for plural marking in Korean as well (Baek 2002, Kang 2007, Kiaer 2010). The examples in (43) illustrate the effect of animacy on *tul*-marking. Although *tul* is generally considered obligatory in

anaphoric contexts in which the host noun refers to a pre-identified set of entities, *tul* is far more strongly required when the referent is animate (43a) than when it is inanimate (43b). That is, omitting *tul* in anaphoric contexts is acceptable only when the referent is inanimate.

- (43) a. Bakkath-e haksayng-i sey-myeng issta. Haksayng-*(*tul*)-un
 outside-LOC student-NOM 3-CL exist student-PL-TOP
 acwu ttwungwwungha-ta.
 very fact-DEC
 'There are three students outside. The students are very fat.'
- b. Bakkath-e beynchi-ka ses issta. Ku beynchi-(*tul*)-nun nae
 outside-LOC bench-NOM 3-CL exist. the bench-PL-TOP my
 halmeni-uy senmwul-ita.
 grandmother-GEN gift-be
 'There are three benches outside. The benches are gifts from my grand-
 mother.'
- (Nemoto 2005, p. 396, 399)

The role of animacy on *tul*-attachment is effective not only in anaphoric contexts but also in non-anaphoric contexts, as shown by corpus data. Kang (2007), in his analysis of the Sejong corpus, found that the frequency of *tul* in a prenominal classifier construction (i.e. numeral + CL-GEN + N + (*tul*)) varies considerably depending on animacy. Table 4.2 (from Kang 2007) presents the frequency of bare nouns and *tul*-marked nouns and the ratio of their frequencies for human, animal and inanimate classifiers. As shown in the table, *tul* co-occurs most frequently with a human classifier and least frequently with an inanimate classifier, in accordance with the animacy hierarchy in (42)².

Individuality: Kang (2007) proposes that the effect of animacy in *tul*-attachment can be explained by the notion of 'individuality', i.e. how saliently the referent of the host noun is perceived as an individual entity. In Kang's view, human

²Animacy also plays an important role in the production or omission of classifiers (Nomoto 2010). Classifiers in Korean can be omitted for certain animate nouns, but not for inanimate ones, as shown below:

- a. sey (myeng-uy) namca
 three (CL-GEN) man
- b. sey *(kay-uy) chayksang
 three (CL-GEN) desk

	N	N+tul	N+tul/N
<i>myung</i> (CL _{human})	363	142	0.391
<i>mali</i> (CL _{animal})	111	12	0.108
<i>kay</i> (CL _{inanimate})	807	13	0.016

Table 4.2: The frequency of *tul* by animacy

nouns are marked *tul* far more frequently than non-human nouns, because they are more easily perceived as individuals.

Kim (2009) also argues that the felicity of *tul* depends on the perceptual salience of the referent of the host noun as an individual entity. Unlike Kang (2007), however, Kim accounts for individuality using the notion of distributivity. In English, a plural marker can only attach to count nouns. In Korean, on the other hand, the plural suffix *tul* attaches not only to count nouns but also to a certain types of mass nouns (e.g. *molay-tul*, ‘sand-PL’) (Kwon & Zribi-Hertz 2004). In Kim (2009)’s claim, the attachment of *tul* on mass nouns is possible because Korean does not use a binary distinction between count versus mass nouns. Korean instead uses a four-way distinction of nouns, as presented in (44), and there is a continuum across the categories for each noun type. Nouns in the upper categories are more compatible with *tul* than those in the lower categories, since they have a higher degree of distributivity or individuality.

- (44) Continuum in the count-mass domain in Korean (Kim 2009, p. 681)
- a. Count nouns that can be used as counting unit: e.g. *haksayng* (student)
 - b. Independently distributive nouns: e.g. *kyoswu* (professor)
 - c. Dependently distributive nouns: e.g. *sakwa* (apple)
 - d. Mass nouns: e.g. *mwul* (water)

Generality: According to Nomoto (2010), ‘generality’ of a noun determines how easily the noun can obtain a subkind reading. A subkind reading is typically easier to obtain for general nouns (e.g. animal) than for specific nouns (e.g. tiger). Generality of nouns seems to affect the acceptability of *tul* as well. Although *tul* does not occur frequently with inanimate nouns, *tul* tends to be used more often on relatively general nouns (e.g. ‘tree’ in 45a) than on specific ones (e.g. ‘pinetree’ in 45b).

- (45) a. I cengwen-eynun *namwu-tul-i* manta.
 this garden-LOC tree-PL-NOM many
 'There are many trees (of different kinds) in this garden.'
- b. I cengwon-eynun *sonamwu-tul-i* manta.
 this garden-LOC pintree-PL-NOM many
 'There are many pinetrees (of different kinds) in this garden.'

Properties of plurality-indicating expressions

The choice of *tul*-attachment is also affected by the properties of other elements in the context. As Kim (2003) and Noh (2008) argued, the production of *tul* on plural nouns is not required in Korean because Korean lacks agreement. Thus, speakers have the option of not producing *tul*, as long as plurality is expressed through other elements in the context. Plurality-indicating expressions can be either numeric (e.g. numeral + CL) or non-numeric (e.g. adjectives, verbs). Examples of non-numeric plurality indicators are presented in (35) (repeated in (46)).

- (46) a. Chamka sincheng-ul nay-n haksayng-(*tul*)-i
 participation application-ACC submit-RL student-PL-NOM
man-ass-ta.
 many-PST-DCL
 'There were many students that submitted an application for participation.'
- b. Chamka sinchengse-lul nayci an-un
 participation application form-ACC submit NEG-RL
 haksayng-(*tul*)-i *mani* chamsekha-ess-ta.
 student-PL-NOM many present-PST-DCL
 'Many students, who did not submit an application for participation, were present.'
 (Noh 2008, p. 57; glosses and translations added)

Tul-attachment has been known to be sensitive to number-specificity of plurality-indicating expressions, i.e. how specifically the number of the referent is expressed in the context (e.g. Kang 2007, Kiaer 2010). While *tul* frequently occurs with plurality-indicators that are vague (e.g. *many*), it occurs much less frequently with specific expressions, especially with numerals. Some researchers

consider *tul* as unacceptable or marginal on nouns that are modified by a numeral, as presented in (47).

- (47) ?? sey myeng-uy uysa-*tul*
 three CL-GEN doctor-PL
 ‘Three doctors’
 (Kiaer 2010, p. 265)

Table 4.3 (adopted from Kang 2007) presents the frequency of bare nouns and *tul*-nouns and the ratio of their frequencies under four different conditions. As shown in the table, the human noun *salam* (person) is used in the plural form three times more frequently than in the bare form, when it is modified by a vague expression *manun* (a lot of). On the other hand, the same noun is used in the bare form more often than in the plural form, when it appears with a relatively specific number expression *myutmyut* (a few). Human nouns in general are used in the bare form more frequently than in the plural form, when they occur with a numeral + CL + GEN construction. This data confirms that the tendency to produce *tul* is higher with less precise number expressions than with precise ones.

	<i>Salam</i>	<i>Salam+tul</i>	N+<i>tul</i>/N
<i>Manun</i> (a lot of)	203	738	3.63
<i>Myutmyut</i> (a few)	28	21	0.75
	[+Human] N	[+Human] N+ <i>tul</i>	N+<i>tul</i>/N
<i>Myut</i> (a few)-CL-GEN	15	31	2.07
<i>Numeral</i> -CL-GEN	363	142	0.39

Table 4.3: The relative frequency of *tul*-marked nouns by modifier type

Noh (2008) proposes that the effect of number-specificity on *tul*-attachment is due to a pragmatic constraint. Since numerals contain ‘more information’ than *tul*, attaching *tul* on nouns in a numeral context only takes more processing effort, without giving any cognitive advantages (Noh 2008, p. 43). *Tul*-attachment, therefore, is not preferred in numeral contexts. This pragmatic effect on plural suffixation is also found in Japanese. Nakanishi & Tomioka (2004) note that, although the Japanese plural morpheme *-tati* is generally avoided in numeral contexts, the acceptability of *-tati* tends to improve when it co-occurs with a bigger

and less precise numeral. In Nakanishi & Tomioka's (2004) view, the incompatibility of *-tati* and numerals is due to 'pragmatic inappropriateness rather than semantic mismatch' (p. 127).

According to Kang (2007), the occurrence of *tul* is closely associated with number-specificity, but not so much with the largeness of a numeral. That is, *tul* does not necessarily occur with bigger numbers more frequently than with smaller numbers. Nonetheless, very small numbers — numbers under 10 (especially two³) — are clearly less compatible with *tul* than with other numbers, possibly because of their cognitive salience. As Nomoto (2010) states, 'large numbers are in a sense vague, because less attention is paid to the individual members as the number increases' (p. 9). To summarise, the acceptability of *tul* does not necessarily correlate with the largeness of a numeral, but *tul* seems to be less compatible with very small numbers.

Properties of predicates

Tul-attachment may also be affected by the semantic and pragmatic properties of predicates. As discussed in the previous section, distributivity of predicates may be one of those properties. At least in a group of researchers' view, *tul* is not felicitous with kind-level or collective predicates that are not applicable to individual members of a set, such as *rare* and *be a group of four*, as shown in the examples below. According to Park (2008), these verbs do not have distributive sub-entailment because they express states, rather than activities or accomplishments. Although there is a disagreement as to whether *tul* is truly unacceptable with these predicates, distributivity might be a factor affecting *tul*-attachment, considering that *tul*-nouns are less optimal than bare nouns with the predicates.

- (48) *Pharangsai-*tul*-un tumwul-ta.
 blue bird-PL-TOP rare-COP
 'Blue birds are rare.' (Nemoto 2005, p. 394)

- (49) ?? Swuhakkwa-nun kyoswu-*tul*-i ney myeng-ita.
 math dept.-TOP professor-PL-NOM four CL-be

³Kang (2007) considers *twu* (two) as an exception. According to his corpus analysis, nouns that are followed by the numeral *twu* appear in the singular form much more frequently than in the plural form, indicating that *tul* is not preferred with the number.

'The professors in the Mathematics department are a group of four.'
(Park 2008, p. 283)

The pragmatic appropriateness of predicates might be another factor that regulates *tul*-attachment. If bare nouns in Korean denote an open, intensional set of entities and *tul*-nouns denote a closed, extensional set, as proposed by Kwon & Zribi-Hertz (2004), the felicity of *tul* may be largely determined by the pragmatic match between the NP and the predicate. In the examples presented below, *tul* is felicitous in (50b), but not in (50a). The predicate in (50a) 'be Mongoloids' is considered more appropriate with an intensional reading of the NP ('whoever is Korean'), rather than an extensional reading ('the (various) people of Korea'), since the predicate is likely to be a description for the entire Korean ethnicity, rather than for certain members of Korean. Thus, the predicate is pragmatically more appropriate with a bare noun than with a *tul*-noun. On the other hand, the predicate in (50b) 'be fond of' is more optimal with an extensional reading of the NP than an intensional one, because the predicate is more appropriate as a description of (various) members of Korean.

- (50) a. *Hankuksalam*-(?*tul*)-un mongkolkyey-ita.
Korean-PL-TOP Mongoloids-COP
'Koreans are Mongoloids.'
- b. *Hankuksalam-tul*-un maywun umsik-ul coaha-n-ta.
Korean-PL-TOP spicy food-ACC like-IN-DEC
'Koreans like spicy foods.'

In this section so far, I have examined three types of factors that constrain the distribution of *tul*, which are: properties of the host noun, properties of plurality-indicating expressions and of predicates. In the following section, I discuss an important issue that needs to be considered in examining attrition effects on *tul*: the ongoing change in the use of *tul*.

4.3.4 *Changes in the use of tul*

Immigrants who have been away from their home country for a prolonged period are, in general, less likely to use innovative forms of L1 than their monolingual counterparts, since they receive both qualitatively and quantitatively limited L1 input. In this regard, any observed differences between attrited and non-attrited Korean speakers in the use of *tul* might be a consequence of a language change in Korea, rather than an effect of attrition.

Apparently, there is an ongoing change in the use of *tul* in Korea. According to Noh's (2008) corpus analysis, the overall frequency of *tul* has increased dramatically over the last few decades. Noh points out that there is an growing tendency for number agreement in contemporary Korean, due to the influence of foreign languages, particularly English. As a result, it is becoming more common to produce *tul* together with other plurality indicators, such as numerals. Table 4.4 (adopted from Noh 2008) shows that the frequency of *tul* in a corpus has doubled over the last twenty years:

Period	Number of tokens		Frequency of <i>tul</i>
	Words	<i>Tul</i> -nouns	
2002	54798	1012	1.85%
1980-1990	53528	474	0.89%

Table 4.4: The frequency of *tul*-nouns in Korean

With the increase in the use of *tul* with other plural indicators, structures that have previously been considered marginal or unacceptable now seem to be accepted by many people. Suh (2008), for example, observed that several native speakers of Korean who participated in her study unexpectedly accepted *tul* on classifiers (e.g. dog five CL-*tul*). Another example is found in Kwon & Zribi-Hertz (2004). Kwon & Zribi-Hertz claimed that the sentence in (51) was unacceptable, but many speakers that I personally contacted, including myself, did not find the sentence particularly awkward. To deal with this problem of language change in the investigation of *tul*, I took an uncommon methodological measure in the present study, which I will discuss in the following chapter.

- (51) I salam-*tul*-un uysa-**tul* i-ta.
 this/these person-PL-TOP doctor-PL be-DCL.

Lit. 'These men are (several) doctors.'
 (Kwon & Zribi-Hertz 2004, p. 148)

4.4 Crosslinguistic differences

The two L2s investigated in this study differ from each other with respect to the obligatoriness of plural marking. Whereas plural marking is obligatory in English, it is by and large optional in Japanese, as in Korean. I compare plural marking of the two languages, focusing on three specific factors that are examined in this thesis: animacy, number-specificity and distributivity.

4.4.1 *Plural marking in English*

Since English is typologically different from Korean, it does not have similarities with Korean in terms of plural marking. Number is a binary property in English in that there is a two-way contrast between singular and plural forms (Radford 1997). Therefore, a noun referring to more than one entity must be marked as plural. Plurality is mostly expressed by the addition of an ending⁴, while singularity is signalled by the absence of such a marker (Corbett 2000).

Animacy

English encodes animacy explicitly through the use of referential expressions (e.g. pronouns) (Yamamoto 1999). However, whether a noun is animate or inanimate is not relevant to pluralisation of common nouns. Plural marking is obligatory for both animate and inanimate nouns, as shown in (52).

- (52) a. many *student/students
 b. many *car/cars

Number-specificity

The type of plurality-indicating expressions is also irrelevant to plural suffixation in English. Count nouns, whether they are modified by a vague plural expression (e.g. *many*) or by a specific one (i.e. numeral), are all marked plural.

⁴Plurality can also be realised covertly, as in *sheep* (Radford 1997).

- (53) a. many *student/students
 b. three *student/students

Distributivity

Distributivity of predicates does not affect plural marking in English. Plural marking is required regardless of distributivity of predicates, as shown in (54a) and (54b) (which are the equivalents of Korean sentences in (28) and (29)).

- (54) a. The *professor/professors in the Mathematics department are a group of four.
 b. *Dinosaur/dinosaurs became extinct.

However, a distributive operator *all* shows incompatibility with collective predicates that express states and achievements, similarly to *tul* (Brisson 2003).

- (55) a. **All* the students are a big group.
 b. **All* the members elected a representative.

4.4.2 *Plural marking in Japanese*

In Japanese, plural marking is generally non-obligatory, the same as in Korean. Plurality can be encoded by plural suffixes, such as *-tati*, *-ra*, *-gata* and *-domo* whose distributional properties differ (Ishii 2000). Among those suffixes, *-tati* is most productive, hence it has been most widely discussed in the research. One of the distinctive properties of *-tati* is that it attaches to proper nouns. According to Nakanishi & Ritter (2009), a *tati*-NP refers to an ‘associate group’, which consists of ‘a focal individual and his/her associates’, as shown in (56) below. Similarly to *tul*, *-tati* has been argued to be ‘semantically and syntactically distinct’ from an additive plural (e.g. the English *-s*) (Nakanishi & Ritter 2009). The distribution of *-tati* shows considerable similarities with that of *tul* with respect to animacy, number-specificity and distributivity.

- (56) Mika-*tati*-ga sono biru-o torikakonda.
 Mika-PL-NOM that building-ACC surrounded

‘Mika and her friends/family/classmates surrounded that building.’
(Nakanishi & Ritter 2009)

Animacy

Animacy plays a crucial role in the attachment of *-tati*. Different from *tul* that attaches to both animate and inanimate nouns, *-tati* combines with animate nouns only, as shown in (57). Among animate nouns, *-tati* is used primarily with [+human] nouns. The attachment of *-tati* on non-human animate nouns is rare, and is only marginally acceptable (Nemoto 2005).

- (57) a. *gakusei-tati* (student-PL)
b. *inu-tati* (dog-PL)⁵
c. **kuruma-tati* (car-PL)
(Ishii 2000, p. 1)

In anaphoric contexts, animate nouns have to be marked as plural, as shown in (58a). Inanimate nouns, on the other hand, do not need to be marked as plural in the same context, as in (58b): the inanimate noun *benti* (bench) can be construed as plural either with the singular demonstrative *sono* or with the plural one *sore-ra-no*. This contrast between animate and inanimate nouns in anaphoric contexts is the same as what is observed in Korean (see (43) for the Korean equivalents of (58a) and (58b)).

- (58) a. *Soto-ni gakusei-ga san-nin imasu. Gakusei-*(tati)-wa*
outside-LOC student-NOM 3-CL exist student-PL-NOM
totemo hutotteimasu.
very fat
‘There are three students outside. The students are very fat.’
- b. *Soto-ni benti-ga mittu arimasu. Sono/sore-ra-no*
outside-LOC bench-NOM 3-CL exist that/that-PL-GEN
benti-wa sobo-kara-no okurimono desu.
bench-TOP grandmother-from-GEN gift COP
‘There are three benches outside. The benches are gifts from my grandmother.’
(Nemoto 2005, p.396-9)

⁵A similar example, *neko-tati* (cat-PL), was judged marginal in Nemoto (2005).

Number-specificity

As briefly noted in the previous section, the acceptability of *-tati* varies depending on the specificity of number-marking expressions in the context. Similarly to *tul*, *-tati* is not considered felicitous in counting contexts, as shown in (59a)⁶. However, it seems that *-tati* is acceptable with numerals for some speakers. Ishii (2000), for example, claims that *-tati* can co-occur with a numeral, as shown in (59b) and (59c).

- (59) a. ?? San-nin-no gakusei-*tati*-ga tsukamat-ta.
 3-CL-GEN student-PL-NOM be.caught-PST
 ‘(The) three students were arrested.’ (Kurafuji 1999, p. 80)
- b. San-nin-no gakusei-*tati*-ga kita.
 3-CL-GEN student-PL-NOM came
 ‘The three students came.’ (Ishii 2000, p. 3)
- c. Gakusei-*tati* san-nin-ga kita.
 student-PL 3-CL-NOM came
 ‘The three students came.’ (Ishii 2000, p. 3)

Regarding the effect of number-specificity, Nakanishi & Tomioka (2004) argue that, although the co-occurrence of *-tati* and a precise number is not completely unacceptable, it is awkward due to pragmatic inappropriateness. In Nakanishi & Tomioka’s (2004) view, a *tati*-NP, in a sense, expresses the speaker’s intention not to be precise about the extension of the noun. Thus, combining a *tati*-NP with a precise number causes a ‘pragmatic conflict’ (p. 127). In the example in (60a) below, *-tati* is not readily acceptable because a precise numeral is given in the context. In (60b), on the other hand, *-tati* is acceptable because a bigger and less precise number is given in the context.

- (60) a. 129-nin-no gakusei-(??*tati*)-ga miitingu-ni sankasita.
 129-CL-GEN student-PL-NOM meeting-LOC participated
 ‘129 students (and possibly others) participated in the meeting.’
- b. 200-nin-izyoo-no gakusei-*tati*-ga miitingu-ni sankasita.
 200-CL-or.more-GEN student-PL-NOM meeting-LOC participated

⁶In fact, this sentence is considered acceptable under Kurafuji’s (2004) revised theory of *-tati*.

‘200 or more students (and possibly others) participated in the meeting.’

(Nakanishi & Tomioka 2004, p. 127)

Distributivity

Tati has not been extensively discussed with respect to distributivity. However, it seems that *-tati* is even more restricted than *tul* in collective contexts that do not have distributive entailment, as *tati*-NPs have been argued to be incompatible with kind-level predicates in several studies (e.g. Nakanishi & Ritter 2009, Nakanishi & Tomioka 2004, Nemoto 2005). The equivalents of the Korean sentences in (28b) and (29b) (repeated below) are also unacceptable in Japanese⁷.

(61) a. Korean:

?? Swuhakkwa-nun kyoswu-*tul*-i ney myeng-ita.
math dept.-TOP professor-PL-NOM four CL-be

‘The professors in the Mathematics department are a group of four.’

b. Japanese:

?? Suugakka-wa kyoujyu-*tati*-ga yo-nin da.
math dept.-TOP professor-PL-NOM four-CL COP

‘The professors in the Mathematics department are a group of four.’

(62) a. Korean:

Konglyong-*tul*-en myelcongha-ess-ta.
dinosaur-PL-TOP extinct-PST-DEC

‡‘Dinosaurs became extinct.’

‘(Some) dinosaurs became extinct.’

b. Japanese:

Kyooryuu-*tati*-wa zetumetsu-shi-ta.
dinosaur-PL-TOP extinct-be-PST

‡‘Dinosaurs became extinct.’

‘(Some) dinosaurs became extinct.’

⁷The acceptability judgements were obtained from native Japanese speakers through personal communication.

4.5 The acquisition of plural marking

Korean plural marking is an interesting area for research from developmental perspectives, since it depends largely on various extra-syntactic factors that are known to pose increased difficulty in language development. However, few studies have been conducted thus far with respect to the acquisition of *tul*, let alone the attrition of it. Possibly the only experiment on the child acquisition of *tul* is of Kiaer (2010). In her small-scale experiment, Kiaer interviewed four 3-year-old children and examined the effect of animacy in their use of *tul*. To elicit the production of *tul*, Kiaer asked the children to describe picture books that included pictures of animals giving and receiving certain objects. During the task, the children often produced *tul* for describing the animals. However, they never produced *tul* when describing the objects being given. These results led Kiaer to conclude that even young children are aware of the fact that animacy is a crucial factor in *tul*-attachment.

To the best of my knowledge, the only empirical study on adult Korean speakers' *tul*-attachment is Suh (2008). Suh tested 14 heritage language speakers of Korean who were born and raised in Canada and compared them with 15 native control speakers in an elicited (written) production task and an acceptability judgement task. In the production task, the informants were given a question prompt and a relevant picture. Then, they were asked to write an answer using an object noun and a verb provided, adding any extra morphology when required. In the acceptability judgement task, the informants were asked to rate sentences that contained *tul* on a 5-point Likert scale.

The experimental results revealed a considerable difference between the heritage speakers and the native speakers in the production and interpretation of *tul*. In the production task, both groups showed a low production of *tul* overall, along with a large inter-speaker variation. The two groups, however, displayed different patterns in their performance. The control speakers did not produce *tul* very often across all contexts, even in contexts where *tul* was required⁸. The heritage speakers rarely produced *tul* in numeral contexts, similarly to the controls, but

⁸Suh (2008) suggests that this result might be due to a design flaw: the control speakers might not have felt a need to mark number in the given task.

they produced *tul* on nouns in neutral contexts (where the nouns do not refer to a predefined entity) significantly more often than the control speakers.

The acceptability judgement task also revealed a difference between the two subject groups. Although both groups showed a preference for *tul* on specific nouns followed by a demonstrative, the preference was much stronger in the heritage speaker group. The heritage speaker group also gave significantly higher ratings to *tul* in numeral contexts than the control group, which Suh (2008) claims is evidence of transfer from English.

There are at least two notable facts about Suh (2008)'s findings. First, there was a large task effect in the heritage speakers' usage of *tul*. In the production task, the heritage speakers rarely produced *tul* in numeral contexts. In the judgement task, on the other hand, the speakers gave high acceptability ratings for *tul* in the same contexts. The discrepancy in the performances of the heritage speakers suggests that there was a dissociation between the speakers' perception and production of *tul*. As Suh suggests, the patterns of *tul*-attachment seem to be greatly affected by the nature of tasks. Second, there was an unexpected pattern in the control speakers' responses. Twenty percent of the control speakers gave positive ratings to *tul* on postnominal classifiers (e.g. dog five CL-*tul*), although *tul*-attachment on classifiers is normally considered unacceptable. Suh (2008, p. 249) proposed that this result might be due to a language change in progress or, alternatively, the native speakers' exposure to English. Suh's control group consisted of Korean-English sequential bilinguals who had lived in Canada from 2 months to 7 years at the time of experiment. Given the fact that attrition can take place within a few years of residence in an L2 context (Köpke & Schmid 2004), it is possible that some of the control speakers had undergone attrition. It is also possible, however, that the control speakers' unexpected responses were due to a language change, considering the rapid increase in the overall frequency of *tul* (cf. Noh 2008). Further research will help determine whether this is the case.

The findings from Kiaer (2010) and Suh (2008) suggest that some of the semantic/pragmatic conditions under which *tul* is felicitous may be easily acquired. The young speakers in Kiaer (2010) were aware of the fact that *tul*-attachment is dependent on the semantic condition of the host noun, i.e. animacy. The incomplete L1 speakers in Suh (2008) also showed sensitivity to a pragmatic factor

i.e. number-specificity, in the production of *tul*. Considering that the two constraints, animacy and number-specificity are acquired even with a small amount of input, the constraints might not be easily attrited under an L2 setting where only limited L1 input is available. The next section examines how plural marking in L1 can be affected by attrition.

4.6 The attrition of plural marking

Evidence of attrition on plural marking has mainly been reported concerning Dutch (Keijzer 2007, Smits 1996) and German (Altenberg 1991, Hutz 2004, Schmid 2002, Waas 1996), both of which have fairly complex morphological system. The most commonly observed patterns of attrition in those languages are i) simplification (reduction) of the L1 plural system resulting from language-internal restructuring and ii) overgeneralisation of certain plurals (e.g. *-s*) due to L2 transfer.

Altenberg (1991), in her study of the attrition of German in the context of L2 English, provides evidence for simplification of the L1 plural system. She observed that her attrited informants produced the wrong plural forms for low frequency, unpredictable nouns. The errors were relatively fewer for frequent, predictable nouns whose plural forms were rule-governed. Based on the results, Altenberg suggested that idiosyncratic (irregular) plurals are more prone to attrition than rule-governed (regular) ones and thus morphological predictability is an important factor in the attrition of the plural system.

Keijzer (2007) found evidence for both simplification and overgeneralisation of L1 plurals among Dutch immigrants in Canada. In an elicited production task using nonsense words (so-called the wug test), attrited speakers overgeneralised the plural *-s* in contexts where the plural *-en* is appropriate (e.g. **glik-s* instead of *glik(k)-en*). Keijzer suggested that this seemed to be a result of transfer from L2 English. The attriters also regularised the irregular plural forms occasionally, producing non-standard forms, such as **schoonheid-en* instead of *schoonhed-en*. This indicated that their L1 system might have become simplified by attrition.

Despite these findings, however, the plural marking system seems to be fairly resistant to attrition. In Keijzer (2007), attrited speakers did not produce any

deviant plural forms in a free production task, unlike in the wug test. Keijzer noted that this result is in line with that of Schmid (2002), who found only a few errors in her attrited German speakers' use of plural allomorphs. Keijzer suggested that the small amount of attrition attested in the two studies might be due to the 'cognitive salient nature' of plural nouns which typically denote concrete objects (p. 256).

Hutz (2004), who investigated the attrition of German morphology, also found only a few cases of non-native plural marking in a written corpus of attrited German. The plural marking errors were rare, compared with other morphological (e.g. case marking) errors (only 7% of the total errors). Hutz concluded that morphological attrition is generally a very slow process and plural marking, in particular, is not much vulnerable to attrition (p. 201). Hutz suggested that the relative stability of L1 morphology (compared with the lexicon) might be due to the fact that morphology is acquired as a finite set of rules.

There has been little research on how attrition manifests in languages without obligatory plural marking, but a few instances of overgeneralisation of L1 plural suffixes have been reported in Seliger & Vago (1991) and Yağmur (2004). The example in (63) shows a non-standard use of Hungarian plurals. The subject and the predicate in the example must be in singular, as shown in the parentheses, since the quantifier *sok* ('many') governs a singular number. However, the subject and the predicate were inaccurately pluralised, possibly due to the influence of English.

- (63) Sok *állatok (állat) *vannak (van) a világon.
 'There are many animals in the world.'
 (Seliger & Vago 1991, p. 7)⁹

A similar pattern of overgeneralisation of plurals is found in Yağmur (2004). Yağmur observed that Turkish immigrants living in Australia¹⁰ produced double plurals, as shown in (64). In the example, the plural marking on the noun *kitap* ('book') is unacceptable, because the nature of the noun is announced by the

⁹The gloss was not provided in the original work.

¹⁰Since Yağmur's (2004) informants included second-generation speakers, the non-target use of plural might be due to incomplete acquisition, rather than attrition.

preceding modifier ‘many’. Both examples in (63) and (64) show that attrited speakers, whose L1 do not have obligatory plural marking, may overgeneralise L1 plural suffixes under L2 influence.

- (64) Çok kitap-lar aldı.
 Many book-PL buy-PST-3SG
 ‘He bought many books.’ (Yağmur 2004, p. 145)

To conclude, the existing attrition research provides a general picture of the attrition of the L1 plural system: the system remains fairly stable under attrition but unpredictable, irregular plurals are often affected. This finding, however, is limited in that it was from particular language combinations only: L1s that have several plural allomorphs (e.g. Dutch, German) and L2s that have a few allomorphs (e.g. English). Therefore, there is a need to investigate how attrition is manifested in other language combinations, for example, in a pairing where both L1 and L2 have non-obligatory plural marking. The present study aims to contribute to the research by examining the attrition of the non-obligatory Korean plural marking under the influence of typologically different L2s.

4.7 Summary

In this chapter, I have presented the background for Experiment 2 of this study by reviewing previous research on plural marking. First, I have discussed general characteristics of non-obligatory plural markers, in comparison with those of obligatory ones. Next, I have examined the distributional properties of the Korean plural *tul* in detail. As there has been a disagreement in the research of *tul*, I have examined different approaches to the semantics of *tul*-nouns, which are: i) *tul* as a simple plural marker; ii) *tul* as a distributive marker; and iii) *tul* as a non-inflectional (lexical) plural marker. I have proposed that the disagreement on the status of *tul* is partly ascribed to the fact that acceptability judgements involving *tul* are gradient rather than categorical. A variety of semantic/pragmatic factors contribute to the gradient acceptability of *tul*, such as animacy, number-specificity and distributivity. Focusing on these three factors, I have compared the properties of plural marking in English and Japanese and shown that the Japanese plural *-tati* has similarities with *tul*, unlike the English *-s*.

This chapter has also examined previous findings on the acquisition and attrition of plural marking. Although the findings show that L1 plural system can be partially affected by L2 or the dominant language, the research needs to be extended to various L1-L2 pairings. Since the Korean plural suffix *tul* is a good candidate for attrition due to its complex distribution, I examine how *tul*-attachment is affected under the influence of two typologically different L2s. Before I present the experiments of this study, I discuss the methodology used for the experiments in the next chapter.

CHAPTER 5

Methodology

5.1 Introduction

This thesis presents two experiments on reflexive binding and plural marking. Since these two experiments were conducted using the same methodology with the same participants, this chapter outlines the design of the experiments and discusses the common methodology used (the details of each experiment are presented in the following chapter).

This chapter is organised as follows. Section 5.2 gives an overview of the methodology used in this study. Section 5.3 discusses the two tasks employed in the experiments, i.e. a Magnitude Estimation task and a self-paced reading task, and explains why these tasks were chosen. Section 5.4 presents the details of the three subject groups that participated in the experiments. In Section 5.5, I focus on the participants' sociolinguistic backgrounds and examine how various extralinguistic factors can play a role in attrition. Section 5.6 provides a summary of the chapter.

5.2 An overview of the methodology

5.2.1 *Method*

One way of measuring L1 attrition is to observe a group of immigrant speakers living in an L2 environment and to examine changes in their L1 at different

points in time. However, this longitudinal design is not easy to implement, because it requires several years of time interval between measurements. An alternative to this design is a cross-sectional method, which is comparing attrited speakers with non-attrited monolingual counterparts living in their home country. In this method, attrition is measured by examining the difference between the performances of the groups. This method, however, also has drawbacks in that the 'difference' between the groups can be easily confounded by several factors (Jaspaert et al. 1986, Yağmur 2004). The major problem is language change. Since languages evolve over time, the L1 of the control speakers may not represent what the attriters' L1 used to be several years before. In other words, the difference between the two groups of speakers might simply be a reflection of recent changes in the L1 that attriters could not keep up with, due to limited L1 input. Another problem is extralinguistic factors. One's use of L1 is influenced by a variety of sociolinguistic factors, such as age, gender, education, social status, etc. Therefore, it is almost impossible to find control speakers who match attrited speakers in terms of all those factors. The other problem is bilingualism itself. It is questionable whether it is appropriate to compare bilinguals (attrited speakers) with monolinguals, since there is robust evidence that bilinguals' language processing is different from that of monolinguals (e.g. Foursha et al. 2006). In this regard, what appears to be attrition might be, in fact, a general effect of bilingualism.

This study used a cross-sectional method for a practical reason, but it attempted to overcome the problems discussed above by taking the following measures. Firstly, this study selected unattrited monolingual speakers from two different age groups, 20s and 40s, as there is an ongoing change in the use of the plural *tul* in Korean. The most straightforward way of investigating language change in progress is to examine the distribution of linguistic elements across age groups, since older speakers are generally slower in adopting changes in language (Labov 1994). Therefore, comparing younger and older age groups can help to factor out the effect of language change from the observed difference between attrited and non-attrited speakers. Secondly, the control speakers were matched to attrited speakers in terms of the education level, since education is known as one of the most influential factors in language loss and maintenance. Other sociolinguistic factors that could not be controlled (e.g. gender) were taken into account in the

statistical analysis of the difference between attrited and non-attrited speakers. Lastly, this study included two groups of attrited speakers who were exposed to different L2s, so that the effect of attrition could be distinguished from that of bilingualism.

5.2.2 *Design and procedure*

Two experiments were planned to investigate reflexive binding and plural marking in Korean. Each experiment included off-line and on-line tasks. As the participants for the experiments consisted of three different language groups, the experiments were conducted in three different locations: Korea, Japan and the US. The participants were recruited through an online advertisement and were paid 7 pounds as a reward. In order to make the results of the two experiments comparable, it was important to have the same participants for the experiments. However, there were not many volunteers who met the subject requirements of this study and most of them were not willing to participate in more than one session. Therefore, test items for the two experiments were put together in one session. For the same practical reason, participants were tested individually at a venue of their choice — usually their own house where participants were not distracted by other people — instead of a lab.

As the target items for the off-line and on-line tasks were matched closely, the on-line task was conducted first, in order to prevent the off-line test items affecting the reading time of the on-line items. Subjects were given a short break between the on-line and off-line tasks. After the completion of the two tasks, the subjects were asked to fill out a short questionnaire that consisted of 9–26 questions about their sociolinguistic background¹. The entire session took about 60–90 minutes for most participants to complete.

5.2.3 *Materials*

There were 84 test items altogether in the off-line task: 12 target items on reflexive binding, 36 target items on plural marking and 36 distractors². Although it is

¹See Appendices B to D for the questionnaires.

²See Appendix E for the list of target items.

common to use a similar number of fillers with target items, distractors were reduced to 9 items per experiment due to the time constraint and the concentration issue. Nevertheless, the number of distractors was not considered insufficient, as the target items for different experiments would serve as distractors for each other. There were the same number of test items in the on-line task, and the items were presented randomly for each subject in both of the tasks.

5.3 Tasks

Two types of tasks were used for the experiments: an off-line acceptability judgement task using the Magnitude Estimation technique and an on-line self-paced reading task. Many attrition studies of the past relied mainly on spoken data, which was obtained from picture description, story-retelling, interviews, etc., and used grammatical errors found in the data as indices of attrition. However, production tasks are not always the best way to investigate syntactic attrition for the following reasons. Firstly, many grammatical structures, such as *tul*-marked nouns in Korean, are often difficult to elicit even in carefully designed tasks due to their distributional properties. Therefore, as demonstrated in Suh (2008), informants may not produce enough cases of the grammatical structures in question. Secondly, attriters may strategically avoid producing certain structures that they do not feel comfortable with (Keijzer 2007). Lastly, spoken data in itself provides limited information about attrition. Unless compared with other types of data, it is often difficult to determine from spoken data alone whether any production errors are simply slips of the tongue or whether they are signs of attrition. Using data from different types of tasks can help overcome these problems (Keijzer 2007, p. 157).

This study, therefore, used a combination of an off-line judgement task and an on-line reading task. A production task was not used due to the difficulty in eliciting the grammatical properties in question. Although an acceptability judgement task has often been employed in attrition studies, a self-paced reading task has rarely been used, nor the combination of the two tasks. Unlike off-line judgement tasks, on-line comprehension tasks are less likely to employ metalinguistic knowledge, since they keep track of participants' implicit, automatic response

to stimuli (Marinis 2010). On-line tasks, therefore, may reveal non-monolingual-like patterns in attrited speakers' performance which are not attested in off-line tasks (c.f. Clahsen & Felser 2006). The comparison of on-line and off-line data can help to identify the source of any non-convergence between bilingual speakers and monolingual controls, since it gives an insight as to whether the non-convergence is more representational or computational in nature (Hopp 2007). If attrition is due more to on-line processing difficulties than to representational underspecification, the divergence of attrited speakers from the monolingual norm would be more visible in an on-line task than in an off-line task. It is important to note that attriters' divergence in an off-line task might not be always due to representational underspecification. Also, any divergence attested in an on-line task might be due not only to processing difficulties but also to representational problems. Neither of the on-line and off-line tasks directly mirror linguistic competence, since both tasks involve language processing. The tasks differ in terms of the type of information they provide: whereas an off-line task shows the final outcome of language processing, an on-line task reveals the temporal process involved in the processing.

5.3.1 *Magnitude Estimation*

This study employed the Magnitude Estimation (ME) technique for its acceptability judgement task. ME was originally developed as a method to observe subjects' judgements about physical stimuli (Stevens 1975). In an estimation of loudness of sensory stimuli, subjects assign numerical values proportional to the loudness of sound they hear. The initial stimulus (i.e. modulus) is assigned an arbitrary number, and the rest of the stimuli are given a number depending on how loud they are, compared to the modulus. For example, if a stimulus is perceived as twice louder than the modulus, it is given a number two-times bigger. Bard et al. (1996) demonstrated that this technique can be adopted for language research and used to obtain acceptability judgements of linguistic stimuli. In an ME task, subjects are not presented with a traditional fixed scale (usually 5-point Likert scale). They are allowed to make a scale of their own using any numbers bigger than zero, based on how acceptable one sentence is compared to others. Since people are generally better at making relative judgements than absolute ones, ME can elicit more reliable and fine-grained linguistic judgements (Bard

et al. 1996, Keller 2000, Sorace & Keller 2005). In this study, ME was considered particularly suitable because of the subtlety of acceptability judgements involving *tul*-attachment.

The ME task for the experiments of this study was set up using the software E-prime. Subjects were asked to type in an appropriate number for each sentence presented on a computer screen. To make sure that subjects fully understood the task, two practice sessions were provided before the main session. In the first session, subjects were presented with lines of different lengths and were asked to assign numbers according to their length. In the second session, they were given full sentences, the same as in the main session.

At the beginning of the main session, subjects were presented with a modulus sentence. The modulus was structured to have a medium level of acceptability, so that the initial value would not be too small or too big. The modulus, presented in (65), was not perfectly acceptable because of its word order. The judgement of the modulus was irrelevant to the grammatical phenomena investigated in the main session. Test items were presented one at a time and were removed from the screen once they were rated. Subjects were not allowed to return to previous sentences.

- (65) Wuli-ka chencay-lako ku-lul mit-ess-ciman silun sakikkwun-ey
 we-NOM genius-as he-ACC believe-PST-but in fact swindler
 pwulkwaha-ess-ta.
 no more than-PST-DEC
 ‘We believed him to be a genius, but in fact he was no more than a swindler.’

5.3.2 *Self-paced reading*

Among many on-line experimental methodologies (e.g. timed grammaticality judgement task, eye-tracking), this study used a self-paced reading task, in which subjects read stimuli word by word at their own pace as if they were reading newspaper or magazines. The rationale underlying this task is that a less acceptable or unexpected phrase takes a longer time to read. By recording the amount of time a subject spends reading each word, it can be inferred at which point of a sentence the subject encountered an unexpected phrase or he/she experienced processing difficulty (Marinis 2003). Previous studies (e.g. Juffs & Harrington

1995, 1996) have demonstrated that a self-paced reading task is useful for observing the difference between L2 learners and native speakers in real-time language processing. In this study, it was expected that the task would reveal differences between attrited and non-attrited speakers' temporal processing, which are not shown in an off-line acceptability judgement task.

The on-line task of this study was set up using E-prime software that records reading time of each segment on a computer. Subjects were presented with stimuli that were displayed on a screen one word at a time. After reading each word, subjects pressed the button of a response box connected to the computer. Then a new word appeared, and the previous one was removed from the screen. As in the off-line task, subjects were not allowed to see previously presented stimuli, once they moved on. When subjects finished reading each test item (which consisted of two sentences), they were presented with a full sentence, which they were asked to judge whether or not it was a true statement of the test item. They pressed the green button of the response box if the statement was true, and the red button if it was not. The true/false task was to ensure that subjects focused more on the meaning of stimuli and less on the structure, so that the subjects' reading times would reflect their implicit grammatical knowledge, rather than metalinguistic knowledge.

5.4 Participants

Three groups of native Korean speakers participated in the study: two groups of potential attriters in different L2 settings and a group of non-attrited monolingual speakers. The two attrition groups consisted of 36 speakers of L2 Japanese and 34 speakers of L2 English, who had lived in an L2-dominant environment for a minimum of 6 years. Although many attrition studies have used the 10-year criterion for the selection of subjects (e.g. de Bot et al. 1991, Gürel 2004), this study included informants with a shorter length of residence in order to observe the early stages of L1 attrition, as well as more advanced stages, considering that attrition may take place within the first 10 years of immigration (Waas 1993).

Other criteria for the selection of attrited speakers were: i) age at migration (age 13 or older); ii) age at the time of testing (under age 50); and iii) the level of education (the undergraduate level or above). The first criterion was to ensure

that all subjects had a full competence in L1, before they were immersed in L2. Speakers who were above age 50 were not included in order to eliminate any possible effects of ageing. Also, this study included only those who had the undergraduate-level or higher education, since education is an important factor in language use and is relatively easy to control.

The control group consisted of 49 monolingual speakers of Korean. The group was matched with the attrition groups in terms of the level of education. Table 5.1 presents the mean of age, age at migration, length of residence of the subject groups.

	N	Age Mean (Range)	Age at migration Mean (Range)	Time since migration Mean (Range)
L2J speakers	36	36.8 (24-50)	25.2 (18-39)	11.6 (6-24)
L2E speakers	34	34.6 (19-49)	21.9 (13-43)	12.6 (6-25)
Monolinguals	49	33.2 (19-49)	-	-
Younger speakers	27	23.0 (19-29)	-	-
Older speakers	22	43.4 (40-49)	-	-
Total	119	34.5 (19-50)	23.6 (13-43)	12.1 (6-25)

Table 5.1: Subjects of the experiments

5.4.1 *The attrition groups*

The first attrition group were L2E speakers living in Boston and New York City in the United States. As all speakers of the group were born and raised in Korea at least until age 13, it was assumed that they all had fully acquired Korean, before emigration. The majority of the subjects reported in the questionnaire that they maintain fairly strong ties with other members of the Korean community and use L1 on a regular basis. This tendency seemed to be relevant to the size of the Korean immigrant population. According to a recent report³, the US has the second largest Korean immigrant community next to China, with more than 2 million people (including second-generation). Therefore, Korean immigrants in the US are hardly isolated from the L1 speaker group, unless they choose to be.

The second attrition group were L2J speakers living in Tokyo, Japan. Subjects in this group were also adult speakers whose age at immigration was above 13.

³*Current Status of Overseas Compatriots* (2011)

Similarly to the L2E speakers, most L2J speakers reported in the questionnaire that they had a frequent contact with other Korean speakers. Since Japan has the third largest Korean immigrant society with an estimated population of 0.9 million, the L2J speakers also seemed to have plenty of opportunities to interact with other Korean speakers in daily life, if they wanted.

5.4.2 *The control group*

The control group were monolingual Korean speakers living in Seoul. All speakers of the group were born and raised in Korea and had never lived outside Korea for more than 6 months. Since Korea is a highly monolingual society, all public education is done only in Korean. Although English is taught from primary school through college, Koreans in general have a low proficiency because English is rarely used outside classroom settings. Foreign languages other than English (e.g. Japanese, Chinese, French) are often taught at secondary schools, but they are not used for daily communication either. Many speakers of the control group reported that they had knowledge of various foreign languages, including English, Japanese, Chinese, etc., but to a limited degree.

The monolingual group was made up of two subgroups: the younger age group (speakers under age 30) and the older age group (speakers over age 40). Although it is considered ideal in an attrition study to match the age of the attrition group and the control group, this study selected control speakers from particular age groups in order to tease apart the effect of language change from attrition. If there were any changes in use of the plural *tul* in Korea in the last two decades, the speakers of the different generations would display different patterns in *tul*-attachment.

5.5 Extralinguistic variables

This section examines the participants' personal and sociolinguistic backgrounds in detail. Although attrition is a consequence of reduced L1 use, the amount of L1 use is not the only predictor for attrition. As observed in a number of studies (e.g. Cherciov 2011, Hulsen 2000, Schmid & Dusseldorp 2010), the manifestation of attrition is determined by a combination of various extralinguistic variables. The variables that have been claimed to play an important role are: time elapsed

since emigration (or length of residence), level of education, age at onset of L2 acquisition, age at onset of L1 attrition, attitudes towards the L2 culture and environment, frequency and amount of L1 use, contexts of L1 use (typical interlocutors and social networks within the immigrant community), etc. Also, other factors, such as gender, occupation and social status, L2 proficiency, knowledge of languages other than L1/L2, have been suggested to have an effect on attrition as well. To examine whether any of these variables are an important predictor for the attrition of reflexive binding and plural marking, this study collected biographical and sociological information about participants through a questionnaire. Based on the sociolinguistic questionnaire designed by Schmid (2005), 24 questions were formulated for attrited speakers and 9 questions for monolingual control speakers. The questions were either open-ended questions or multiple choice ones, depending on the type of information referred to. Table 5.2 presents the list of questions given to the attrited speakers, which are divided into four categories⁴. The information obtained from the questionnaires were turned into numerical values (if applicable) for the purpose of statistical analyses. Table 5.3 gives a summary of the sociobiographical information about the participants of this study.

Category	Questions
Personal background	age (Q1), gender (Q2), hometown (Q3) time since emigration (Q4), education in L1 and L2 (Q8/9)
L1 use	self-confidence in L1 (Q14/Q15), frequency of L1 use (Q17) contexts and amount of L1 use (Q18) type and amount of L1 input (Q19/20/21/22)
L2 and other language use	age of first exposure to L2 (Q10) self-rated L2 proficiency (Q11/12/16) knowledge of languages other than L1/L2 (Q6/7)
Attitudes	motives for emigration (Q5) importance of L2 (Q13), importance of L1 (Q23) intention to return to home country (Q24)

Table 5.2: Sociolinguistic questionnaire

⁴The full questionnaires for the monolingual, L2E and L2J groups are found in Appendices B to D.

Group	N	Sex Male : Female (%)	Hometown Seoul : Other (%)	Age Mean (Range)	Age at L2 exposure Mean (Range)	Age at migration Mean (Range)
L2 Japanese	36	22 : 78	50 : 50	37 (24-50)	11 (6-14)	25 (18-39)
L2 English	34	50 : 50	70 : 30	35 (19-49)	22 (15-40)	22 (13-43)
Monolingual	49	31 : 69	57 : 43	33 (19-49)	-	-
Younger	27	30 : 70	61 : 39	23 (19-29)	-	-
Older	22	32 : 68	50 : 50	43 (40-49)	-	-
Group	Yrs. of residence Mean (Range)	Education level UG : PG ^a (%)	Edu. in L2 No : Yes (%)	L2 proficiency Mean (/6)	Language choice L1 : both : L2 (%)	Freq. of L1 use Mean (/5)
L2 Japanese	12 (6-24)	80 : 20	39 : 61	4.8	36 : 25 : 39	4.2
L2 English	13 (6-25)	65 : 35	21 : 79	4.2	68 : 32 : 0	4.8
Monolingual	-	76 : 24	-	-	-	-
Younger	-	85 : 15	-	-	-	-
Older	-	64 : 36	-	-	-	-
Group	Amount of L1 use Mean (/5)	Amount of L1 input Mean (/20)	Attitude (L1) Mean (/5)	Attitude (L2) Mean (/5)	Eng. proficiency Mean (/6)	
L2 Japanese	1.48	9.0	4.4	4.6	-	
L2 English	2.39	9.4	4.3	4.7	-	
Monolingual	-	-	-	-	1.8	
Younger	-	-	-	-	1.8	
Older	-	-	-	-	1.7	

^a UG: undergraduate, PG: postgraduate

Table 5.3: Sociobiographical background of the participants

Sex/gender

In several attrition studies (e.g. Keijzer 2007, Köpke 1999, Schmid 2002), sex has been claimed to be a factor that may have an influence on the loss or maintenance of L1. A behavioural difference between male and female speakers has been observed in many areas of language research, such as language change and language acquisition. Generally, female speakers are known to be more open to new forms of language and to contribute more to societal language change than male speakers (Labov 1990). Females also tend to have more positive attitudes toward L2 than males and thus are more likely to be successful in L2 learning (Ellis 1994, p. 202). These findings suggest that female immigrants might exhibit a greater degree of attrition than males. However, as little research has been done on a sex difference in attrition thus far, it is unclear whether sex plays a role in the attrition of L1. Köpke (1999) is one of the very few studies that examined the role of sex in attrition, but she did not find a difference between male and female speakers in any tasks. de Leeuw (2009), following Yağmur (1997), argues that it is gender rather than sex that is influential in attrition because the differences between men and women in language use have more to do with social and cultural factors, than with biological factors.

Due to a possible effect of the sex/gender factor, most attrition studies attempt to control the factor by including the equal number of male and female informants. In the present study, however, the gender factor could not be controlled, due to the difficulty in finding participants who met other requirements (e.g. age, length of residence, education, etc.). While the L2E group had the same number of male and female speakers, the L2J group and the monolingual group had more females than males. Therefore, the gender factor was taken into account when the performances of the subject groups were compared.

Hometown/birthplace

Hometown or birthplace is a variable that might have an impact on one's language use. In this study, the factor was not controlled, as it was considered non-influential. The Korean language is largely homogeneous, and all dialects of different regions of Korea are mutually intelligible, despite their slight difference in tones and vocabulary (Sohn 1999, p. 12). Moreover, as all participants

of this study had received a relatively high level of education, it was expected that they had the knowledge of standard Korean. Nevertheless, the information about participants' hometown was collected through the questionnaire, in order to make sure that the three subject groups did not represent completely different populations. From the questionnaire, it was found that about half the speakers of all three groups were from the central area (Seoul and neighbouring cities) and the rest from other areas, confirming that the three groups did not differ considerably with respect to the regional factor.

Age

Chronological age may have a significant effect on one's performance in linguistic tasks, especially in cognitive tasks that tap language processing and comprehension. Previous research provides extensive evidence that there is an age-related decline in language processing (e.g. Burke & Shafto 2008, Caplan et al. 2011, DeDe et al. 2004). Caplan et al. (2011), for example, observed that older speakers show longer on-line processing times than younger speakers in a self-paced reading task, due to their inefficiency in language processing. Age, therefore, is an important variable that needs to be considered in the investigation of attrition effects on L1 processing.

In this study, participants of the two attrition groups were roughly matched in terms of age. The average ages of the L2J group and the L2E group were 36.8 (S.D.=6.0) and 34.6 (S.D.=8.9), respectively. The difference in the two groups' age was not significant ($t(68)=1.336$; $p=.186$). As noted earlier, the age of the monolingual group was deliberately not matched to that of attrition groups for the purpose of examining language change in progress.

Age at migration

Age at migration or age of arrival is a variable that has been considered crucial in both acquisition and attrition research. In the domain of L2 acquisition, there has been a great deal of research as to whether there is a critical period for native-like achievement and, if so, when the offset of the period is. Many researchers have proposed that the critical period *does* exist and that the cut-off point sets around puberty or earlier, for example, age 6 (e.g. Johnson & Newport 1989,

Long 1990, Patkowski 1980, Pinker 1994). However, due to conflicting findings among empirical studies, the issues regarding the critical period have not yet been settled. Nevertheless, a general consensus seems to be that the level of ultimate attainment in L2 negatively correlates with age of acquisition (Harley & Wang 1997, p.37).

Age of arrival in an L2 setting has been known as one of the most powerful predictors for attrition as well (see Köpke & Schmid 2004, Montrul 2008 for an overview). Unlike adult speakers, young, pre-puberty speakers typically experience severe deterioration of L1 when L1 input is reduced (e.g. Pallier 2007). Given the fact that considerable L1 loss is almost never found among adult speakers who had fully acquired L1 before immersed in L2, it can be said that the cut-off point for L1 attrition is the time when L1 acquisition is completed. Once the cut-off point passes, age at migration is no longer a strong predictor for attrition (Köpke & Schmid 2004). Since L1 acquisition is generally known to be completed around puberty, this study set the subject selection criterion for the time of migration as age 13. The two grammatical phenomena in question, reflexive binding and plural marking, were known to be acquired relatively early (as early as age 6) (Kiaer 2010, Kim & You 2011). Therefore, it was assumed that speakers who were above age 13 at the time of emigration had the full representation of the grammatical phenomena, before the onset of attrition.

Although all informants of this study met the requirement for age of arrival, their age at the time of migration varied. A t-test revealed that the L2E speakers migrated to an L2 environment at a relatively younger age than the L2J speakers ($t(68)=2.335$; $p=.022$). The difference between the two groups seemed to be due, in part, to a trend in education-migration among Koreans. For the last two decades, it has become increasingly popular among pre-college Korean students to migrate to an English-speaking country for educational purposes (Cho 2007). In the L2E group, there were 9 subjects who had migrated to the US at pre-college age. Also, the majority of the other participants reported that their primary reason for immigration was education. In the L2J group, on the other hand, none of the subjects had moved to Japan at pre-college age, and the subjects' purpose of immigration varied. This difference between the attrition groups in terms of age of arrival, therefore, was taken into account in the comparison of their performances.

Age of first exposure to L2

The two attrition groups showed a difference in terms of age of first exposure to L2 as well. Through the questionnaire, it was found that the L2E group was exposed to their L2 at much younger age than the L2J group ($t(68)=10.811; p=.000$). Due to the status of English as a lingua franca, the L2E speakers had a chance to learn English at school at a relatively young age (mean=11.2, S.D.=2.3). The L2J speakers, on the other hand, had a limited opportunity for exposure to the L2 before their immigration to Japan, thus the mean of their age of exposure to L2 was greater (mean=22.2, S.D.=5.5).

Length of residence

Time since migration to an L2 setting is an important factor for attrition, but the function of the time and the amount of attrition is not linear (Jaspaert et al. 1986). It has been suggested that bilingual speakers experience a certain degree of attrition during their first 10 years in an L2 environment, but relatively little attrition after that period (Ammerlaan 1996, de Bot & Clyne 1994, Gürel 2002). There has also been a claim that length of residence might be relevant only when there is little or no contact with L1 (de Bot & Weltens 1991). However, both claims are in need of further supporting evidence.

This study aimed to observe early stages of attrition, as well as advanced stages. Therefore, it included bilingual speakers with varying lengths of residence, ranging from 6 years to 25 years, with the averages of 11.6 years (S.D.=4.6) and 12.6 years (S.D.=5.5) for the L2J group and the L2E group, respectively (the length of residence of the two groups did not differ significantly: $t(68)=-.768; p=.448$). The participants' varying lengths of residence allowed the examination of whether the time factor had an explanatory power for attrition.

Education

It is a well-known fact that speakers who have had a higher education generally perform better in linguistic tasks than those who have had a lower education (e.g. Mulder & Hulstijn 2011). The level of education is known as an important soci-linguistic factor in attrition as well. Yağmur (2004), who compared two groups of Turkish immigrants in Australia that had different levels of education (i.e. a

'working-class' group and a white collar group), found that the highly educated group better retained the L1 than the less educated group. Yağmur's finding is in accord with those of other studies that observed a correlation between the level of education and a better retention of L1 (e.g. Clyne 1973, Jaspaert & Kroon 1989, Waas 1996). In this study, therefore, the three subject groups were matched in terms of the level of education. Both the monolinguals and bilinguals had an undergraduate-level or higher education, and there was no significant difference between the groups with respect to the education level ($\chi^2(2)=2.365$; $p=.306$).

L2 proficiency

Generally, a high proficiency in L2 helps immigrants to acculturate into L2 context better. However, a high proficiency in L2 is not a necessary condition for attrition. Sorace (2000), in her observation of bilingual speakers, argued that L2 speakers do not have to be near-natives to be candidates for attrition. Evidence for her claim is found in Yağmur (2004), where attrition was exhibited among Turkish immigrants who had a low proficiency in L2 English.

Most bilingual speakers of this study reported that they had at least an intermediate proficiency in their L2. All of them except one rated their L2 proficiency as an intermediate level or higher, and about half of them (38 out of 70) answered that they had an advanced or native-like proficiency. However, the self-rated L2 proficiency was higher in the L2J group than in the L2E group ($U=438$; $p=.035$; $r=-0.25$).

L1 use

Attrition is known to manifest most severely in immigrants who have had no or little contact with other L1 speakers, although it is also exhibited among those who use their L1 on a daily basis (e.g. Cuza-Blanco 2008, Tsimpli et al. 2004). One's patterns of L1 use (both the amount and frequency of use), typical interlocutors, the quality of L1 input accessible to the speaker are crucial factors that determine the amount of attrition. The questionnaire of this study, therefore, was designed to include questions about: i) how often attriters use L1; ii) how much they use L1 in what social settings; and iii) how much they are regularly exposed to unattrited input.

The first question, which was about the frequency of L1 use, gave participants five options to choose from. The answers were later converted to numerical values, ranging from 1 (least frequent) to 5 (most frequent). The second question, which was about the amount of L1 use, asked participants to give information about their use of L1 in proportion to L2 in four different social contexts: home, school/workplace, church/community gatherings with neighbours, social gatherings with friends. The answers for this question were also turned into numerals from 1 (low use) to 5 (high use). The third question, which was about the amount of L1 input, asked participants how much they received unattrited L1 input through contact with family and friends in the home country or through media (TV, radio, books, etc.). This unattrited L1 input excluded the input received through communication within the immigrant community, since the L1 used by members of the immigrant community (many of whom are second or third generation speakers) is qualitatively different from the L1 that is used by monolingual speakers in the home country (Köpke 2007, Sorace 2011). The answers to this question were also converted to numerical values so that a bigger value would represent a larger amount of input. In addition to these three questions, participants were also asked regarding the frequency and length of their visits to Korea, through which they had full access to unattrited L1.

All attrited speakers except two L2J speakers (68 out of 70 speakers) answered that they used Korean at least several times a month, and the majority of them (49 speakers) answered that they used it on a daily basis. Notably, the L2E speakers tended to use L1 more frequently than the L2J speakers ($U=414.5$, $p=.004$, $r=-0.34$) in more various settings ($U=244$; $p=.000$, $r=-0.52$). The two groups, however, did not differ in terms of the amount of L1 input that they were exposed to ($t(68)=-.593$, $p=.555$): both groups reported that they received a fairly large amount of unattrited L1 input.

Attitudes toward L1 and L2

Attitudes and motivation have been claimed to be a crucial factor in L1 maintenance in several attrition studies (e.g. Hulsen 2000, Schmid 2002, Yağmur 2004). However, there has not been sufficient evidence for the role of attitudinal factors

in adult L1 attrition⁵. In fact, the informants of this study did not constitute a group that was the most ideal for the investigation of the role of attitudes, since most of them had a high degree of willingness to maintain L1: the majority of both attrition groups (64 out of 70 speakers) answered that it was “very important” or “important” for them to maintain L1 proficiency. It was, nonetheless, examined in this study whether this slight difference in their willingness was a significant factor for the loss or maintenance of L1.

The speakers of the L2E and L2J groups did not differ in terms of their attitude toward L1 ($U=577$, *ns*, $r=-.05$), nor the attitude toward L2 ($U=566$, *ns*, $r=-.07$). All of the attrited speakers except one answered that it was “very important” or “important” for them to have high proficiency in their L2.

English proficiency

Although it would have been ideal if the monolingual speakers and the L2J speakers had no knowledge of English, both groups reported that they had at least a basic knowledge of English, due to the English education at school. However, their self-rated proficiency in English was significantly lower than that of the L2E group (Monolinguals: $U=94$ $p=.000$, $r=-.77$; L2E speakers: $U=57$, $p=.000$, $r=-.80$). The majority of the monolingual and L2J groups (72 out of 85 speakers) rated their English proficiency either as beginner or low-intermediate levels. There was no significant difference between the L2J group and the monolingual group in terms of English proficiency ($t(83)=1.826$; $p=.969$).

5.6 Summary

This chapter has presented the methodology used in this study. First, I have presented an overview of the design, procedure and materials of the experiments of this study. Then, I have discussed the nature of the two tasks used for the experiments, i.e. the Magnitude Estimation task and the self-paced reading task, and provided accounts for the choice of the tasks. I have also provided detailed information about participants of the experiments with respect to various extralinguistic variables that have previously been claimed to play a role in attrition. In

⁵In child L1 attrition, there has been evidence that language aptitude is a significant predictor for the maintenance of L1 (Bylund, Abrahamsson & Hyltenstam 2010).

the following chapter, I present the details of the experiments and discuss their results.

CHAPTER 6

Experiments and results

6.1 Introduction

In this chapter, I present the two experiments of this thesis that investigated the effect of attrition on reflexive binding (Experiment 1) and plural marking (Experiment 2). This chapter is organised as follows: Section 6.2 presents the aims, research questions, design and materials of Experiment 1 and discusses the results of the experiment. Section 6.3 presents the details of Experiment 2 and discusses the results, examining the general patterns of *tul*-marking in the three subject groups. From Section 6.4 to Section 6.6, I examine the results of Experiment 2 with a focus on three different factors affecting *tul*-attachment, i.e. animacy, number-specificity and distributivity, respectively. Section 6.7 summarises the chapter.

6.2 Experiment 1: Core binding of *caki*

6.2.1 *Aims and research questions*

Experiment 1 investigated the attrition of reflexive binding: whether the representation and/or processing of *caki*-binding is affected by attrition at all and, if so, how it is affected. The experiment aimed to test the assumption that structures whose distribution is fully specified by grammar are not susceptible to attrition. Reflexive binding, like all other grammatical phenomena, involves the interfaces between syntax and other cognitive domains (c.f. Montrul 2011). However, according to Kim (2007) and Kim & Yoon (2009), core binding of the Korean

reflexive *caki* is licensed grammar-internally and is not sensitive to discourse-pragmatic conditions, unlike exempt binding¹. Therefore, core binding of *caki* is one of the grammatical phenomena that are unlikely to be affected by attrition. The research questions addressed in the experiment were as follows:

- Does attrition affect the grammatical representation and/or processing of core binding of *caki*?
- If attrition is manifested on *caki*-binding, is it a result of transfer from L2 or is it a cost of bilingualism?
- If attrition is exhibited, is the amount of attrition predicted by any sociolinguistic factors (e.g. length of residence, age at migration, L1 use)?

6.2.2 Design and materials

Experiment 1 was designed based on Kim et al.'s (2010) study on *caki*-binding, but its design differed from that of Kim et al. (2010). Kim et al. used a truth-value judgement task, in which subjects were presented with a short story and a description of the story and were asked to decide whether the binding relation presented in the description was acceptable. In the task, Kim et al. did not find any difference between the performances of attrited speakers and non-attrited speakers. However, it was possible that the result was due to the nature of the task. Since a truth-value judgement task yields categorical results, it may not reflect the subtlety of grammatical acceptability. To illustrate, a speaker might accept a case of *caki*-binding in the task, even when he/she finds it only marginally acceptable. Therefore, Experiment 1 of this study used a different type of judgement task, a Magnitude Estimation task, which provides non-categorical judgement data, along with a self-paced reading task which provides on-line processing data.

In each task, two types of stimuli that had different binding conditions were used: sentences containing an anaphor that did not violate any of the two Opacity Conditions, as in (66a) and those containing an anaphor that violated the Tensed Sentence Condition (TSC), as in (67a). Following Kim et al. (2010), the target items were constructed to have two possible referents for *caki*: the subject and non-subject antecedents. However, it was predicted that participants would

¹See Section 3.2 for the discussion of core versus exempt binding.

prefer the subject antecedent, since *caki* is strongly subject-oriented (Kang 1988). Upon this prediction, the main concern of the experiment was whether attrited speakers treated TSC-violating anaphors differently from those without the violation.

One problem in constructing the target items was that the items of the two binding conditions were not directly comparable, since they did not have the identical sentence structures. The structural factor needed to be controlled, because the factor was likely to influence the acceptability judgements, as well as the reading time of the target items. To solve this problem, each target item was paired with a reference sentence that contained a proper noun instead of a reflexive, so that the difference between a target item and a reference item would be compared in two different binding conditions. The sentences in (66b) and (67b) exemplify reference items that were matched to the off-line target items in (66a) and (67a). There were three target items and three reference items for each binding condition (a total of 12 items), plus 9 filler items that were not relevant to core binding of *caki*².

(66) Off-line items (Condition A): without the violation of the TSC

a. Reflexive:

Tohyen-i Senhuy-eykey **caki**-uy sacin-ul poyecwu-ess-ta.
T-NOM S-DAT self-GEN picture-ACC show-PST-DEC

'Tohyen_i showed Senhuy_j self_{i/j}'s picture.'

b. Proper N:

Hyensek-i Yengmi-eykey **Minswu**-uy sacin-ul poyecwu-ess-ta.
H-NOM Y-DAT M-GEN picture-ACC show-PST-DEC

'Hyensek showed Yengmi Minswu's picture.'

(67) Off-line items (Condition B): with the violation of the TSC

a. Reflexive:

Minyeng-i Cwunsey-eykey [**caki**-ka ipen senke-eyse
M-NOM C-DAT self-NOM this election-LOC
tangsen-toy-ess-ta]-ko malha-ess-ta.
elect-PAS-PST-DEC-COMP say-PST-DEC

²See Section 5.2.3 for the discussion of distractors.

'Minyeng_i told Cwunsey_j that self_{i/j} won this election.'

b. Proper N:

Hyenseng-i Yenghuy-eykey [**Senmi**-ka ipen senke-eyse
 H-NOM Y-DAT S-NOM this election-LOC
 tangsen-toy-ess-ta]-ko malha-ess-ta.
 elect-PAS-PST-DEC-COMP say-PST-DEC

'Hyenseng told Yenghuy that Senmi won this election.'

The target items for the on-line task were constructed in the same way as the off-line items, since it was important that the test materials of the two tasks were kept identical for the purpose of comparison. In the on-line task, however, a sentence providing the context was added before each target item, in order to help participants to read the items as naturally as possible. Also, to ensure that the participants fully processed the target items, a short statement was added. The participants were asked to judge whether the statement was true or false, based on the information provided either in the context sentence or in the target sentence. As in the off-line task, the on-line task included three target items and three reference items for each condition (a total of 12 items), plus 9 filler items. The target items exemplifying the two binding conditions are presented in (68a) and (69a). The reference items that were matched to these target items are shown in (68b) and (69b).

(68) On-line items (Condition A): without the violation of the TSC

a. Reflexive:

(Context: Senhuy opened an old album.)

Kuleca Tohyen-i Senhuy-eykey **caki**-uy sacin-ul
 then T-NOM S-DAT self-GEN picture-ACC
 poyecwu-ess-ta.
 show-PST-DEC

'Then Tohyen_i showed self_{i/j}'s picture to Senhuy_j.'

Statement: 'Senhuy opened an album.' (True)

b. Proper N:

(Context: Yengmi wanted to see her friends' pictures.)

Kuleca Hyensek-i Yengmi-eykey **Minswu**-uy sacin-ul
 then H-NOM Y-DAT M-GEN picture-ACC
 poyecwu-ess-ta.
 show-PST-DEC

'Then Hyensek showed Minswu's picture to Yengmi.'

Statement: 'Yengmi saw a picture of herself.' (False)

(69) On-line items (Condition B): with the violation of the TSC

a. Reflexive:

(Context: Cwunsey asked about the result of the election.)

Kuleca Minyeng-i Cwunsey-eykey [**caki**-ka ipen senke-eyse
then M-NOM C-DAT self-NOM this election-LOC
tangsen-toy-ess-ta]-ko malha-ess-ta.
elect-PAS-PST-DEC-COMP say-PST-DEC

'Then Minyeng_i told Cwunsey_j that self_{i/j} won this election.'

Statement: 'Cwunsey asked about the exam.' (False)

b. Proper N:

(Context: Yenghuy said that she wanted to know the ballot result.)

Kuleca Hyenseng-i Yenghuy-eykey [**Senmi**-ka ipen senke-eyse
then H-NOM Y-DAT S-NOM this election-LOC
tangsen-toy-ess-ta]-ko malha-ess-ta.
elect-PAS-PST-DEC-COMP say-PST-DEC

'Then Hyenseng told Yenghuy that Senmi won this election.'

Statement: 'Senmi won the election.' (True)

6.2.3 Predictions

A general prediction for the experiment was that there would be no visible attrition effects, since it was assumed that the conditions for core binding of *caki* are determined by grammar thus are resistant to attrition. The attrited speakers would not significantly diverge from their monolingual peers, either in the acceptability judgements or in the processing of *caki*-binding. Specific predictions for each task were as follows:

Off-line task

- In the off-line judgement task, the monolingual Korean speakers would accept *caki*-binding in the TSC-violation condition, as well as in the no-violation condition, since *caki*-binding is acceptable in both conditions. Therefore, the monolinguals' acceptability ratings of *caki* in the TSC-violation condition would not be significantly different from their ratings of *caki* in

the no-violation condition: *caki* in both conditions would be considered equally acceptable.

- If the grammatical knowledge and the processing of core binding of *caki* was unaffected by attrition, the attrited Korean speakers, even those who were at advanced stages of attrition, would not significantly differ from the monolinguals: the attriters would readily accept *caki*-binding in both of the TSC-violation condition and the no-violation condition, the same as the monolinguals.

On-line task

- In the on-line task, the monolinguals' reading time (RT) for *caki* would not differ in the two different binding conditions, since *caki*-binding is acceptable in both conditions.
- If the processing of core binding of *caki* was unaffected by attrition, the attrited speakers would not diverge from the monolinguals: the attriters' RT would not significantly differ under the two binding conditions, like that of the monolinguals. Also, there would be no difference between the performance of the two attrition groups: both groups would perform in the native range.

6.2.4 *Data analysis*

Off-line data

Raw data from the Magnitude Estimation task needed to be normalised for statistical analysis, as each participant used a scale of their own for acceptability judgements in the task. Therefore, the raw data was first divided by the modulus, which was assigned by each participant at the beginning of the task. As the data was positively skewed, it was then transformed to logarithms, so that the skewness would be reduced. The ratings that did not fall within ± 3 standard deviations from the mean rating of each target item (about 2% of the entire data) were removed before analysis.

On-line data

The average RTs for each target item were calculated in the following procedure. First, the extreme values that were shorter than 50ms or longer than 4000ms (less than 1% of the entire data) were removed. Before statistical analysis, the raw RTs needed to be adjusted, since the segments in the critical regions were in different lengths. For example, a proper noun sometimes was longer than *caki* because it had an extra syllable. In such a case, a direct comparison of the two RTs was not appropriate. Therefore, predicted RTs were computed for each item, using simple linear regressions of the observed RTs and the segment length. Then, residual RTs were calculated by subtracting the predicted RTs from the observed RTs. If the residual RT of a certain segment had a value smaller than 0, it would mean that the segment was read faster than it was expected. On the other hand, if the residual RT had a value larger than 0, it would mean the segment was read slower than expected. Lastly, residual RTs that did not lie within +/-3 standard deviations from the mean RT for each segment (about 2–3% of the remaining data) were excluded from analysis.

The two regions examined were the manipulated region (i.e. the reflexive/proper noun region) and the following region. The example below shows the examined regions for the sentence in (68a) in bold characters. Each forward slash represents a word boundary that required a button press of the Serial Response Box.

(70) Tohyen-i / Senhuy-eykey / **caki-uy** / **sacin-ul** / ...
 T-NOM / S-DAT / self-GEN / photo-ACC
 NP1 / NP2 / **Reflexive** / **Reflexive+1** / ...

6.2.5 *Results of the off-line task*

Figure 6.1 and Table 6.1 present the mean ratings of test items by the monolingual group and the two attrition groups. Overall, the results of the judgement task showed that the attrited speakers performed closely to the monolinguals. All three groups displayed similar patterns of responses and there was no significant difference between the groups.

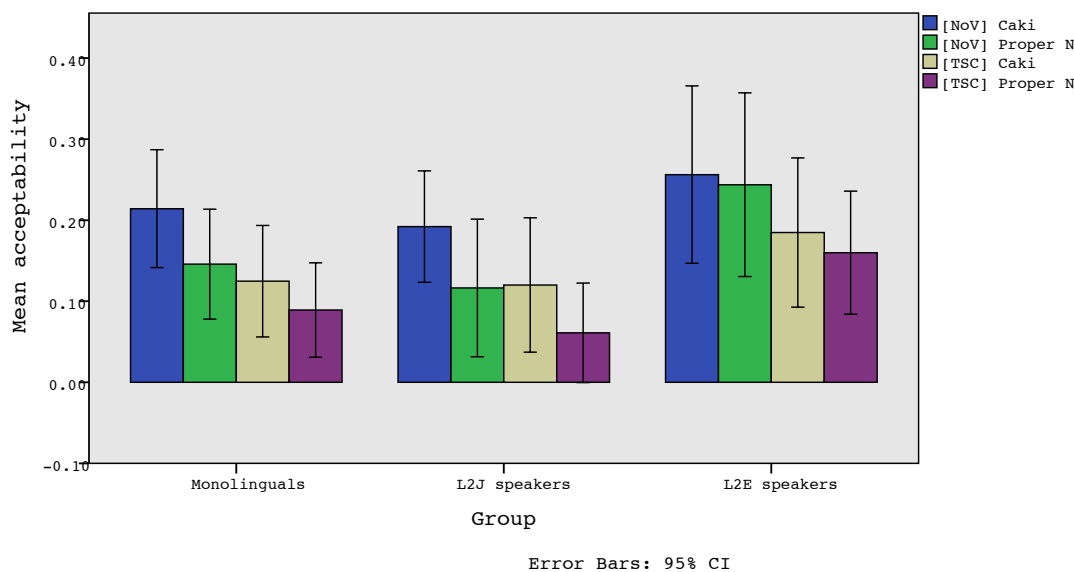


Figure 6.1: Mean acceptability of core binding sentences (Experiment 1)

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
No-violation	<i>Caki</i>	.21 (.25)	.19 (.20)	.26 (.30)
	Proper N	.15 (.23)	.12 (.25)	.24 (.31)
TSC-violation	<i>Caki</i>	.12 (.23)	.12 (.24)	.18 (.26)
	Proper N	.09 (.20)	.06 (.18)	.16 (.21)

Table 6.1: Mean acceptability of core binding sentences (Experiment 1)

Within-subjects factors

Before comparing the responses of the groups, it was first examined whether the within-subjects factor, Binding condition (no-violation/TSC-violation) had a significant effect within each group. A paired t-test indicated that two groups, the monolingual group and the L2J group, rated sentences with TSC-violation lower than those without the violation. The difference between the acceptability ratings of the two types of sentences was highly significant in both the monolingual group (paired $t(46)=3.857$; $p=.000$) and the L2J group (paired $t(35)=2.956$; $p=.006$). Only in the L2E group, there was no difference in the acceptability of those sentences (paired $t(33)=1.605$; $p=.118$). The response patterns of the three groups appeared to be the opposite of the predictions, as the L2E group, not the monolingual group and the L2J group, was expected to rate *caki* with TSC-violation lower than *caki* without the violation due to crosslinguistic influence from L2.

Importantly, however, the low acceptability ratings for TSC-violating anaphors in the monolingual group and the L2J group did not seem to indicate that the two groups were sensitive to the TSC in determining the felicity of *caki*-binding. In both groups, it seemed that the difference in the ratings of *caki* with and without the violation of TSC resulted from the difference in structural complexity of the target items, rather than the difference in binding condition, because the ratings of the reference items also exhibited similar patterns: the average rating of the reference items matched to the sentences with TSC-violation was lower than that of the reference items matched to the sentences without the violation of TSC. The difference between the ratings of the reference items was not significant in the L2J group (paired $t(35)=1.751$; $p=.089$), but reached significance in the monolingual group (paired $t(46)=2.261$; $p=.012$).

When the structural difference between the target items was partialled out in a two-way repeated-measures ANOVA (Sentence type \times Binding condition), the difference between the ratings of *caki* in the two conditions was no longer significant in any of the three groups (monolinguals: $F(1, 46)=1.531$; $p=.222$; L2J speakers: $F(1, 35)=.129$; $p=.721$; L2E speakers: $F(1, 31)=.170$; $p=.683$). This result suggested that the binding condition (i.e. TSC-violation) did not have a significant effect on the acceptability of *caki* in either of the monolingual group or the attrition groups. The result was in accord with the prediction that both the monolingual and attrition groups would accept TSC-violating anaphors as much as those without the violation of the TSC.

A notable pattern in the responses of the subjects was that there were gradient ratings across conditions. In all three groups, the target items, which contained an anaphor, were rated higher than the reference items which contained a proper noun. Also, the sentences of the no-violation condition were rated higher than those of the TSC-violation condition. In other words, the sentences that contained an anaphor without TSC-violation were rated highest among all types, and the reference sentences that were matched to the sentences containing a TSC-violating anaphor were rated lowest. In a one-way repeated-measures ANOVA, the effect of item type was significant at $p<.05$ in all groups (monolinguals: $F(3, 138)=9.959$; $p=.000$; L2J speakers: $F(3, 105)=7.631$; $p=.000$; L2E speakers: $F(3, 93)=3.622$; $p=.016$).

Given the fact that all of the target items and the reference items were grammatically perfect, the difference in their ratings seemed to reflect the difference in terms of the processing load: the easier a sentence was to process, the higher it was rated. The reference items that contained a proper noun instead of an anaphor had a higher processing load than the target items, since subjects were given one extra person's name to remember. Similarly, sentences of the TSC-violation condition might have been relatively harder to process, compared with those of the no-violation condition, because they were bi-clausal.

Between-subjects factors

The three-way interaction between Group, Binding condition (no-violation/TSC-violation) and Sentence type (reflexive/proper noun) did not reach significance ($F(2, 112)=.428; p=.653$), indicating that the three groups did not differ in their acceptance of *caki*-binding. The two-way interactions of Group and Binding condition and of Group and Sentence type were not reported significant, either ($F_1(2, 112)=.088; p=.916; F_2(2, 112)=1.590; p=.208$). These results were in accord with the prediction that the attrition groups, especially the L2E group, would not diverge from the monolingual group in accepting TSC-violating anaphors, despite the interference from the L2.

Sociolinguistic factors

In order to further examine whether exposure to L2 English had any impact on core binding of *caki*, the correlations between the L2E speakers' acceptability of TSC-violating *caki* and various sociolinguistic variables were calculated. However, none of the correlations were reported significant, as presented in Table 6.2³. The acceptability of TSC-violating *caki* was plotted against the length of residence and self-rated English proficiency in Figure 6.2 and Figure 6.3, respectively. These figures show that L2E speakers' acceptability of *caki* was irrelevant to their exposure to English.

To summarise the results of the off-line judgement task, there was no evidence that attrited speakers were less accepting of *caki*-binding with TSC-violation than *caki*-binding without the violation, compared with non-attrited speakers. In the

³The table includes only 5 variables out of 15 variables examined (see Table 5.3 for the entire list of variables).

Variables	Acceptability of TSC-violating <i>caki</i>		
	Pearson correlation (r)	Sig. (2-tailed)	N
Age	-.181	.307	34
Age at migration	-.254	.148	34
Length of residence	.050	.779	34
Self-rated L2 proficiency	.162	.360	34
Frequency of L1 use	.068	.701	34

Table 6.2: Correlation between sociolinguistic variables and the L2E speakers' acceptability of TSC-violating *caki*

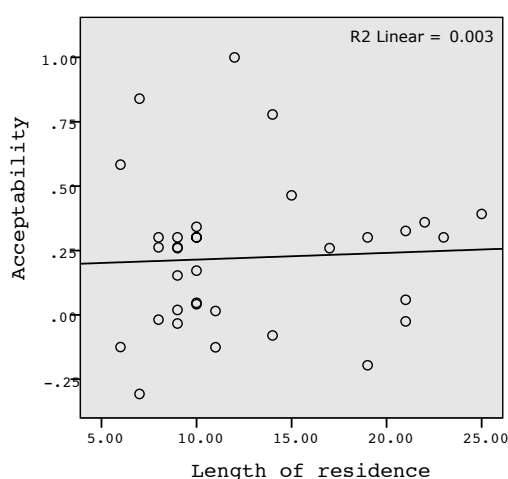


Figure 6.2: The L2E speakers' acceptability of TSC-violating *caki* by length of residence

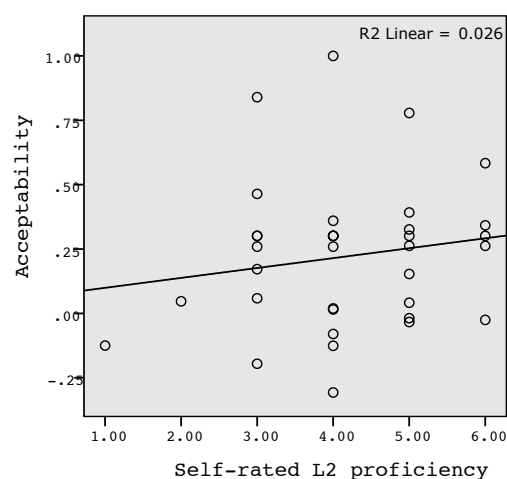


Figure 6.3: The L2E speakers' acceptability of TSC-violating *caki* by L2 proficiency

monolingual group and the L2J group, sentences containing *caki* with TSC-violation received lower acceptability ratings than those containing *caki* without the violation. However, the difference in their acceptabilities seemed to be due to the structural factor that required a different amount of processing load, rather than due to the binding condition. There was no statistically significant difference between the monolingual group and the two attrition groups with respect to the acceptability of TSC-violating *caki*. Despite the crosslinguistic difference between English and Korean in core binding, the L2E speakers' acceptability of TSC-violating *caki* did not correlate with any of the sociolinguistic variables, such as length of residence or English proficiency, suggesting that the degree of their acceptability of *caki* was irrelevant to the amount of their exposure to L2 English.

6.2.6 Results of the on-line task

Results of the on-line task were different from those of the off-line task in that they revealed attrition effect in the bilinguals' on-line processing of *caki* and proper nouns. Both the L2J group and the L2E group diverged from the monolingual group, showing slightly different response patterns. Figure 6.4 and Table 6.3 present the averages of adjusted RTs for the critical region (i.e. the reflexive/proper noun region) by sentence type and group. Note that the RTs for the target items which contained a reflexive had negative values in all groups, indicating that the items were read faster than expected. The RTs for the reference items which contained a proper noun had positive values in contrast, indicating that the items were read more slowly than expected.

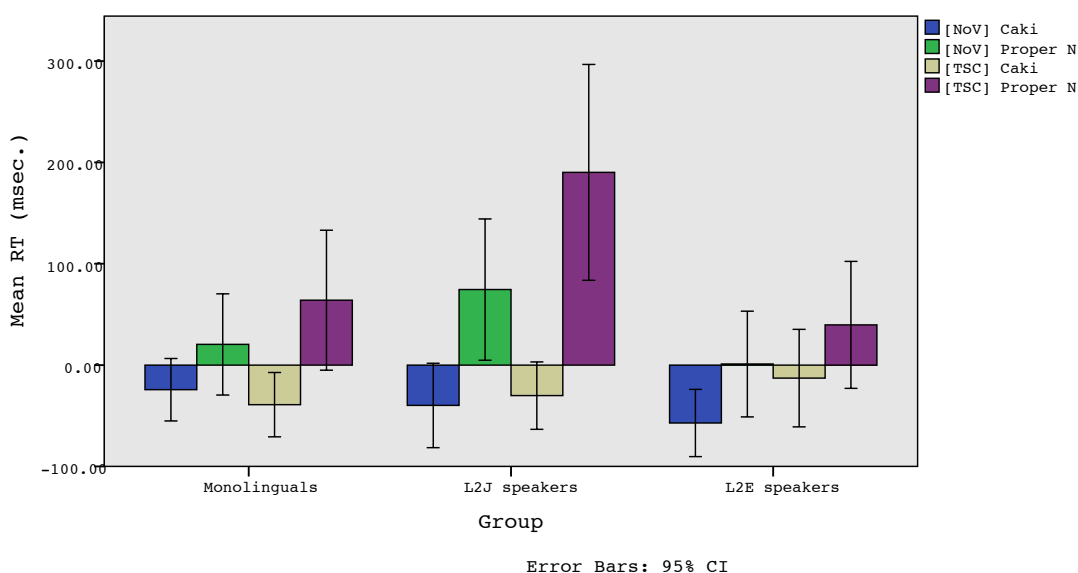


Figure 6.4: Mean residual RT for the reflexive region (Experiment 1)

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
No violation	Caki	-33 (113)	-35 (121)	-63 (98)
	Proper N	25 (170)	88 (211)	16 (149)
TSC-violation	Caki	-35 (121)	-31 (94)	-1 (131)
	Proper N	66 (233)	204 (321)	59 (179)

Table 6.3: Mean residual RT for the reflexive region (Experiment 1)

Within-subjects factors

First, in order to examine whether subjects found *caki* with TSC-violation less acceptable than *caki* without the violation, the RTs for *caki* under the two binding conditions were compared within each group. A paired t-test revealed that the RT for TSC-violating *caki* was significantly larger than the RT for *caki* with no violation of the TSC in the L2E group (paired $t(32)=-2.243$; $p=.032$), unlike in the monolingual group (paired $t(47)=.325$; $p=.747$) and the L2J group (paired $t(33)=-.437$; $p=.665$). This result indicated that the L2E group, different from other groups, spent more time processing TSC-violating *caki* than *caki* without the violation. It was possible that the difference between the RTs for *caki* in the two conditions was largely due to the structural difference between the target items, rather than the difference in the binding condition, since the two-way interaction between Binding condition (no-violation/TSC-violation) and Item type (reflexive/proper noun) was not significant ($F(1, 33)=.009$; $p=.925$). Nevertheless, it was notable that only the L2E group among the three groups showed an increased RT for TSC-violating *caki*, as this result was likely to be L2 influence.

At the post-critical region (i.e. the reflexive/proper noun + 1 region), the three groups' RT again showed slightly different patterns (Figure 6.5). A paired t-test showed that the L2E group' RT for the post-*caki* region was significantly larger in the TSC-violation condition than in the no-violation condition (paired $t(32)=-2.665$; $p=.012$). This result was the same as the result from the critical region which indicated that the L2E group treated *caki* with and without TSC-violation differently in real-time processing. The monolingual group also showed a significant difference in RTs under the two binding conditions at the post-critical region (paired $t(48)=-2.282$; $p=.027$), unlike at the critical region. The L2J group was the only group that showed no difference in RTs at both the critical and post-critical region (paired $t(34)=-1.691$; $p=.100$).

The same as the off-line task, the on-line task revealed a significant effect of the sentence type. In a one-way ANOVA, the effect of the sentence type on RT was significant in the monolingual group ($F(3, 138)=3.783$; $p=.026$) and the L2J group ($F(3, 99)=11.481$; $p=.000$). In all three groups, the RTs were shorter for reflexives than for proper nouns, suggesting that reflexives were easier for readers to process than proper nouns. This confirmed the result of the off-line task which

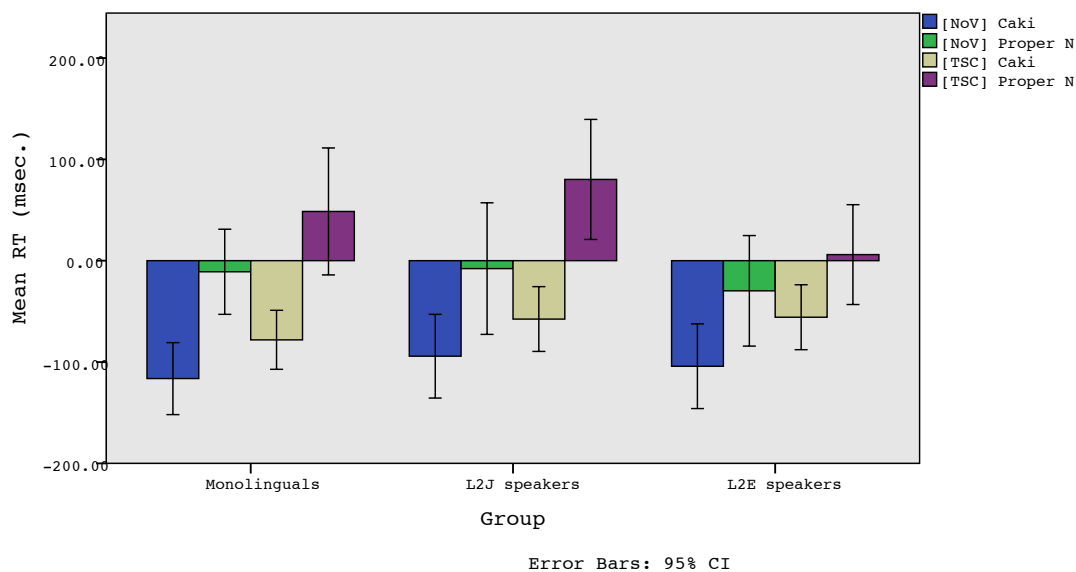


Figure 6.5: Mean residual RT for the post-reflexive region (Experiment 1)

showed that the acceptability of test items varied considerably depending on the ease of processing.

Between-subjects factors

A three-way ANOVA yielded no significant interaction effect between Group, Binding condition (with/without TSC-violation) and Sentence type (reflexive/proper noun) on the RT for both the critical region ($F(2, 108)=.974; p=.381$) and the post-critical region ($F(2, 110)=.617; p=.542$). This result indicated that the three subject groups did not display different patterns of RT overall.

However, there was a significant interaction between Group and Sentence type at the critical region ($F(2, 108)=4.625; p=.012$). A post-hoc Tukey test revealed that the L2J group, unlike the L2E group, had a considerably larger RT for proper nouns, compared with the monolingual group ($p=.029$). This indicated that an additional proper noun that replaced a reflexive increased processing difficulty to a greater extent in the L2J group than in other groups. In other words, the L2J group experienced the most difficulty processing proper nouns among the three groups.

Sociolinguistic factors

In order to examine whether the L2J speakers' large RT for proper nouns had to do with long-term exposure to L2, the correlations between the speakers' RT and various sociolinguistic factors were calculated⁴. Although none of the factors examined were found to be significant, the frequency of L1 use was the most relevant predictor ($r(35)=-.315$; $p=.065$). When the correlation was calculated for the entire attrition group (both the L2J and L2E groups), it reached significance at the .05 level ($r(67)=-.255$; $p=.037$). This result suggested that L2 speakers who used L1 less frequently tended to have more difficulty in processing proper nouns, as shown in Figure 6.6.

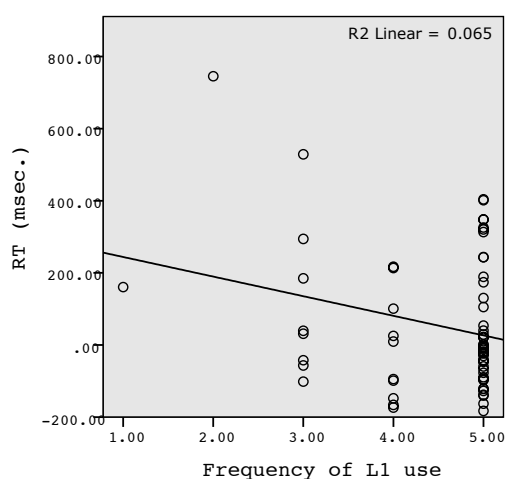


Figure 6.6: The attrited speakers' RT for proper nouns by frequency of L1 use

It was also examined whether the L2E speakers' RT for TSC-violating *caki* was associated with any sociolinguistic factors, as the L2E group showed a significantly larger RT for *caki* with TSC-violation than without the violation. As presented in Table 6.4, however, none of the factors examined were found to be relevant. Figure 6.7 and Figure 6.8 show that the speakers' RT for *caki* was irrelevant to their length of residence in the US and self-rated English proficiency. These results indicated that a larger amount of exposure to English did not necessarily result in a longer processing time of TSC-violating *caki*.

To summarise, the on-line task showed slightly different patterns of RT among the three subject groups at both the critical and the post-critical region. At the

⁴Other multivariate analyses, such as multiple regression, could not be done, since the number of cases (36 subjects) was not sufficient, compared to the number of variables (15 variables).

Variables	RT of TSC-violating <i>caki</i>		
	Pearson correlation (r)	Sig.(2-tailed)	N
Age	.085	.637	33
Age at migration	.223	.213	33
Length of residence	-.131	.468	33
Self-rated L2 proficiency	-.002	.990	33
Frequency of L1 use	-.287	.105	33

Table 6.4: Correlation between sociolinguistic variables and the L2E speakers' RT of TSC-violating *caki*

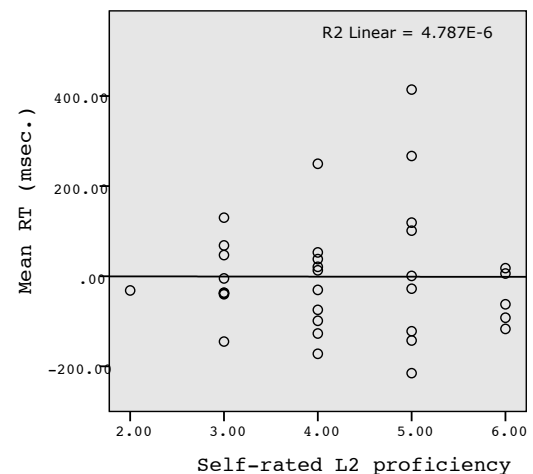
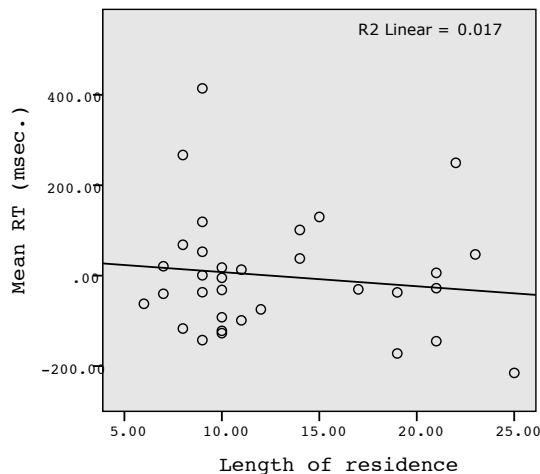


Figure 6.7: The L2E speakers' RT for TSC-violating *caki* by length of residence

Figure 6.8: The L2E speakers' RT for TSC-violating *caki* by L2 proficiency

critical region, the L2E group had a significantly larger RT for *caki* with TSC-violation than for *caki* without the violation, unlike other groups. Also at the post-critical region, the L2E group showed the biggest difference in the RTs for *caki* of the two conditions. These results indicated that the L2E group among all groups was most sensitive to the TSC in the real-time processing of *caki*-binding. Different from the L2E group, the L2J group diverged from the monolingual norm in the reading of proper nouns by showing a considerably larger RT at the critical region. It seemed that the group's inefficiency in the processing of proper nouns was due to their reduced use of L1, given that their RT was in a negative correlation with the frequency of L1 use.

6.2.7 Discussion

Experiment 1 examined whether attrition has an effect on the representation and/or processing of core binding of the reflexive *caki*. The theoretical assump-

tion for the experiment was that there is crosslinguistic variation among the investigated languages with respect to constraints for core binding: the TSC of the Opacity Condition is effective in core binding in English, but not in Korean and Japanese. Despite this difference, the prediction for the experiment was that attrited speakers would not diverge from non-attrited monolinguals in both on-line and off-line tasks, since it was assumed that the felicity of core binding of *caki* is determined by grammar and thus is not vulnerable to attrition.

The results of the experiment were different from the prediction in that the on-line self-paced reading task revealed attrition effect in the processing of *caki*-binding among long-term Korean immigrants. In the reading task, both the L2E group and the L2J group exhibited different patterns of RT from the monolingual group. The L2E group had a significantly larger RT for *caki* with TSC-violation than for *caki* without the violation at both the critical region and the post-critical region, whereas the monolingual group had a larger RT for TSC-violating *caki* only at the post-critical region. The L2J group showed no difference in RTs for *caki* of the two conditions either at the critical or the post-critical region. The L2J group further diverged from other groups in the reading of proper nouns, showing a considerably larger RT at the critical region.

Unlike in the on-line task, the off-line judgement task did not show different response patterns among the three groups. The monolingual group and the L2J group rated *caki* with TSC-violation significantly lower than *caki* with no violation of the TSC. However, this result seemed to be due to the structural difference between the target items (i.e. mono-clausal vs. bi-clausal), rather than due to the difference in the binding condition, since the reference items that were matched to the target items showed a similar difference in acceptability ratings. When the impact of the structural difference between the target items was partialled out in a two-way (Binding condition \times Sentence type) ANOVA, the difference between the acceptabilities of *caki* with and without TSC-violation was no longer significant in either of the monolingual or the L2J groups. This indicated that TSC-violation did not have much impact on the two groups' acceptability of *caki*-binding. The L2E group, whose L2 has different binding properties from the L1, did not show a difference in the acceptability of *caki* with and without

TSC-violation, readily accepting *caki*-binding of both conditions. This result suggested that L2 English did not have an effect on the attriters' representation of constraints for *caki*-binding.

The discrepant results of the off-line and on-line tasks suggested that the bilinguals' temporal processing of *caki*-binding was affected due to prolonged L2 influence whereas the speakers' representation of core binding of *caki* remained intact. In the off-line task, the L2E group did not show sensitivity to TSC-violation, rating *caki* with TSC-violation no lower than *caki* without the violation. In the on-line task, on the other hand, the L2E group spent considerably longer time to process *caki* with TSC-violation than *caki* without the violation, indicating that the group was less accepting of the former than the latter. The increased RT for TSC-violating *caki* might be partly attributable to the structural factor, i.e. the presence of a clausal boundary. A clausal boundary is generally known to require an extra amount of time in on-line processing. Since TSC-violating *caki* was at the boundary of an embedded clause, unlike *caki* without the violation, it was possible that the increased RT was due to the boundary effect. Nevertheless, it was important to note that the L2E group was the only group that showed an increase in RT at the critical region under the TSC-violation condition. Compared with the monolingual group and the L2J group, the L2E group was more sensitive to TSC-violation in the processing of *caki*-binding. Considering that only the L2E group did not treat *caki* with and without TSC-violation differently in the off-line task, it seemed that the group's on-line processing of *caki*-binding became less optimal due to interference from English in which core binding of reflexives is constrained by the TSC.

The on-line results, however, did not provide evidence that the amount of exposure to English was a predictor for the amount of the L2E speakers' divergence from the monolingual norm. None of the sociolinguistic factors examined in this experiment (e.g. length of residence, L2 proficiency, etc.) significantly correlated with the speakers' RT for TSC-violating *caki* (Table 6.4). For example, L2E speakers with longer lengths of residence (more than 10 years) were no slower than those with shorter lengths of residence (less than 10 years) in processing TSC-violating *caki*, indicating that a longer period of exposure to L2 did not result in slower processing of *caki*-binding. Given that the L2E speakers of this

study mostly used L1 on a daily basis, the non-significant effect of length of residence might be due to the speakers' frequent use of L1. A follow-up experiment that includes speakers who use L1 less frequently will be useful for determining whether the amount or length of exposure to L2 is a significant predictor for the processing of *caki*-binding.

In contrast with the L2E group that exhibited the most sensitivity to TSC-violation, the L2J group displayed the least sensitivity to the binding condition, showing no difference in RTs for *caki* with and without TSC-violation either at the critical region or at the post-critical region. This result suggested that the L2J group's on-line processing of *caki*-binding was as efficient as the monolinguals': their L1 processing was not affected under L2 influence because Japanese is similar to Korean in that core binding of reflexives is not constrained by the TSC. Although the L2J group showed no evidence of attrition in the processing of reflexive binding, they did exhibit attrition in the processing of proper nouns. The group had a significantly larger RT for proper nouns at the critical region, compared with the monolingual group. The large RT indicated that the L2J group experienced extra difficulty in processing proper nouns. It seemed that the L2J speakers' processing inefficiency was associated with reduced L1 use, since the frequency of L1 use was in a significant negative correlation with attriters' RT for proper nouns ($p=.037$): L2 speakers who used L1 less frequently were less efficient in the on-line processing of proper nouns, thus they spent a longer time for reading.

Unlike the L2J group, the L2E group did not show a significantly larger RT for proper nouns, compared with the monolingual group. Given the fact the L2E speakers tended to use L1 more than the L2J speakers did (c.f. Table 5.3), it was possible that the contrast between the L2E group and the L2J group in the processing of proper nouns was due to the different amount/frequency of L1 use. However, it was also possible that the contrast between the two L2 groups was partly due to the properties of their L2. Under the TSC-violation condition, the L2J speakers seemed to have expected to encounter a reflexive rather than a proper noun at the critical region, since it is unusual in Japanese (as in Korean) that more than two proper nouns are used in a row. Moreover, Japanese permits a reflexive to be bound across clausal boundaries, the same as in Korean. The L2E speakers, on the other hand, seemed to have had a less clear expectation for

a reflexive under the TSC-violation condition as shown by their large RT for *caki*, because English does not allow a reflexive to appear across clausal boundaries. Therefore, both the L2J group's large RT for proper nouns and the L2E group's large RT for *caki* under the TSC-violation condition may be considered two sides of the same coin, i.e. different consequences of L2 influence.

On the whole, the results of this experiment provided evidence that the on-line processing of core binding of reflexives can be affected by attrition when L1 and L2 has different binding properties. Attrited speakers who were exposed to English for a prolonged period, unlike those who were exposed to Japanese, diverged from their monolingual peers in the on-line processing of *caki*, showing a relatively larger RT for TSC-violating *caki*. The L2E speakers, however, performed like the monolinguals in the off-line judgements of *caki*, suggesting that the representation of constraints for core binding is resistant to attrition. These results build on the findings from a previous study on the attrition of *caki*-binding. Kim et al. (2010), in their experiment using an acceptability judgement task, did not find any signs of attrition among Korean long-term immigrants in the US. Regarding the result, Kim et al. suggested that the following three reasons might be responsible: i) the speakers' frequent L1 use and their maintenance of L1 as the dominant language; ii) the methodological limitation, particularly the small sample size (N=10); and iii) the inherent stability of the grammatical knowledge of core binding. The results of this experiment reduce the likelihood of the first two accounts and present implications for the third account.

First of all, the results suggest that the representation of constraints for core binding is not likely to be affected by attrition, regardless of immigrant speakers' frequency or amount of L1 use. Kim et al. (2010) noted that their informants' knowledge of binding might not have been affected even after a prolonged stay in the US, because most of the speakers had daily contact with other members of the Korean community and as a result, they still kept the L1 as the dominant language. In this study, nearly 90 percent of the L2E group (29 out of 34 speakers) reported that they used L1 every day, similarly to the informants in Kim et al. (2010). Therefore, this study does not provide conclusive evidence that binding constraints remain unaffected when immigrants had little contact with L1. Nonetheless, this study demonstrates that the frequency and amount of L1 use were not significant predictors for the L2E speakers' acceptability ratings of

TSC-violating *caki* ($r(34)=.068$; $p=.701$; $r(34)=-.257$; $p=.142$, respectively). Moreover, this study showed that speakers' dominant language was not a significant factor, either. Although the majority of the L2E group answered that they still felt more comfortable using L1 than L2, over 30 percent of the group (12 out of 34 speakers) answered that they felt equally comfortable in L1 and L2 and had no preference for either language (see Table 5.3). These two groups of speakers with a different language preference, however, did not significantly differ in the acceptability judgement of TSC-violating *caki* ($t(32)=-.583$; $p=.564$), as presented in Figure 6.9. Considering these results, it seems less likely that the absence of attrition effects in Kim et al. (2010) was due to the informants' frequent L1 use or the status of L1 as the dominant language in the speakers' minds.

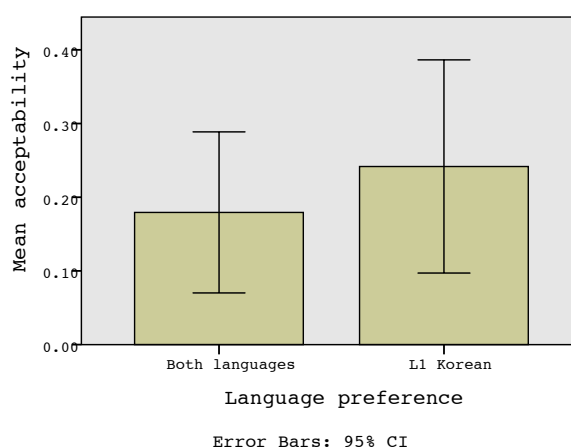


Figure 6.9: The L2E speakers' acceptability of TSC-violating *caki* by language preference

It also seems unlikely that Kim et al. (2010) observed no attrition effect in their judgement task due to methodological limitation, such as the small number of informants or the nature of the task employed, since this experiment tested a larger group of potential attriters ($N=70$) using a different judgement task and still found no evidence of attrition. Then, the last possible explanation for Kim et al.'s (2010) result is that the representation of core binding of *caki* is the type of knowledge that is not prone to attrition, as the authors proposed (Kim et al. 2010, p. 83). The off-line judgement task of this study showed no sign of attrition among long-term immigrants, thus the result provides support for Kim et al.'s proposal. At the same time, however, this study observed that, although constraints for core binding of reflexives remain intact even under prolonged exposure to L2, the on-line processing of the constraints may be affected when L2

has different binding constraints from those of L1. This finding is against the hypothesis of this study that L1 structures that are fully specified by grammar are not affected by attrition.

6.3 Experiment 2: *tul*-marking

6.3.1 *Aims and research questions*

In Chapter 4, I have examined several factors that play an important role in the attachment of the non-obligatory plural suffix *tul*. In Experiment 2, I investigated whether attrition affects the grammatical knowledge and/or processing of the conditions in which *tul* is most felicitous, focusing on three specific factors, i.e. animacy, number-specificity and distributivity. For the purpose of convenience, I first examined the overall results of Experiment 2 and compared the general patterns of *tul*-attachment in the monolingual group and the attrition groups. Then, in the following three sections, I divided Experiment 2 into three parts, Experiments 2a through 2c, and discussed each of the three factors in detail. The research questions addressed in the experiment were as follows:

- Does attrition affect the general preference for *tul* in off-line acceptability judgements and/or in on-line processing?
- If there is any attrition effect on the preference for *tul*, is it due to L2 influence?
- Is attrition effect a function of any extralinguistic factors (e.g. length of residence, age at migration, etc.)?

6.3.2 *Design and materials*

The same as in the previous experiment, Experiment 2 included an off-line acceptability judgement task and an on-line self-paced reading task. These tasks were chosen not only because they have rarely been used for other attrition studies, but also because they were considered particularly suitable for the investigation of the distribution of *tul*. Suh's (2008) experiment on *tul* has shown that the production of *tul* can be difficult to elicit, due to the non-obligatory nature of *tul*, and thus a judgement task can be more effective than a production task for the investigation of *tul*-attachment. This experiment, therefore, used a judgement task

rather than a production task. An on-line reading task was also used because the task was less likely to involve metalinguistic knowledge than judgement tasks⁵ (Marinis 2010) and thus it would allow the investigation of how speakers process *tul* in everyday language use.

The test materials for both on-line and off-line tasks were all constructed in pairs: one sentence containing a bare noun (e.g. *haksayng*, 'student') and the other sentence containing a *tul*-marked noun (e.g. *haksayng-tul*, 'student-PL'). The target items were structured in three different types for the investigation of the three factors in *tul*-attachment (the examples are found in the following three sections). A total of 36 target items plus 27 fillers were used for the on-line and off-line tasks, respectively.

6.3.3 Predictions

A general prediction for Experiment 2 was that attrition would be exhibited in long-term immigrants' off-line acceptability judgements as well as in their on-line processing of *tul*-attachment. This prediction was based on the assumption that the distribution of *tul* is underspecified by grammar and is dependent largely on discourse-pragmatic conditions, hence the distribution is susceptible to attrition.

6.3.4 Data analysis

Raw data from this experiment was treated following the same procedure used in Experiment 1 (refer to 6.2.4). The critical regions examined in the analysis of the on-line data were the NP region for Experiments 2a and 2b and the VP region for Experiment 2c (the critical regions analysed for each experiment are found in the following sections).

6.3.5 Results of the off-line task

Figure 6.10 and Table 6.5 present the mean acceptabilities obtained for all bare nouns and *tul*-marked nouns in Experiment 2. T-tests within each group revealed

⁵The metalinguistic knowledge could be the grammatical knowledge of foreign languages, especially English, since all participants of the experiment learned English as L2 at school.

that all three groups preferred *tul*-nouns over bare nouns in plural contexts. Notably, the preference for *tul*-nouns was highest in the L2E group (paired $t(33)=-4.681$; $p=.000$), relatively lower in the monolingual group (paired $t(48)=-3.505$; $p=.001$) and lowest in the L2J group (paired $t(35)=-2.519$; $p=.017$). The group factor, however, did not reach significance in a repeated-measures ANOVA (Group \times Plural marking: $F(2, 116)=2.143$; $p=.122$), indicating that the difference between the groups was not big enough.

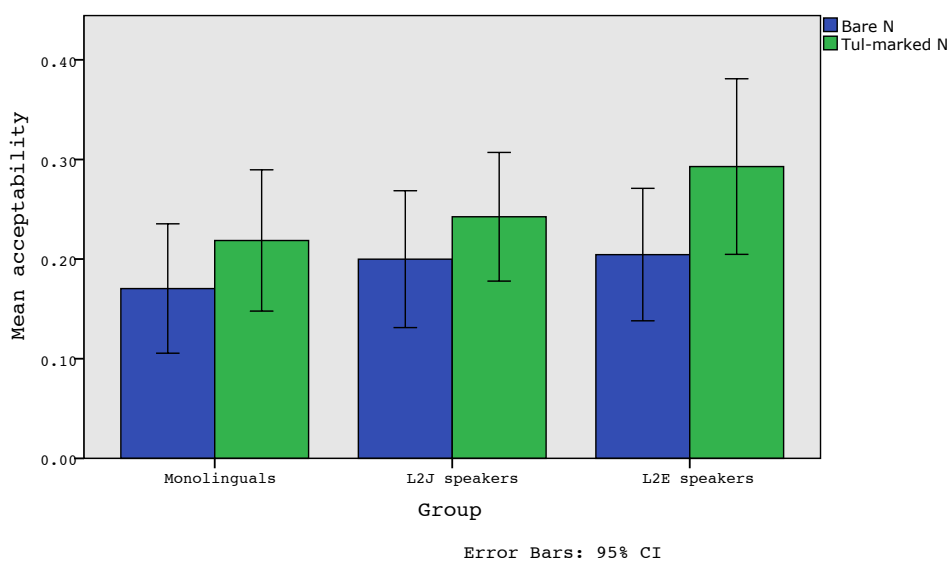


Figure 6.10: Mean acceptability of bare/*tul*-marked nouns (Experiment 2)

	Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
N	.17 (.22)	.20 (.20)	.20 (.19)
N+ <i>tul</i>	.22 (.24)	.24 (.19)	.29 (.25)

Table 6.5: Mean acceptability of bare/*tul*-marked nouns (Experiment 2)

In order to examine whether the degree of preference for *tul*-marking over zero-marking was explained by any extralinguistic factors, such as age and English proficiency, individual speakers' preference for *tul* was first calculated by deducting the mean ratings for bare nouns from the ratings for *tul*-nouns. Then, correlations were measured between the degree of preference for *tul* and various extralinguistic factors. As presented in Table 6.6, age and English proficiency did not show a significant correlation with the preference for *tul*. The level of education, on the other hand, was found to be a significant predictor. Figure 6.11

shows that participants who had postgraduate education tended to have a higher preference for *tul* than those who had undergraduate education only.

Variables	Preference for <i>tul</i>		
	Pearson correlation (<i>r</i>)	Sig. (2-tailed)	N
Age	-.029	.754	119
Self-rated English proficiency	.157	.088	119
Education level	.215	.019*	119

Table 6.6: Correlation between sociolinguistic variables and subjects' overall preference for *tul* in the off-line task

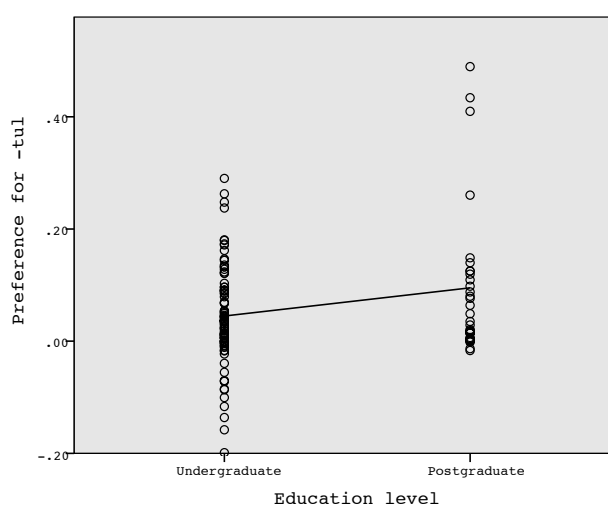


Figure 6.11: The preference for *tul* by level of education

6.3.6 Results of the on-line task

Figure 6.12 and Table 6.7 present the mean RTs for the critical regions under the bare noun condition and the *tul*-noun condition in Experiment 2. T-tests performed within each group revealed that only the monolingual group displayed an overall preference for *tul*-marking: the group showed a significantly smaller RT under the *tul*-noun condition than under the bare noun condition (paired $t(48)=2.619$; $p=.012$). The L2J group and the L2E group, on the other hand, did not show significantly different RTs under the two conditions (L2J group: paired $t(35)=1.392$; $p=.173$; L2E group: paired $t(33)=1.769$; $p=.086$). These results indicated that both of the L2 groups did not have a preference for *tul*-nouns over bare nouns in on-line processing, unlike the monolingual group. However, despite the different results of T-tests within each group, the group effect was not

reported significant in a repeated-measures ANOVA (Group \times Plural marking: $F(2, 116)=.246$; $p=.782$), indicating that the responses of the three groups did not differ considerably.

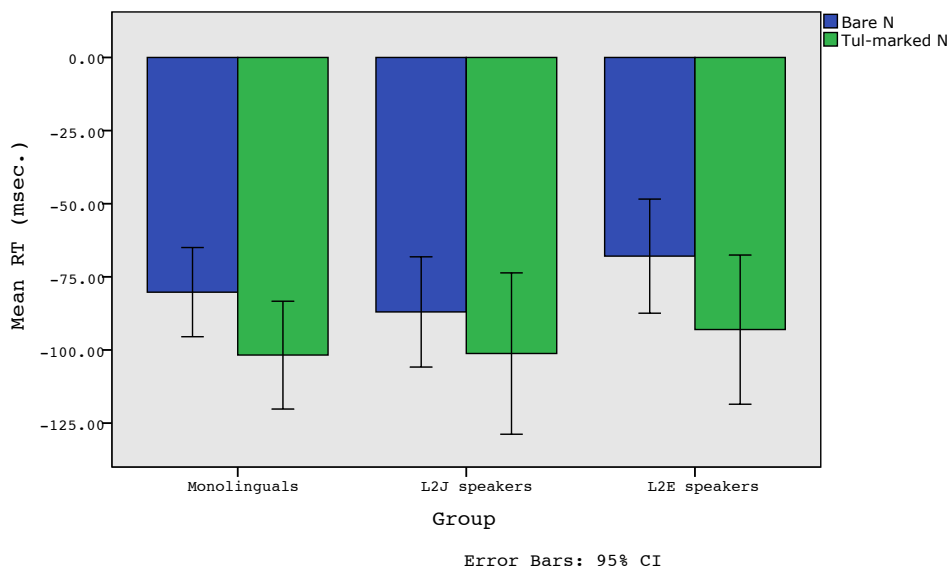


Figure 6.12: Mean residual RT for the noun region (Experiment 2)

	Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
N	-80 (53)	-87 (55)	-68 (55)
N+tul	-102 (64)	-101 (81)	-93 (73)

Table 6.7: Mean residual RT for the noun region (Experiment 2)

The same as in the off-line task, it was examined whether any extralinguistic factors were associated with participants' preference for *tul*-nouns. The individual speakers' preference for *tul* was calculated by subtracting the mean RT in the *tul*-noun condition from the mean RT in the bare noun condition. Since the difference in the RTs indicated how much a speaker found a bare noun in plural contexts surprising or inappropriate in comparison with a *tul*-marked one, a larger difference in the RTs indicated a stronger preference for *tul*. Table 6.8 presents the correlations between subjects' preference for *tul* with three variables: age, English proficiency and level of education. Although none of the three factors significantly correlated with the degree of *tul*-preference, age was in a nearly significant negative correlation ($p=.056$), indicating that younger speakers tended to have a higher preference for *tul* (Figure 6.13).

Variables	Preference for <i>tul</i>		
	Pearson correlation (<i>r</i>)	Sig. (2-tailed)	N
Age	-.176	.056	119
Self-rated English proficiency	.063	.496	119
Education level	-.088	.339	119

Table 6.8: Correlation between sociolinguistic variables and subjects' overall preference for *tul* in the on-line task

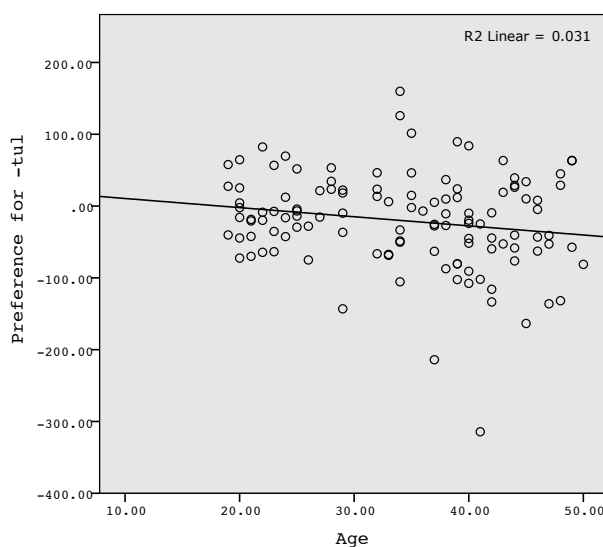


Figure 6.13: Subjects' preference for *tul* by age

In addition to the effect of age in the entire subject group, age at migration negatively correlated with the preference for *tul* within the attrition groups ($r(70) = -.241$; $p = .044$). As presented in Figure 6.14, immigrants who left Korea at a younger age tended to show a higher preference for *tul* than those who migrated at an older age.

6.3.7 Discussion

The aim of Experiment 2 was to investigate the effect of attrition on the grammatical representation and the on-line processing of the plural suffix *tul*. In this section, I analysed the overall patterns of *tul*-attachment in monolingual speakers and attrited bilingual speakers and examined differences between them. The results of both the off-line and on-line tasks revealed non-convergence between the attrited and non-attrited speakers, which may be attributable not only to attrition but also to language change in progress.

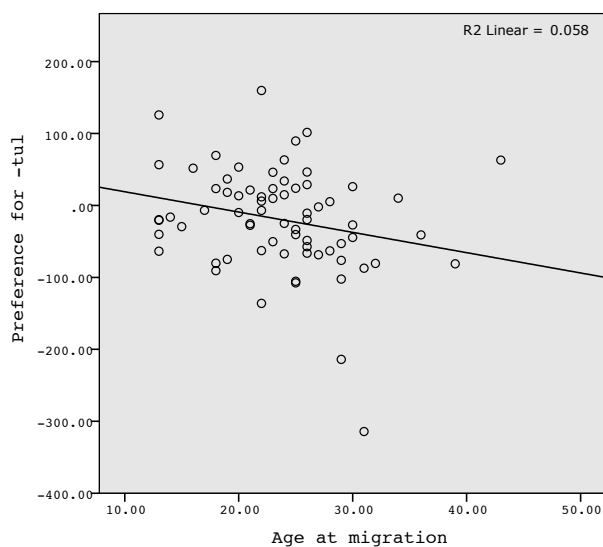


Figure 6.14: Attriters' preference for *tul* by age at migration

Firstly, the off-line judgement task showed an interesting pattern in the responses of the three subject groups. Although all three groups displayed a preference for *tul*-marking over zero-marking by assigning higher ratings to *tul*-marked nouns than to bare nouns in plural contexts, the difference between the ratings of bare nouns and *tul*-nouns in each group, which represents the degree of preference for *tul*-marking, was largest in the L2E group, relatively smaller in the monolingual group, smallest in the L2J group. Given that English has obligatory plural marking unlike Korean and Japanese, it was likely that the L2E group's high preference for *tul* was a consequence of long-term exposure to L2. Similarly, the L2J group's low preference for *tul* might be due to L2 influence as well, since Japanese plural markers (e.g. *-tati*) have more restricted distributions than *tul*. It was also possible that the L2J group's relatively low preference for *tul*, compared with that of the monolingual group, was due to the heightened *tul*-preference among the monolinguals. That is, the tendency for *tul*-attachment became stronger in monolinguals as a result of language change in Korea, but the L2J speakers could not keep up with the change due to limited L1 input.

The correlation analysis within the off-line data did not provide direct evidence for language change in the use of *tul*, as age did not significantly correlated with subjects' overall preference for *tul*. The level of education, however, showed a significant positive correlation with the preference for *tul* ($p=.019$). Considering that higher education generally requires higher level of English proficiency, it

might be suggested that speakers who have had a higher level of education had a larger amount of exposure to English (regardless of their language environment) and, as a result, showed a higher preference for *tul* in the judgement task. This conjecture is supported by the observation of other researchers (Noh 2008, Suh 2008) that the frequency of *tul* is rapidly increasing in the Korean language due to the influence of number marking languages, particularly English.

In the on-line task, unlike in the off-line task, only the monolingual group showed a preference for *tul*. The monolingual group spent a significantly smaller RTs under the *tul*-marking condition than under the zero-marking condition, indicating that they prefer *tul*-marked nouns over bare nouns in plural contexts. Different from the monolingual group, the L2J group did not show a preference for *tul*. The L2E group showed no preference for *tul* either, despite their long-term exposure to English. These results were in contrast with those of the off-line task which revealed a clear preference for *tul* in both L2 groups. The fact that the attrited speakers of both the L2 groups did not show the effect of *tul*-marking suggests that the attriters, regardless of their L2, were inefficient in the on-line processing of appropriate conditions for *tul* and thus could not determine the felicity of *tul* as quickly as the monolinguals did.

Within the on-line data, the level of education was not found to be a relevant factor for subjects' preference for *tul*. Age, however, was in a nearly significant negative correlation with the preference for *tul* ($p=.056$). Also, age at migration within the attrition groups showed a significant negative correlation with the preference for *tul* ($p=.044$), which indicated that L2 speakers who immigrated at a younger age had a higher preference for *tul*. These age effects in the on-line data, along with the significant effect of education in the off-line data, suggested that the use of *tul* in plural contexts is increasing, particularly among highly educated young people.

To summarise the findings of this section, both the monolingual group and the attrition groups had a clear preference for *tul*-marking over zero-marking in the off-line judgements. The L2 groups, however, failed to display the preference in the on-line reading unlike the monolinguals, suggesting that their on-line processing of *tul* was affected by attrition. It was also found that the distribution

of *tul* may be undergoing language change and the change might be responsible for the non-convergence between the monolingual and the bilingual groups. In the next three sections, I re-analyse the results of Experiment 2 focusing on three factors that influence the production/omission of *tul*, i.e. animacy, number-specificity, distributivity, and discuss further the effect of attrition and the ongoing change in the use of *tul*.

6.4 Experiment 2a: Animacy in *tul*-marking

6.4.1 Aims and research questions

Experiment 2a examined the effect of attrition on *tul*-marking with respect to animacy: whether attrited speakers are sensitive to the animacy hierarchy in judging the felicity of *tul*. Although the attachment of the suffix *tul* is generally optional in plural contexts, the preference for *tul* is strongly influenced by animacy of the target noun. While *tul* is required on human nouns, it may be omitted on inanimate nouns⁶. Since the distribution of *tul* regarding animacy is not fully determined by grammar, it is assumed to be a better candidate for attrition than core binding of *caki*. If attrition had an impact on *tul*-attachment, attriters might diverge from monolinguals by displaying less sensitivity to the animacy factor in *tul*-marking. Especially, if the attrition effect was due to interference from L2, the L2E speakers might exhibit a higher preference for *tul* in plural contexts, regardless of the noun type, since plural marking is obligatory in English and is not constrained by animacy, unlike in Korean. The research questions examined in the experiment were as follows:

- Does attrition affect sensitivity to the animacy hierarchy either in the judgments or in the processing of *tul*-attachment?
- If there is any attrition effect on *tul*-attachment, is it a result of L2 transfer?
- If there is attrition, is the amount of attrition a function of any extralinguistic factors (e.g. length of residence, age at migration, etc.)?

⁶See Section 4.3.3 for the discussion of animacy.

6.4.2 Design and materials

The test materials for this experiment were constructed based on the examples from Nemoto (2005). Nemoto showed a difference in the obligatoriness of plural marking on human nouns and on inanimate nouns, using the examples presented in (71). In anaphoric contexts in both Korean and Japanese, where the host noun refers to a specific entity that has been previously mentioned, plural marking may be omitted on inanimate nouns, as shown in (71a), whereas it is obligatory on human nouns, as in (71b)⁷. Since these examples were appropriate for observing the effect of animacy on *tul*-attachment, the test materials of this experiment were constructed in this way: a clause providing the context and an anaphoric target noun followed by a demonstrative.

- (71) a. 'There are three benches outside. The **bench-(PL)** are gifts from my grandmother.'
- b. 'There are three students outside. The **student-*(PL)** are very fat.'
- (Nemoto 2005, p. 396, 399)

The experiment was a 3 (noun type) × 2 (plural marking) design. In order to observe the effect of animacy, three nouns of different types were used: a human noun *ai* (child), an animal noun *tokki* (rabbit) and an inanimate noun *chayk* (book). These nouns were chosen because they were reported to occur relatively frequently with *tul* in a corpus (Kang 2007)⁸. The target nouns, whose reference were plural entities, were presented in two different conditions: the zero-marking (bare) condition and the *tul*-marking condition. The paired items for different conditions were matched as closely as possible in order to avoid the influence of any other factors. However, they were constructed using slightly different vocabulary to reduce the familiarity effect.

The sentences in (72) exemplify the off-line test items that contained a human noun in the zero-marking and *tul*-marking conditions. Each item was composed of two separate clauses that were connected by a conjunction. The target noun in

⁷The glossed examples are found in (43).

⁸According to Kang (2007), *ai* is the second most frequent noun that appears with *tul* in the Sejong Corpus. *Tokki* is also the second in the animal noun category. *Chayk* is the eighth in the inanimate category, but it was chosen for the experiment because other more frequent nouns did not have a reference to a concrete object (e.g. *il* (work), *mwuncey* (problem)).

the second clause, which was followed by the demonstrative *ku*, was intended to refer to the plural entity that was mentioned in the first clause. There were four items for each noun type in two conditions (a total of 12 items) and 9 fillers.

(72) Off-line items: human noun

a. Bare N:

Iwuscip-ey elin nammay-ka salkoiss-nun-tey, ku
 next.door-LOC young brother.sister-NOM live-IN-and the
ai-nun mwuchek yamcenhay-ta.
 child-TOP very quiet-DEC

'A young brother and a sister live next door to me and the child/children are very quiet.'

b. N+tul:

Pan-ey ssangtwung.i hyengjey-ka cenhakwa-ss-nun-tey, ku
 class-LOC twin brother-NOM transfer-PST-IN-and the
ai-tul-un mwuchek yeyuypalu-ta.
 child-PL-TOP very polite-DEC

'A twin brother transferred to our class and the children are very polite.'

As in Experiment 1, the target items for the on-line task were constructed similarly to those of the off-line task. Each item consisted of two sentences, the former providing the context and the latter containing the target noun. After each test item was presented word by word, a short statement about the contents of the item was given to participants to decide whether it was true or false. This was a measure taken to ensure that participants fully process the test items. The examples in (73) are on-line items that were paired with the off-line items in (72).

(73) On-line items: human noun

a. Bare N:

(Context: A few days ago, a young brother and a sister moved next door to me.)

Ku **ai-nun** mwuchek yamcenhay poi-ess-ta.
 the child-TOP very quiet/shy seem-PST-DEC

'The child/children seemed to be very quiet.'

Statement: 'An old couple moved next door to me.' (False)

b. N+*tul*:

(Context: Some time ago, twin brothers transferred to the class next to mine.)

Ku **ai-tul-un** mwuchek hwaltalhay poi-ess-ta.
 the child-PL-TOP very outgoing seem-PST-DEC
 'The children seemed to be very outgoing.'

Statement: 'Twin brothers transferred some time ago.' (True)

6.4.3 Predictions

The prediction was that the monolinguals would show the effect of animacy in both the judgements and processing of *tul*, and that the attrited speakers would display non-monolingual-like performance, since the distribution of *tul* regarding animacy is not fully specified by grammar and thus is assumed to be vulnerable to attrition. If attrited speakers had the intact representation of *tul* and simply had difficulties in on-line processing, their divergence from the monolingual norm would be more clearly exhibited in the on-line task, than in the off-line task. Also, in such a case, the two L2 groups would not show much difference in their performances. On the other hand, if attrited speakers' representation of *tul* was affected, the attriters were likely to exhibit non-monolingual patterns in both the off-line and on-line tasks. Further, if the attrition was due to transfer from L2, the L2E speakers would display more divergence from the monolingual norm than the L2J speakers. More specific predictions for each task were as follows:

Off-line task

- In the off-line acceptability judgement task, the monolingual speakers would display a general preference for *tul*-marked nouns over bare nouns, but their preference for *tul* would reflect the animacy hierarchy. The preference would be highest for a human noun, less high for an animal noun and lowest for an inanimate noun. Therefore, the difference in acceptability ratings between the zero-marked form and *tul*-marked form would be largest for a human noun and smallest for an inanimate noun.
- If attrition affected the mental representation of conditions for *tul*-marking, attrited speakers would diverge from monolinguals in the task. Especially,

if the observed attrition was due to transfer from L2, rather than simplification, the L2E group would show a higher preference for *tul* overall, regardless of animacy of the host nouns.

On-line task

- In the on-line reading task, the monolinguals would display an overall preference for *tul*-nouns over bare nouns, but their preference for *tul* would vary depending on the noun type. The difference in their RTs for bare nouns and *tul*-nouns would be largest for a human noun, smallest for an inanimate noun.
- If attrition affected the judgements and/or processing of *tul*, the attrited speakers would be less sensitive to the animacy factor than the monolinguals. The attriters' RTs would not vary systematically depending on the animacy condition.
- If the observed attrition was due to the difficulties in processing the felicitous conditions for *tul*, the two attrition groups would not display a significant difference: both groups would diverge from the monolingual norm.

6.4.4 *Data analysis*

In the analysis of the on-line data of this experiment, residual RTs were calculated for the NP region which was the manipulated region. The following example shows the critical region for sentences in (73) in bold characters.

- (74) ku / **ai-(tul)-un** / mwuchek...
 the / child-(PL)-TOP / very...
 D / **NP** / AdvP

6.4.5 *Results of the off-line task*

The off-line judgement task demonstrated that the participants in general favoured *tul*-marking over zero-marking in anaphoric plural contexts and that they were sensitive to animacy in *tul*-attachment. Figure 6.15 and Table 6.9 present the mean acceptabilities obtained for the target items by each group. An ANOVA, in which Animacy (human, animal, inanimate) and Plural marking (zero-marking,

tul-marking) served as within-subject factors, and Group (monolingual, L2J, L2E) as a between-subject factor, yielded significant main effects for Animacy ($F(2, 212)=13.080$; $p=.000$) and Plural marking ($F(1, 106)=76.158$; $p=.000$). The ANOVA also revealed a significant two-way interaction between Animacy and Plural marking ($F(2, 212)=6.788$; $p=.002$), which indicated that the subjects' judgements of *tul* varied depending on the animacy of the target nouns. However, the two-way interaction between Plural marking \times Group ($F(2, 106)=2.423$; $p=.094$) did not reach significance, revealing no difference between the subject groups with respect to the general preference for *tul*. The two-way interaction Animacy \times Group and the three-way interaction Animacy \times Plural marking \times Group was not significant, either ($F(4, 212)=.530$; $p=.714$; $F(4, 212)=1.719$; $p=.147$, respectively).

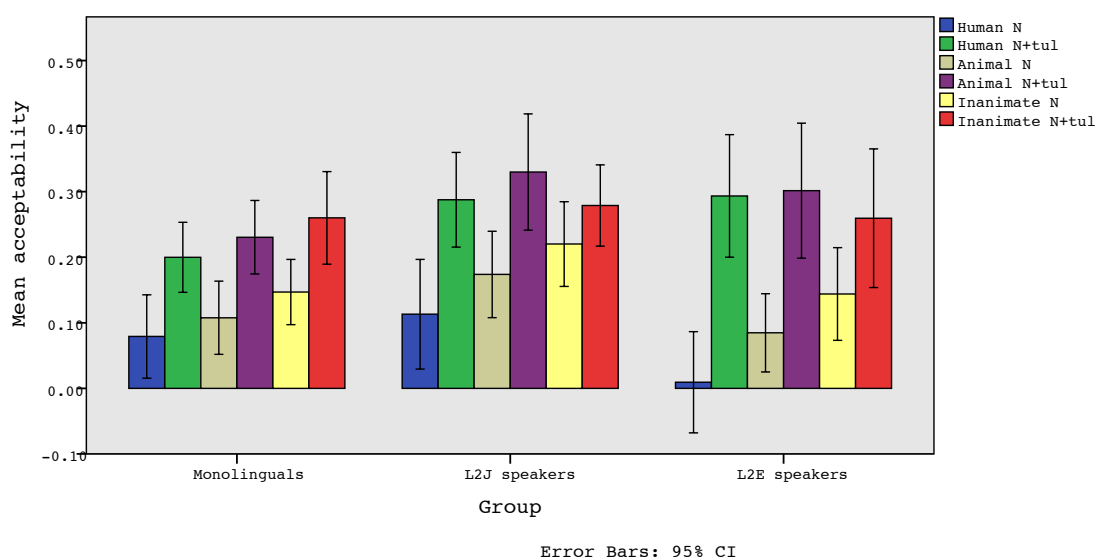


Figure 6.15: Mean acceptability of bare/*tul*-marked nouns (Experiment 2a)

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Human	N	.09 (.29)	.12 (.19)	.17 (.20)
	N+tul	.23 (.22)	.25 (.22)	.28 (.25)
Animal	N	.09 (.27)	.17 (.20)	.22 (.24)
	N+tul	.29 (.27)	.31 (.25)	.26 (.20)
Inanimate	N	.02 (.23)	.08 (.17)	.14 (.20)
	N+tul	.31 (.27)	.32 (.30)	.27 (.30)

Table 6.9: Mean acceptability of bare/*tul*-marked nouns (Experiment 2a)

Within-subjects factors

A series of t-tests within each noun type and group showed that all three groups had a strong preference for *tul*-marking over zero-marking, regardless of animacy. The monolingual group's ratings of the *tul*-marked nouns were significantly higher than those of bare nouns for all noun types (human nouns: paired $t(44)=-3.572$; $p=.001$; animal nouns: paired $t(44)=-4.236$; $p=.000$; inanimate nouns: paired $t(43)=-3.022$; $p=.004$). The attrition groups showed similar patterns to those of the monolinguals: the difference in the ratings of *tul*-nouns and bare nouns was reported significant for nearly all noun types in both the L2J group (human nouns: paired $t(33)=-4.887$; $p=.000$; animal nouns: paired $t(34)=-4.016$; $p=.000$; inanimate nouns: paired $t(34)=-1.785$; $p=.083$) and the L2E group (human nouns: paired $t(33)=-5.194$; $p=.000$; animal nouns: paired $t(33)=-4.794$; $p=.000$; inanimate nouns: paired $t(43)=-2.299$; $p=.028$).

Although the participants showed a general preference for *tul*-marking, their relative preference for *tul* varied systematically depending on the animacy of the target nouns. Two-way ANOVAs within each group revealed that the interaction between Animacy and Plural marking was significant in the L2J group ($F(2, 64)=3.342$; $p=.042$) and in the L2E group ($F(2, 64)=4.630$; $p=.022$). This result indicated that the attrited speakers found it less acceptable to omit *tul* on human nouns than on inanimate nouns. In other words, they were sensitive to animacy when judging the necessity of *tul*-marking.

In the monolingual group, the two-way interaction between Animacy and Plural marking did not reach significance ($F(2, 84)=.035$; $p=.966$). This result was unexpected because the group was predicted to display a higher degree of sensitivity to animacy in *tul*-attachment than the attrition groups. However, the monolinguals' acceptability for zero-marked nouns did show a significant effect of animacy. An one-way ANOVA showed that their acceptability ratings were lowest for bare human nouns and highest for bare inanimate nouns ($F(2, 84)=4.242$; $p=.022$), while their ratings for *tul*-nouns did not vary considerably ($F(2, 90)=2.078$; $p=.139$). This result showed that the monolinguals were also sensitive to animacy, albeit to a smaller degree, in judging the felicity of omitting *tul* in anaphoric contexts.

Between-subjects factors

Although the animacy effect was displayed more clearly in the responses of the attrition groups than in the responses of the monolingual group, the three way interaction of Animacy, Plural marking and Group did not reach significance, suggesting that the groups did not differ considerably in terms of their sensitivity to animacy in *tul*-marking. However, separate ANOVAs within each noun type yielded a significant interaction of Group x Plural marking in the ratings of human nouns ($F(2, 110)=4.285; p=.016$). A post-hoc test showed that the L2E group differed significantly from the monolinguals group ($p=.012$), whereas the L2J group did not ($p=.564$). This group effect indicated that the L2E group was more reluctant to drop *tul* for human plural nouns than other groups. Figure 6.16 presents this difference between the groups.

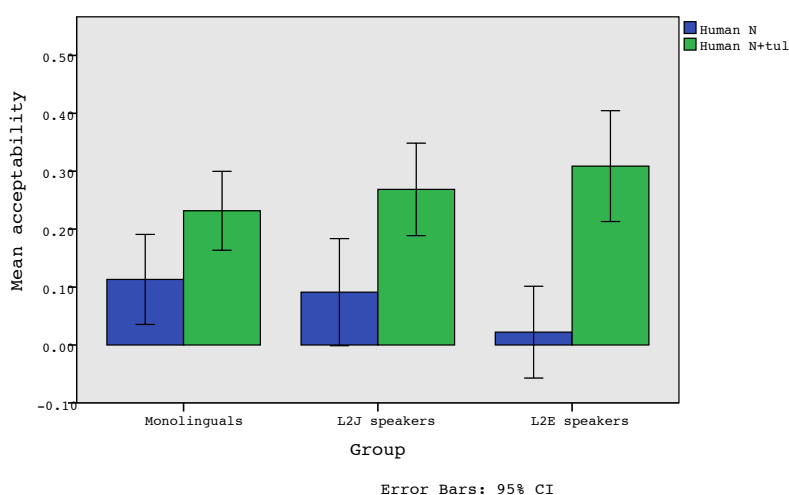


Figure 6.16: Mean acceptability of human nouns by group

The L2E group was not distinguished from other groups in their acceptability of animal nouns or inanimate nouns: the Group x Plural marking interaction was not significant either for animal nouns ($F(2, 111)=2.531; p=.084$) or for inanimate nouns ($F(2, 111)=.504, p=.605$).

Sociolinguistic factors

In order to examine whether the degree of L2E speakers' divergence was explained by any sociolinguistic factors, the relative preference for *tul*-marking for each noun type was calculated, first by deducting the acceptability of bare nouns

from that of *tul*-nouns. Then, the correlation between the values and each extralinguistic factor was measured. The analysis revealed no significant correlations between the factors examined and the L2E speakers' preference for *tul* on human or animal nouns. However, two factors, age and length of residence, appeared to be more relevant with the speakers' preference for *tul* on inanimate nouns than other factors, as presented in Table 6.10.

Variables	Preference for <i>tul</i>		
	Pearson correlation (<i>r</i>)	Sig. (2-tailed)	N
Age	-.301	.089	33
Age at migration	-.111	.537	33
Length of residence	-.327	.063	33
Self-rated L2 proficiency	-.002	.990	33
Frequency of L1 use	-.091	.615	33

Table 6.10: Correlation between sociolinguistic variables and the L2E speakers' preference for *tul* on inanimate nouns

To examine whether age was a predictor for the preference for *tul*, the correlation was calculated for the entire subject group. The analysis revealed a nearly significant negative correlation ($r(110)=-.184, p=.053$). Figure 6.17 presents the speakers' preference for *tul* on inanimate nouns plotted against age, which shows that younger speakers had a stronger preference for *tul* than older speakers. When the entire subjects were grouped into three age groups (under 30, 30-39, over 40), there was a highly significant between-groups effect ($F(2, 112)=7.027, p=.001$). Figure 6.18 illustrates that the acceptability of *tul*-marked inanimate nouns differed in each group, while the acceptability of bare inanimate nouns was invariant across the groups. This age effect seemed to reflect the recent increase in the frequency of *tul* in the Korean language, as discussed in the previous section (6.3.7). Given the fact that the age effect was found only for inanimate nouns, it seemed that the increase in the frequency of *tul* was largely driven by younger speakers' high preference for *tul* on inanimate nouns.

The results of the off-line task can be summarised as follows. Firstly, it was demonstrated that both the monolinguals and attrited speakers preferred *tul*-marking to zero-marking, regardless of animacy, in anaphoric contexts where the target noun refers to a pre-identified plural entity. At the same time, it was also found that the speakers' relative preference for *tul*-marking over zero-marking was strongly influenced by animacy, since all groups showed a higher tendency

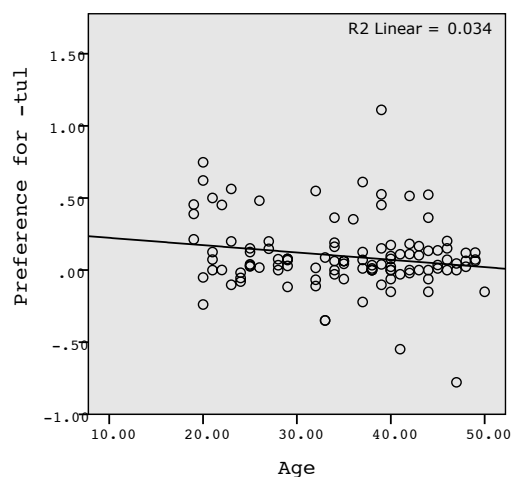
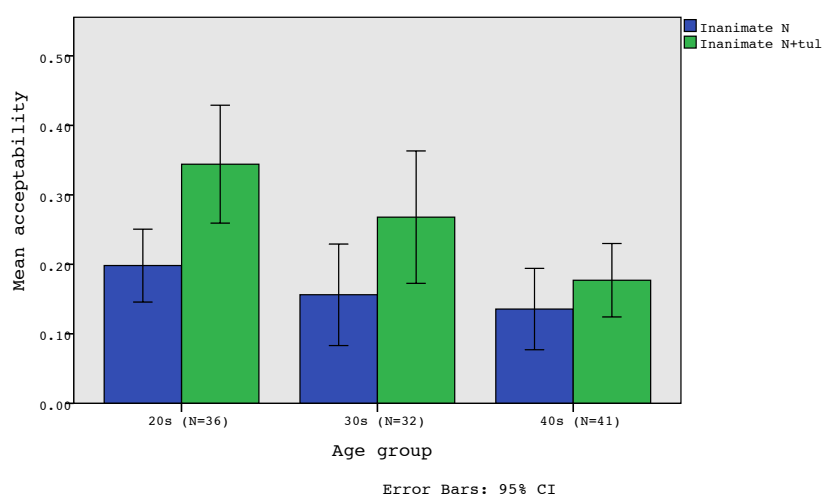
Figure 6.17: The preference for *tul* on inanimate nouns by age

Figure 6.18: Mean acceptability of inanimate nouns by age group

not to drop *tul* for human nouns than for inanimate nouns. Secondly, contrary to the assumption that attrition would affect the sensitivity to animacy in *tul*-attachment, both the L2J and L2E groups displayed sensitivity to the animacy factor in their judgements of the omission of *tul*, even to a greater degree than the monolingual group did. Thirdly, the L2E group was distinguished from other groups for their low acceptability of bare animate (human) nouns, which seemed to be due to the influence of L2. Lastly, a significant age effect was found in the acceptability of inanimate nouns: younger speakers showed a higher acceptability of *tul*-marked inanimate nouns than older speakers, suggesting that there is an ongoing change in the distribution of *tul*.

6.4.6 Results of the on-line task

Overall, the results of the on-line task were less clear than those of the off-line task, and there was a large variance among individuals across all conditions. Figure 6.19 and Table 6.11 present the mean residual RTs for the critical region (i.e. the target noun region) in each condition. The values were negative in all conditions, indicating that the target noun region was read faster than expected, not only when the target nouns were *tul*-marked but also when they were zero-marked. The adjusted RTs were submitted to a three-way ANOVA with the two within-subject factors (Animacy and Plural marking) and one between-subject factor (Group). The analysis revealed significant main effects for Animacy ($F(2, 212)=5.366$; $p=.005$) and Plural marking ($F(1, 106)=8.083$; $p=.005$). However, all possible two-way interactions, Animacy \times Group ($F(4, 212)=.351$; $p=.843$), Plural marking \times Group ($F(2, 106)=.356$; $p=.702$) and Animacy \times Plural marking ($F(2, 212)=.841$; $p=.433$) did not reach significance, nor did the three-way interaction of Animacy \times Plural marking \times Group ($F(4, 212)=.682$; $p=.605$).

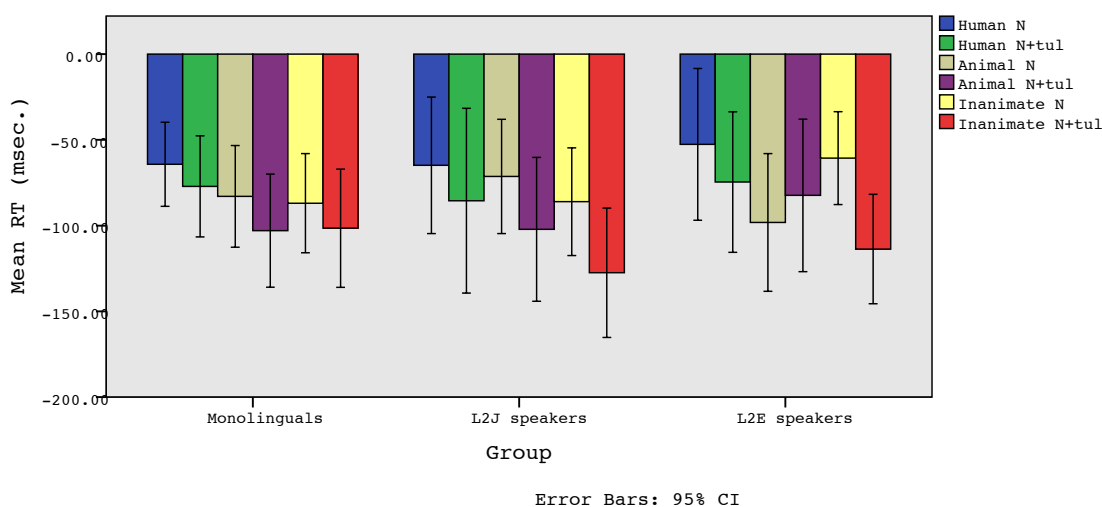


Figure 6.19: Mean residual RT for the noun region (Experiment 2a)

Within-subjects factors

The significant effect of plural marking was further explored within each group. It seemed that all three groups had a preference for *tul*-marking over zero-marking in general, since the average RT for bare nouns was larger than the RT for *tul*-nouns in all groups. However, a series of t-tests showed that the difference between the RTs was not significant in any of the groups (monolinguals: paired

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Human	N	-66 (80)	-66 (111)	-67 (128)
	N+tul	-75 (103)	-88 (150)	-80 (115)
Animal	N	-80 (101)	-72 (94)	-91 (103)
	N+tul	-104 (112)	-104 (119)	-87 (116)
Inanimate	N	-81 (98)	-85 (87)	-50 (88)
	N+tul	-111 (117)	-123 (109)	-119 (86)

Table 6.11: Mean residual RT for the noun region (Experiment 2a)

$t(49)=1.880$; $p=.066$; L2J speakers: paired $t(36)=1.997$; $p=.054$; L2E speakers: paired $t(34)=1.720$; $p=.095$). The preference for *tul* was not clearly visible within each noun type, either. In the monolingual group and the L2J group, the difference in the RTs for bare nouns and *tul*-nouns did not reach significance for any of the noun types. This meant that the presence or absence of *tul* did not have a considerable influence on the two groups' RT. Only in the L2E group, the difference between the RTs for bare and *tul*-nouns was significant for inanimate nouns (paired $t(31)=2.937$, $p=.006$), not for human or animal nouns.

Unlike in the off-line task, the expected effect of animacy was not displayed in any of the groups. Separate two-way ANOVAs for each group revealed that the interaction effect of Animacy and Plural marking was not significant, either in the monolingual group ($F(2, 88)=.033$; $p=.968$) or in the attrition groups (L2J speakers: $F(2, 66)=.176$; $p=.781$; L2E speakers: $F(2, 58)=1.631$; $p=.205$). These non-significant results indicated that the subjects' on-line processing of *tul* was not systematically influenced by animacy of the target nouns.

Between-subjects factors

Both a three-way (Animacy \times Plural Marking \times Group) ANOVA and a two-way (Plural marking \times Group) ANOVA revealed that the monolingual group and the two attrition groups did not differ in terms of their sensitivity to animacy or their overall preference for *tul*. The group effect was further examined in separate two-way (Plural marking \times Group) ANOVAs for each noun type, but the interaction of the variables was not significant either for human nouns ($F(2, 114)=.095$; $p=.910$) or for animal nouns ($F(2, 111)=.768$; $p=.466$). The interaction did not reach

significance for inanimate nouns, either ($F(2, 111)=1.027$; $p=.361$), although the L2E group had a significantly smaller RT for *tul*-marked inanimate nouns than bare ones, different from other groups.

Sociolinguistic factors

Since the L2E group's RTs for bare and *tul*-marked inanimate nouns differed significantly, it was examined whether their preference for *tul* was associated with any sociolinguistic variables. Table 6.12 shows that the degree of the L2E speakers' preference for *tul* (which was calculated by subtracting the mean RT for *tul*-nouns from the mean RT for bare nouns) had a positive correlation with the length of residence and a negative correlation with the amount of L1 input⁹. As shown in Figure 6.20, bilinguals who had a longer length of residence in an L2 setting showed a higher preference for *tul*. Also, as presented in Figure 6.21, bilinguals who received a smaller amount of unattrited input had a higher preference for *tul*. These results were partially in accord with those of the off-line task that showed a marginal correlation between the preference for *tul* on inanimate nouns and the length of residence (see Table 6.10).

Variables	Preference for <i>tul</i>		N
	Pearson correlation (r)	Sig. (2-tailed)	
Age	.142	.437	32
Age at migration	-.123	.502	32
Length of residence	.392	.026*	32
Self-rated L2 proficiency	.085	.642	32
Frequency of L1 use	-.250	.167	32
Amount of L1 input	-.554	.001**	32

Table 6.12: Correlation between sociolinguistic variables and the L2E speakers' preference for *tul* on inanimate nouns

The correlation analysis did not reveal any significant age effects for the monolingual group or the entire subject group. In the off-line task, younger speakers displayed a stronger preference for *tul* on inanimate nouns (refer to Figure 6.17 and Figure 6.18). Such a pattern was not found in the on-line task. Age did not significantly correlate with the preference for *tul* on inanimate nouns ($r(110)=.167$; $p=.076$). Also, there was no difference between the younger and older age groups in terms of the RTs for inanimate nouns ($F(2, 113)=1.027$; $p=.361$).

⁹This input only includes unattrited input obtained through media or through communication with speakers in the home country. See the discussion in Table 5.3.

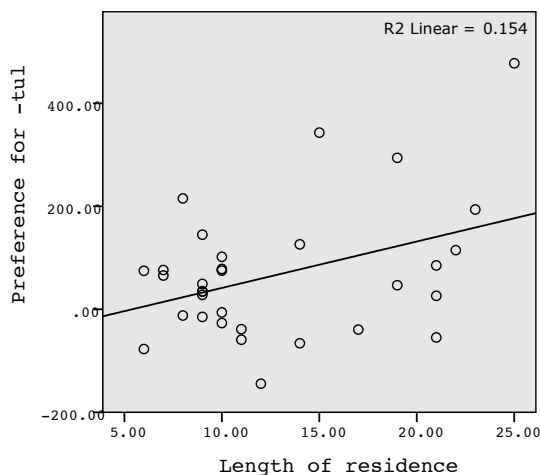


Figure 6.20: The L2E speakers' preference for *tul* by length of residence

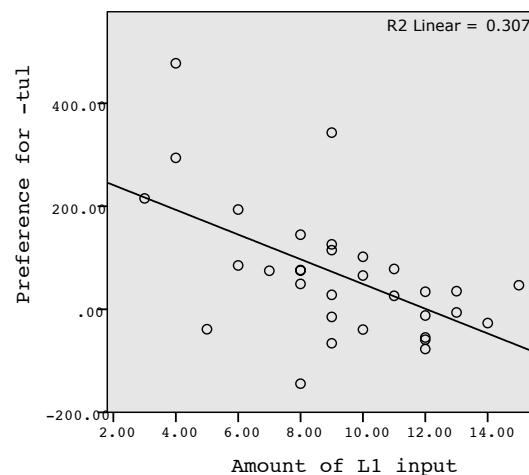


Figure 6.21: The L2E speakers' preference for *tul* by amount of L1 input

In summary, the on-line task showed that the monolingual group and the attrition groups processed *tul*-nouns more quickly than bare nouns in the given anaphoric contexts, since there was a significant effect of *tul*. However, there was no evidence that attrition affected sensitivity to the animacy factor in the processing of *tul*. Since the effect of animacy was not visible in any of the groups' RTs, the difference between the monolingual group and the attrition groups with respect to the sensitivity was not found.

One notable result was that the L2E group was distinguished from other groups in terms of the processing of inanimate nouns. The L2E group, unlike the monolingual group or the L2J group, had a significantly smaller RT for *tul*-marked inanimate nouns than bare ones, showing that they had a stronger *tul*-preference for inanimate nouns than other groups. Their degree of preference for *tul* correlated with two sociolinguistic factors, the length of residence and the amount of L1 input. The correlations suggested that the L2E speakers' strong preference for *tul* was due to their exposure to L2 English and reduced L1 input. Unlike in the off-line task, age effect was not found in the preference for *tul* on inanimate nouns.

6.4.7 Discussion

Experiment 2a investigated whether attrition has an effect on *tul*-attachment regarding the animacy hierarchy, based on the fact that *tul* is more strongly re-

quired on animate (human/animal) nouns than inanimate ones in plural contexts. The prediction was that the monolingual Koreans would show sensitivity to animacy in *tul*-attachment. Also, if attrition affected the grammatical representation and/or processing of *tul*, the bilingual speakers would be less sensitive to animacy than the monolingual controls. The results showed a significant animacy effect in the monolingual group's judgement data, as predicted. However, there was no evidence that the bilingual speakers were less sensitive to animacy either in the off-line or on-line data. In fact, the bilinguals were even more sensitive to animacy than the monolinguals. The bilinguals also showed non-monolingual response patterns which suggested that attrition affected both their acceptability judgements and on-line processing of *tul*.

Firstly, in the off-line acceptability judgement task, the L2E group differed from the monolingual group in that they assigned significantly lower ratings for bare nouns overall. Although the monolingual group and the L2J group both found bare nouns less acceptable than *tul*-marked nouns, their acceptability ratings for bare nouns were not as low as those of the L2E group. Considering that the L2J group's judgements fell within the monolingual range, it seemed that the L2E group's low acceptability for bare nouns was due to crosslinguistic influence from their L2 English, in which plural marking is obligatory regardless of animacy. It was not determined in this task whether the L2E speakers' preference for *tul* (or the reluctance to omit *tul*) was a function of the amount of exposure to L2 or the level of L2 proficiency, since the correlations between the variables were not significant. Still, it was notable that the effect of length of residence approached significance ($p=.063$), as a larger subject pool might show a clearer pattern.

In the on-line reading task, there was also a result that was indicative of attrition among the L2E speakers. Whereas the monolingual group and the L2J group did not display significantly different RTs for bare nouns and *tul*-nouns for any of the noun types, the L2E group showed smaller RTs for *tul*-marked nouns than bare nouns, when the nouns were inanimate. This result was notable because it disagreed with the group's response pattern in the off-line task. In the judgement task, the L2E group showed a strong animacy effect in their acceptability ratings. Thus, their preference for *tul* was relatively lower for inanimate nouns than for other nouns. In the on-line task, on the other hand, the L2E group did not show

an effect of animacy in their RTs. Rather, the group exhibited a preference for *tul* for inanimate nouns only.

It is not clear why the L2E group showed different response patterns in the two tasks. However, considering that the monolingual group and the L2J group did not show reduced RTs for *tul*-marked inanimate nouns, different from the L2E group, one possibility was that the discrepancy in the L2E speakers' on-line and off-line performances was due to the interference from the L2 in the on-line processing of *tul*. The L2E speakers' grammatical knowledge of L2 on number marking and agreement might have interfered the processing of *tul*, and as a result, the processing of semantic properties of the host noun might have become less efficient. This conjecture gained support from the fact that the degree of their preference for *tul*, which was calculated based on the difference between the RTs for bare nouns and for *tul*-nouns, significantly correlated with the length of residence and the amount of L1 input. Speakers who had a longer length of residence and who were exposed to less L1 input tended to show a higher preference for *tul* (Figure 6.20 and 6.21). These results suggested that the L2E speakers' divergent performance in the on-line task was not irrelevant to their exposure to L2.

With respect to the sensitivity to animacy, there was no evidence that the attrition groups behaved differently from the monolingual group. In the off-line judgement task, there was a significant effect of animacy in all groups, which indicated that not only the monolinguals but also the attrited speakers were sensitive to animacy when deciding *tul*-attachment. The result suggested that the attriters' grammatical knowledge of the distributional property of *tul* was not lost or underspecified as a consequence of attrition. In fact, attriters appeared to have become more conscious of the animacy factor, since there was a stronger animacy effect in the attrition groups than in the monolingual group. It might be suggested that the bilingual speakers were imposing the semantic constraint to the omission of *tul* more strictly than the monolinguals, possibly because their metalinguistic awareness had increased as a result of L2 learning. However, it can also be suggested that it was the monolingual group whose judgements of *tul* were changed. The relatively weaker animacy effect in the monolingual group seemed to be due mostly to the group's high preference for *tul* on inanimate nouns. The group showed the highest *tul*-preference on inanimate nouns among

all groups. This seemed to indicate that the use of *tul* on inanimate nouns, nouns that are considered least compatible with *tul*, is on the increase in Korea.

From the on-line reading data, it could not be decided whether the attrited speakers were less sensitive to animacy in the real-time processing of *tul*, since the effect of animacy was not visible in any of the groups' RT. This result was rather surprising considering the strong animacy effect attested in the off-line data. The effect of *tul*-marking in the on-line data was not as strong as in the off-line data either. Whereas there was a highly significant preference for *tul*-nouns over bare nouns in both the monolingual group and the attrition groups in the judgement task ($p < .001$), the difference in the RTs of bare nouns and *tul*-nouns was only at approaching significance. Furthermore, the difference in the RTs was not visible for any of the noun types. The weak effect of *tul*-marking and the non-significant animacy effect in the on-line task might be attributable to methodological limitations. Due to the difficulty in subject recruitment and the time constraint involved, the informants of this study were asked to read a fairly large number of sentences in one session¹⁰. Although the reading task took no longer than 30 minutes to complete for most participants, some speakers might have felt bored and thus have paid less attention while reading the materials, since the task was monotonous (this in fact seems to be one of the reasons for a relatively large interspeaker variation in the on-line data from all experiments). Also, given the fact that the experiment was not conducted in a lab environment, there might have been possible sources of distraction, such as small noises. From the on-line data of this study, it can only be concluded that the effect of animacy on the real-time processing of *tul* may not be as great as it was assumed. Other types of on-line data, such as eye-tracking, will help to further examine the role of animacy in on-line processing of *tul*.

The results of this experiment provided not only the evidence of L2 influence, but also the evidence of language change in progress. In the off-line data, there was a significant effect of age in the preference for *tul* on inanimate nouns: speakers in the younger age group showed a higher preference for *tul* than those in the older speaker group (Figure 6.18). This result demonstrated that there is an increasing tendency for *tul*-marking, particularly on inanimate nouns, and the

¹⁰There were 84 test items which consisted of two sentences each. See 5.2.3 for the discussion of the materials.

language change may be accelerated by attrited Korean speakers living in an English-speaking environment.

6.5 Experiment 2b: Number-specificity in *tul*-marking

6.5.1 Aims and research questions

Experiment 2b investigated the effect of attrition on *tul*-marking with respect to number-specificity: whether attrited speakers' preference for *tul*-marking on a noun varies depending on how precisely the number of the noun is expressed in the context. In Chapter 4, I have discussed that the distribution of *tul* is affected by the type of plurality-indicating expressions. That is, in neutral contexts where the target noun does not have a pre-identified reference, the choice of production or omission of *tul* is made pragmatically, depending on the amount of information carried by other plurality-indicating expressions in the contexts: *tul* appears most frequently with vague plurality-indicators, such as *manun* ('a lot of'), and less frequently with more precise expressions, such as *sene* ('three or four'). *Tul* occurs least frequently with nouns that are modified by numerals, thus some researchers (e.g. Kiaer 2010) claim that *tul* is only marginally acceptable in numeral constructions (e.g. three CL-GEN book-*tul*). Since the distribution of *tul* regarding number-specificity is not specified by grammar and is determined by contextual factors, it is considered vulnerable to attrition under the hypothesis of this thesis. This experiment, therefore, examined attrition effect on the representation and/or processing of *tul* focusing on the following research questions:

- Does attrition affect the distribution of *tul* regarding the number-specificity factor?
- If there is an attrition effect on *tul*-marking, is it due to transfer from L2 or to other reasons (e.g. real-time processing inefficiency)?
- Is the amount of attrition predicted by any sociolinguistic factors?

Along with these questions, one of the major concerns of this experiment was to examine whether unattrited monolinguals display sensitivity to number-specificity in *tul*-marking as predicted. It has been reported in previous research that the use of *tul* with other plural expressions, particularly numerals, is becoming more common in Korean (e.g. Noh 2008, Suh 2008). If there was language change in

the distribution of *tul*, there would be a difference between the monolinguals of different generations with respect to the preference for *tul*.

6.5.2 Design and materials

Similar to Experiment 2a, this experiment had a 3 x 2 design, with three types of items of varying specificity under two different conditions: the zero-marking condition and the *tul*-marking condition. The target items included expressions that indicated plurality with different degrees of specificity, which were: *manun* ('a lot of'), *myut-myeng-uy* ('a few'-CL-GEN) and (*numeral*)-*myeng-uy* ((numeral)-CL-GEN). The adjective *manun* ('a lot of') was considered most vague amongst these expressions, as it gave the largest range of numbers to the noun it modified. On the other hand, numerals were considered most specific, as they expressed the exact number of the noun that they combined with. *Myut* ('a few') provided information more specific than *manun*, but less specific than numerals.

In order to minimize the interference of other factors that influence *tul*-attachment, particularly animacy, all stimuli of this experiment were constructed to include the same human noun *haksayng* ('student'), which was known to appear with *tul* frequently. The target nouns were presented in neutral contexts in which they do not have a reference to a pre-identified set of entities. The following sentences in (75) exemplify the off-line items that contained the 'a few-CL-GEN' construction. As shown in the example, the target items of the zero-marking condition and of the *tul*-marking condition were structurally identical, but included slightly different lexical items. There were two sets of items for each type of plural expression (a total of 12 target items), plus 9 distractors in the off-line task.

(75) Off-line items: a few + N

a. Bare N:

Myut myeng-uy haksayng-i kyonay hakswultayhoy-uy
 a few CL-GEN student-NOM school's conference-GEN
 kihoyk-ey him-ul ssot-ko.iss-ta.
 planning-DAT effort-ACC exert-PROG-DEC

'A few student/students are putting their efforts into planning the conference of the school.'

b. N+*tul*:

Myut myeng-uy haksayng-tul-i kyonay
 a few CL-GEN student-PL-NOM school's
 casenkongyen-uy hongpo-ey nolyek-ul
 benefit.performance-GEN advertising-DAT effort-ACC
 kiwuli-ko.iss-ta.
 exert-PROG-DEC

'A few students are putting their efforts into advertising the benefit performance of the school.'

The target items for the on-line task were matched with those for the off-line task. Each target sentence was presented after a sentence providing the context and was followed by a short statement, which participants had to judge true or false, based on the information provided. The number of the target items was the same as in the off-line task. An example of the on-line items is presented in (76):

(76) On-line items: a few + N

a. Bare N:

(Context: The benefit performance didn't get any attention.)

Myut myeng-uy haksayng-i hongpo-ey
 a few CL-GEN student-NOM advertising-DAT
 cwulyekha-ess-ciman hyokwa-ka ep-ess-ta.
 make.all.effort-PST-but effect-NOM not.exist-PST-DEC

'A few student/students made a lot of effort for advertising but it was not effective.'

Statement: 'The benefit performance was very popular.' (False)

b. N+tul:

(Context: The conference was not popular at all.)

Myut myeng-uy haksayng-tul-i hongpo-ey
 a few CL-GEN student-PL-NOM advertising-DAT
 cwulyekha-ess-ciman soyong-i ep-ess-ta.
 make.all.effort-PST-but effect-NOM not.exist-PST-DEC

'A few students made a lot of effort for advertising but it was no use.'

Statement: 'The conference was not popular at all.' (True)

6.5.3 Predictions

The general predictions were that the monolingual Korean speakers would be sensitive to number-specificity in the acceptability judgements and processing of *tul* and that the attrited speakers would be less sensitive to the number factor than the monolinguals. Also, if the source of the attriters' non-convergence on the monolingual performance was computational rather than representational, the difference between the monolinguals and the attriters would be more visible in the on-line task than in the off-line task.

Off-line task

- In the acceptability judgement task, the monolinguals' preference for *tul*-attachment would vary, depending on the type of plurality indicators. Their preference for *tul*-marking would be higher for nouns modified by a vague expression, and the preference would be lower for nouns modified by a numeral.
- If attrition affected the representation of the conditions for *tul*-marking, attrited speakers' acceptability ratings would not show the effect of number-specificity. Especially, if the attrition was a result of L2 transfer, the L2E group would display a greater degree of divergence from the monolingual norm than the L2J group, as plural marking in English is not constrained by number-specificity.

On-line task

- In the self-paced reading task, the monolinguals' RT would show a significant effect of number-specificity. The monolinguals' preference for *tul* would be higher for nouns occurring with a less precise plurality-indicator.
- If attrition affected the judgements and/or processing of *tul*, the attrited speakers' RT would not show the same effect of number-specificity as the RT of the monolinguals.
- If attrition was due mainly to the difficulties in on-line processing, the two attrition groups would not exhibit a significant difference in their performances, despite the crosslinguistic difference in their L2s: both the groups would diverge from the monolingual range.

6.5.4 Data analysis

The on-line data used for statistical analysis was the residual RT for the manipulated NP region which immediately followed the quantifiers. The following example shows the critical NP region for the sentences in (76) in bold characters.

- (77) Myut / myeng-uy / **haksayng-(tul)-i** / kyonay...
 a few / CL-GEN / student-(PL)-NOM / school...
 QP / NP / NP

6.5.5 Results of the off-line task

Figure 6.22 and Table 6.13 present the mean acceptabilities of bare nouns and *tul*-marked nouns for each modifier condition. The ratings were submitted to a three-way ANOVA, in which Plural expression (*many*, *a few*, numeral) and Plural marking (zero-marking, *tul*-marking) served as within-subjects factors and Group (monolingual, L2J, L2E) served as a between-subject factors. The analysis yielded a significant main effect for Plural expression ($F(2, 212)=50.153$; $p=.000$), but not for Plural marking ($F(1, 106)=.001$; $p=.971$). The interaction between Plural expression and Plural marking was highly significant ($F(2, 212)=9.412$; $p=.000$), indicating that subjects were sensitive to number-specificity when deciding the felicity of *tul*-marking. There was also a significant two-way interaction of Plural marking x Group ($F(2, 106)=3.481$; $p=.034$) and a significant three-way interaction of Plural expression x Plural marking x Group ($F(4, 212)=3.581$; $p=.008$), which indicated that the three groups differed in terms of their preference to *tul* and the sensitivity to number-specificity.

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Many	N	.15 (.21)	.21 (.19)	.19 (.26)
	N+ <i>tul</i>	.13 (.18)	.03 (.28)	.18 (.25)
A few	N	.10 (.18)	.13 (.23)	.21 (.21)
	N+ <i>tul</i>	.15 (.22)	.14 (.15)	.24 (.26)
Numeral	N	.26 (.23)	.21 (.21)	.31 (.29)
	N+ <i>tul</i>	.27 (.23)	.29 (.23)	.38 (.33)

Table 6.13: Mean acceptability of bare/*tul*-marked nouns (Experiment 2b)

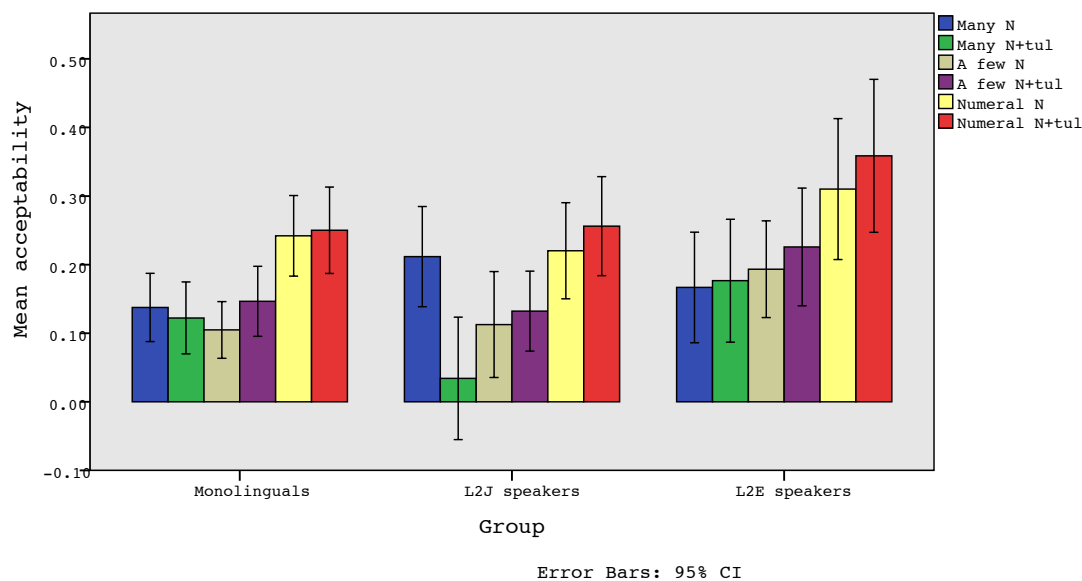


Figure 6.22: Mean acceptability of bare/*tul*-marked nouns (Experiment 2b)

Within-subjects factors

The non-significant effect of *tul* across the conditions indicated that speakers did not consider *tul*-marking obligatory in the given neutral contexts, unlike in the anaphoric contexts used for Experiment 2a. A series of t-tests for each group showed that none of the three groups had an overall preference for *tul*-marked nouns over bare nouns across the conditions: the average acceptability of *tul*-marked nouns was not significantly higher than that of bare nouns either in the monolingual group (paired $t(48)=-.786$; $p=.436$) or in the attrition groups (L2J speakers: paired $t(35)=1.106$; $p=.276$; L2E speakers: paired $t(33)=-1.126$; $p=.268$).

However, there was a difference between the groups as to whether their preference for *tul* was influenced by the type of plural expressions. Separate two-way ANOVAs within each group showed that the Plural expression \times Plural marking interaction was highly significant in the L2J group ($F(2, 60)=13.126$; $p=.000$), but not in the monolingual group ($F(2, 88)=1.635$; $p=.201$) nor in the L2E group ($F(2, 64)=.288$; $p=.696$). This indicated that number-specificity had a significant influence on the preference for *tul* in the L2J group, but not in other groups.

Analyses for each plural expression showed that the monolingual group did not have a preference either for bare nouns or for *tul*-nouns in 'many' contexts and numeral contexts: their acceptability of bare nouns and *tul*-nouns did not differ

significantly in either of the conditions (paired $t(45)=.904$; $p=.371$; paired $t(45)=-.325$; $p=.747$). Only in ‘a few’ contexts did the group rate *tul*-nouns significantly higher than bare nouns (paired $t(45)=-2.415$; $p=.020$). Interestingly, there was a significant difference between the younger age group and the older age group in terms of the preference for *tul* ($F(1, 44)=6.950$; $p=.012$): only the younger monolinguals showed a preference for *tul* in ‘a few’ contexts, indicating that there is language change in progress (Figure 6.23).

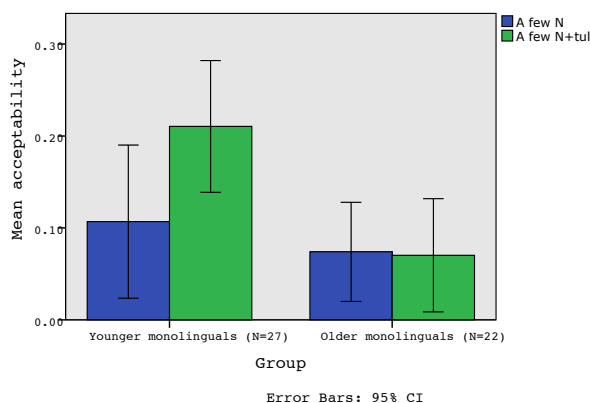


Figure 6.23: The acceptability of bare/*tul*-nouns in ‘a few’ contexts by age group

In the L2J group, the preference for *tul* varied considerably depending on the type of number expressions ($F(2, 60)=13.126$; $p=.000$). However, the group’s responses were in the opposite direction of the prediction. Their acceptability of bare nouns was significantly higher than that of *tul*-nouns in ‘many’ contexts (paired $t(33)=3.535$; $p=.001$), while their acceptability of bare and *tul*-nouns did not differ in ‘a few’ contexts (paired $t(32)=-.650$; $p=.520$) and in numeral contexts (paired $t(34)=-1.796$; $p=.081$). These patterns were different from the prediction that the group would show a stronger preference for *tul* in ‘many’ contexts than in other contexts.

In the L2E group, the preference for *tul* did not vary much across conditions. Their acceptability of bare nouns and *tul*-nouns did not differ considerably in either of the ‘many’ contexts (paired $t(33)=.258$; $p=.798$) or the ‘a few’ contexts (paired $t(33)=-.914$; $p=.368$). In numeral contexts, the difference in their acceptability of bare nouns and *tul*-nouns did not reach significance, either (paired $t(32)=-1.802$; $p=.081$). However, the group’s preference for *tul* in the contexts was at approaching significance, the same as in the L2J group. The analysis for

the entire attrition group revealed that the acceptability of *tul* was significantly higher than that of bare nouns (paired $t(68)=-2.540$; $p=.013$).

Between-subjects factors

There was a significant three-way interaction effect between the type of modifiers, *tul*-marking and group ($F(4, 212)=3.581$; $p=.008$) with a significant two-way interaction effect of *tul*-marking and group ($F(2, 106)=3.481$; $p=.034$), which indicated that the influence of number-specificity on *tul*-marking varied across groups. Within each modifier condition, there was a significant interaction effect of group and *tul*-marking for ‘many’ contexts ($F(2, 113)=4.622$; $p=.012$), indicating that the groups’ preference for *tul* differed significantly in the contexts: the L2J group’s acceptability of *tul*-marked nouns was significantly lower than that of other groups ($F(2, 114)=3.753$; $p=.026$), as presented in (Figure 6.24). In ‘a few’ and numeral contexts, the interaction effect of group and *tul*-marking did not reach significance ($F(2, 112)=.379$; $p=.686$; $F(2, 113)=1.061$; $p=.349$, respectively).

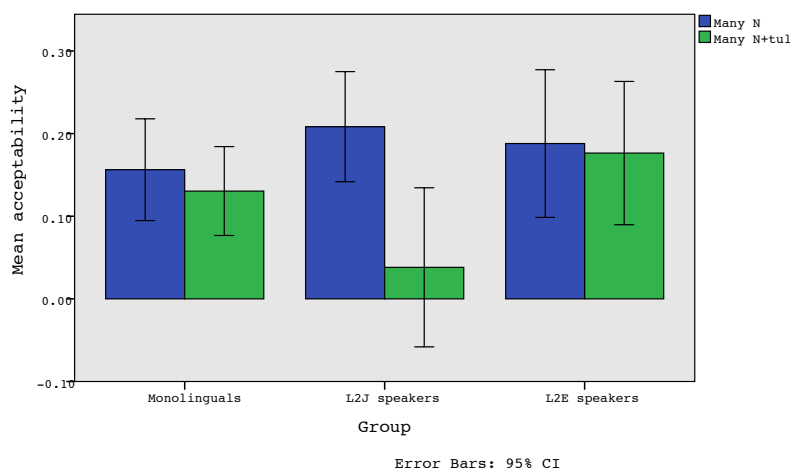


Figure 6.24: Mean acceptability of bare/*tul*-nouns modified by ‘many’

Sociolinguistic factors

Since the L2J group was significantly less accepting of *tul* on nouns in ‘many’ contexts than other groups, it was examined whether their divergence can be explained by any sociolinguistic variables. As in the previous experiment, the relative preference for *tul* was calculated by subtracting the acceptability of bare nouns from that of *tul*-nouns. Table 6.14 presents the correlations between the degree of preference and 6 variables (among 15 variables in total). Only the amount

of L1 use showed a significant negative correlation with the preference for *tul* in the contexts, indicating that speakers who use L1 more tend to have a weaker preference for *tul* (or a stronger preference for zero-marking) (Figure 6.25).

Variables	Preference for <i>tul</i>		N
	Pearson correlation (r)	Sig. (2-tailed)	
Age	.103	.561	34
Age at migration	-.085	.633	34
Length of residence	.204	.248	34
Self-rated L2 proficiency	.040	.821	34
Frequency of L1 use	-.016	.927	34
Amount of L1 use	-.384	.025*	34

Table 6.14: Correlation between sociolinguistic variables and the L2J speakers' preference for *tul* on 'many + N'

It was also examined whether attriters' preference for *tul* can be predicted by any sociolinguistic variables, as the L2J and L2E groups displayed a preference for *tul*-nouns over bare nouns in numeral contexts, different from the monolingual group. The attriters' degree of *tul*-preference significantly correlated with only one of the variables examined: the frequency of L1 use ($r(68)=.245$; $p=.044$). As presented in Figure 6.26, speakers who used L1 more frequently showed a higher preference for *tul* in the contexts.

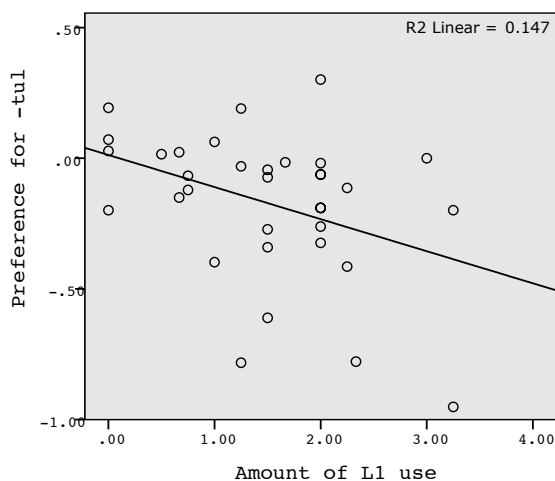


Figure 6.25: The L2J speakers' preference for *tul* on 'many' + N by amount of L1 use

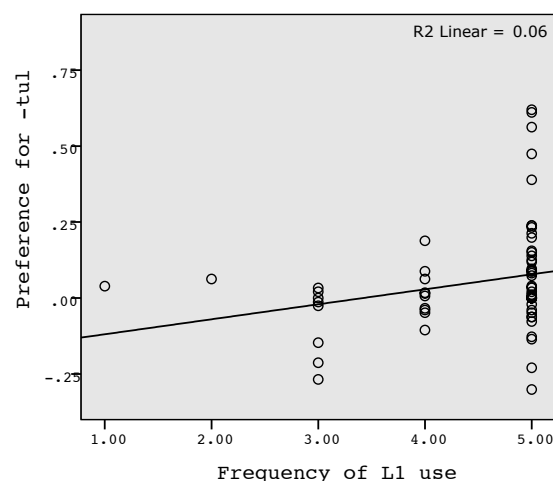


Figure 6.26: The attriters' preference for *tul* on numeral + N by frequency of L1 use

In 'a few' contexts, there was a significant age effect on the preference for *tul* on nouns. As shown in Figure 6.23, younger and older monolingual speakers

showed a significant difference in their preference for *tul*. The correlation between the degree of *tul*-preference and age was nearly significant for the entire subject group ($r(113)=-.183$; $p=.053$), indicating that younger speakers tended to have a higher preference for *tul* (Figure 6.27).

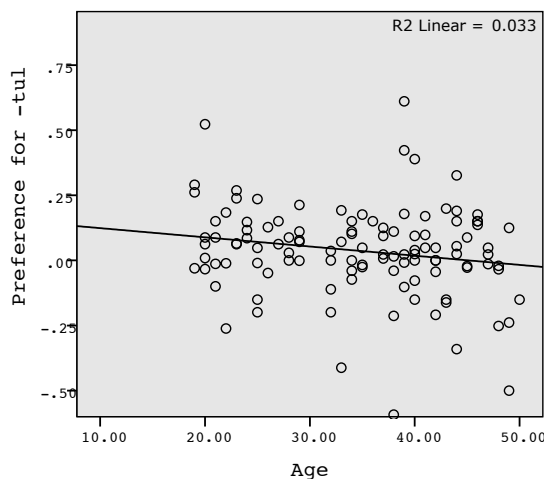


Figure 6.27: The preference for *tul* on ‘a few’ + N by age

To recap the results, it was found in the judgement task that both the monolinguals and attrited bilinguals were influenced by number-specificity of plural expressions when deciding the felicity of *tul*, at least to a certain degree. The L2J group showed a significant Plural expression x Plural marking interaction, and the monolingual and the L2E groups displayed a preference for *tul* only in one type of contexts (‘a few’ contexts and numeral contexts, respectively), not in other contexts. However, the effect of number-specificity was different from the prediction in both the monolingual group and the bilingual groups. Contrary to the prediction that *tul* would be most preferred on nouns followed by ‘many’, the monolinguals did not show a preference for *tul* in the condition. The L2J speakers showed the lowest acceptance of *tul* in ‘many’ contexts and the L2E speakers showed the highest acceptance of *tul* in numeral contexts. It could not be determined whether the attrited speakers were less sensitive to the number factor in *tul*-attachment than the monolinguals, since the monolingual group did not show the effect of number-specificity in the predicted way.

The most notable differences between the monolinguals and the L2 speakers were as follows: firstly, the L2J group showed a significantly higher preference for bare nouns over *tul*-nouns in the ‘many’ condition. The degree of their acceptability of *tul* negatively correlated with the amount of L1 use, indicating that

speakers with a larger amount of L1 use tended to have a weaker preference for *tul*-nouns (or a stronger preference for bare nouns). Secondly, the L2J and L2E groups showed a significant preference for *tul*-nouns over bare nouns in numeral contexts, unlike the monolingual group. The attriters' preference for *tul* in the contexts significantly correlated with the frequency of L1 use, indicating that speakers who used L1 more frequently tended to have a higher *tul*-preference. Both of the observed correlations seemed problematic in that they showed that attriters with more L1 use exhibited greater divergence from the monolingual mean, since the opposite patterns are generally expected. The discussion of these results follows shortly.

The off-line results also showed an age effect, attesting that there is language change in progress. The degree of preference for *tul* on nouns in 'a few' contexts negatively correlated with age, which indicated that younger speakers had a stronger preference for *tul* than older speakers. The effect of age, however, was not visible in other plural contexts (i.e. 'many' and numeral contexts).

6.5.6 Results of the on-line task

The mean residual RT for the target noun region obtained under each condition are presented in Figure 6.28 and Table 6.15. As in Experiment 2a, the adjusted RTs were negative values under all conditions, showing that both bare nouns and *tul*-nouns were read faster than expected. An ANOVA with two within-subjects factors (Plural expression, Plural marking) and one between-subjects factor (Group) yielded a significant main effect for Plural expression ($F(2, 214)=10.905; p=.000$), but a non-significant effect for Plural marking ($F(1, 107)=3.267; p=.073$). The interaction Plural expression x Plural marking did not reach significance ($F(2, 214)=1.124; p=.327$), indicating that the RT for bare or *tul*-nouns was not systematically influenced by the type of plural expressions. The effect of Group was not significant either at all possible combinations with other factors (Plural expression x Group: $F(4, 214)=.225; p=.924$; Plural marking x Group: $F(2, 107)=.325; p=.724$; Plural expression x Plural marking x Group: $F(4, 214)=.732; p=.571$), revealing no difference between the groups.

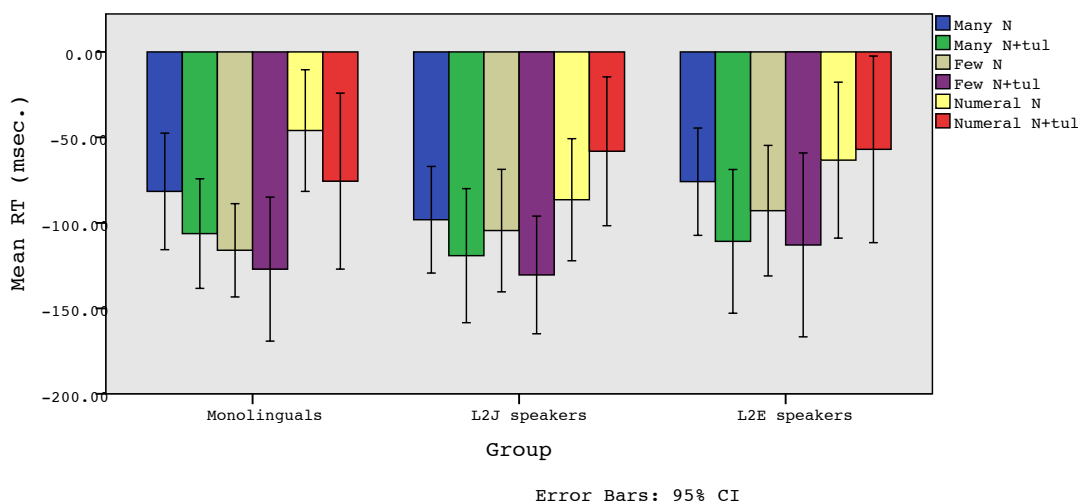


Figure 6.28: Mean residual RT for the noun region (Experiment 2b)

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Many	N	-91 (118)	-109 (95)	-62 (101)
	N+tul	-110 (107)	-116 (111)	-122 (130)
A few	N	-116 (92)	-99 (108)	-91 (104)
	N+tul	-140 (150)	-133 (94)	-109 (148)
Numeral	N	-54 (125)	-94 (101)	-56 (132)
	N+tul	-84 (180)	-75 (143)	-44 (166)

Table 6.15: Mean residual RT for the noun region (Experiment 2b)

Within-subjects factors

Although the Plural expression \times Plural marking interaction was non-significant in the entire subject group, there was a distinction between nouns followed by non-specific plural expressions ('many' and 'a few') and those followed by a specific expression (numeral): separate t-tests for each type of plural expression revealed that the RT obtained for bare nouns was significantly larger than the RT for *tul*-nouns in 'many' and 'a few' contexts (paired $t(116)=2.095$; $p=.038$; paired $t(117)=2.101$; $p=.038$), whereas in numeral contexts, the RTs for bare and *tul*-nouns did not differ (paired $t(112)=.240$; $p=.811$) (Figure 6.29). These results indicated that subjects found *tul*-nouns more appropriate than bare nouns after the plural expressions 'many' and 'a few', but not after numerals.

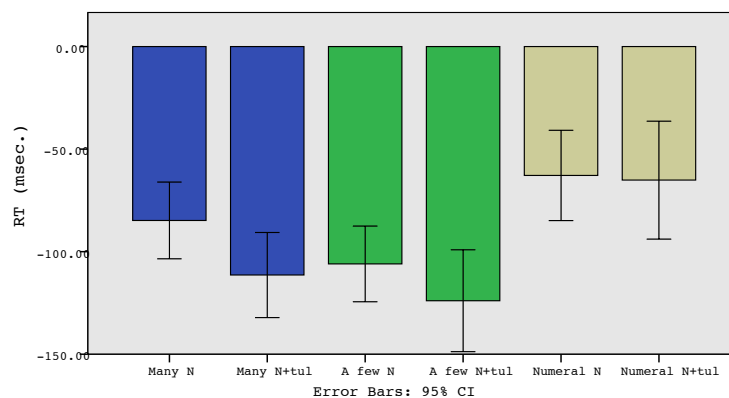


Figure 6.29: Mean residual RT for the noun region by number-specificity and *tul*-marking (Experiment 2b)

Despite the different patterns of RT across the conditions, analyses within each group yielded no significant effect of number-specificity in any of the groups: the interaction between Plural expression and Plural marking did not reach significance either in the monolingual group ($F(2, 90)=.176; p=.818$) or in the attrition groups (L2J speakers: $F(2, 62)=2.448; p=.109$; L2E speakers: $F(2, 62)=.569; p=.545$).

A series of T-tests revealed that the monolingual group did not have a preference for *tul*-nouns over bare nouns in any of the three contexts: their RT for bare nouns and *tul*-nouns did not differ significantly ('many': paired $t(47)=1.134; p=.262$; 'a few': paired $t(48)=1.283; p=.206$; numeral: paired $t(46)=1.079; p=.286$). The L2J group had a significantly smaller RT for *tul*-nouns in 'a few' contexts (paired $t(34)=2.216; p=.041$), but not in other contexts ('many': paired $t(35)=.485; p=.631$; numeral: paired $t(32)=-.791, p=.435$). The L2E group did not have different RTs for bare nouns and *tul*-nouns in all contexts ('many': paired $t(32)=1.772; p=.086$; 'a few': paired $t(33)=.590; p=.559$; numeral: paired $t(32)=-.407, p=.687$).

Between-subjects factors

Although the separate T-tests within contexts yielded slightly different results for each group, the Group \times Plural marking interaction did not reach significance for any of the contexts ('many': $F(2, 114)=.998; p=.372$; 'a few': $F(2, 115)=.241; p=.787$; numeral: $F(2, 110)=1.016; p=.365$), indicating that there was no difference in the three groups' preference for *tul* across all conditions.

Sociolinguistic factors

The same as in the previous experiment, Pearson correlations were computed to examine whether any sociolinguistic factors were associated with the degree of preference for *tul* (the difference in RTs for bare nouns and *tul*-nouns) in any conditions. However, none of the factors examined showed a significant correlation.

In sum, the on-line task demonstrated that the number-specificity of plurality-indicating expressions had an effect on subjects' processing *tul*. The subjects' RT for *tul*-nouns was significantly shorter than their RT for bare nouns when the nouns were modified by less specific plural expressions ('many' and 'a few'), whereas their RT did not vary when the nouns were modified by a numeral. However, the effect of number-specificity was not as clear as it was expected: neither of the monolingual group nor the attrition groups did display a statistically significant effect of specific and less specific plural expressions in *tul*-marking. Since there was no difference between the performance of the groups with respect to the number-specificity factor, it could not be determined whether attrition had an impact on bilinguals' processing of *tul*.

6.5.7 Discussion

Experiment 2b investigated whether *tul*-attachment is influenced by number-specificity of plural expressions and whether attrition affects the distribution of *tul* regarding the pragmatic factor. Based on the corpus data that shows *tul* co-occurs frequently with non-specific number marking expressions (e.g. *many*) and far less frequently with specific numbers (numerals), it was predicted that non-attrited Korean speakers' acceptability and processing of *tul* would be influenced by the type of plural expressions modifying the host noun. Also, since the felicity of *tul*-attachment is underspecified by grammar and thus the distribution of *tul* is assumed to be vulnerable to attrition, it was predicted that attrited speakers would diverge from monolinguals in the acceptability judgement or processing of *tul* with respect to the number-specificity factor.

Results from the experiment were in accord with the prediction only partially: within the monolingual group, the effect of number-specificity was not displayed

as clearly as it was predicted in both the on-line and off-line tasks. The difference between the monolingual and the bilingual groups was visible in the off-line task, but not in the on-line task. Nevertheless, the bilinguals' divergence displayed in the off-line task hinted an effect of attrition on *tul*-attachment.

The off-line data showed a significant effect of number-specificity on the acceptability of *tul* overall, but neither the monolingual group nor the attrition groups displayed the predicted patterns. Firstly in the monolingual group, the effect of number-specificity was non-significant, indicating that the group's preference for *tul* did not vary considerably for different types of plurality indicators. The group did not show a preference either for bare nouns or for *tul*-nouns in 'many' and numeral contexts, although they were expected to show a relatively higher preference for *tul* in the former and a lower preference in the latter. It was particularly surprising that they accepted *tul*-nouns as much as bare nouns in numeral contexts, given that *tul* was pragmatically redundant in the contexts. The group did show a preference for *tul*-nouns in 'a few' contexts; however, the preference was visible only in the younger speaker group. The older speaker group did not show a preference for bare nouns or *tul*-nouns in all of the three contexts, suggesting that the preference for *tul* in 'a few' contexts reflects a recent trend in the Korean language.

Both of the attrition groups behaved differently from the monolingual group in the off-line task. The L2J groups' acceptability ratings showed a highly significant effect of number-specificity ($p < .000$), but their patterns were in the opposite direction from the prediction made based on the corpus data¹¹: the L2J speakers had the lowest preference for *tul*-nouns in 'many' contexts and the highest preference for them in numeral contexts, not vice versa. In the L2E group, the effect of number-specificity was not significant, the same as in the monolingual group. However, the group differed from the monolingual group, in that they had a preference for *tul* in numeral contexts, similarly to the L2J group.

Unlike the off-line data, the on-line data did not show a significant effect of number-specificity in any of the groups, nor differences between the groups. However, in the entire subject group, there was a visible distinction between less

¹¹The corpus data show the highest occurrence of *tul* with 'many' and the lowest occurrence of it with numerals. See Table 4.3.

specific plural expressions and specific ones that indicated the role of number-specificity in *tul*-attachment: in 'many' and 'a few' contexts, the average RT for *tul*-nouns was significantly smaller than the RT for bare nouns, whereas there was no difference between the RTs in numeral contexts. These results were in accord with the prediction, although the effect of number-specificity was not extensive enough to be visible in each subject group. As there was no significant difference between the performance of the monolingual group and the bilingual groups, it could not be determined whether the bilingual speakers were less influenced by the number-specificity factor than the monolinguals in the processing of *tul* as a result of attrition.

The results of the experiment pose a few questions. First, why was the effect of number-specificity not as robust as predicted among the monolinguals in both the on- and off-line tasks? The result was unexpected, given the considerable differences in the frequency of *tul* for different plural indicators in a corpus. A possible explanation can be found in the nature of the production and perception of *tul*. Whereas a corpus provides (written/spoken) production data on the distribution of *tul*, this study presents perception data. It has been previously reported that the usage of *tul* may be greatly affected by the nature of tasks. Suh (2008) has observed that Korean speakers rarely produced *tul* in an elicited production task, while they (particularly, heritage speakers of Korean who were born and raised in an English-speaking environment) showed a high acceptance of *tul* in a judgement task. From Suh's (2008) finding, it may be suggested that Korean speakers are more conscious of pragmatic factors, such as the number-specificity factor, when they decide the production or omission of *tul* than when they simply process the felicity of *tul*. As this study did not include a production task, it did not demonstrate whether the number-specificity factor actually plays an important role in the production of *tul*¹². However, this study showed that the influence of number-specificity might not as strong as it was assumed, at least in the perception of *tul*.

Another possibility for the weak number-specificity effect in the monolingual group is language change in progress. Noh (2008) noted that there is an increasing tendency among Korean speakers to produce *tul* along with plural expres-

¹²In Suh's (2008) experiment, native Korean speakers showed a higher production of *tul* in non-numeral plural contexts than in numeral contexts.

sions for number agreement, possibly due to the effect of English. Therefore, it might be suggested that the influence of number-specificity has reduced as the preference for *tul* in the 'a few' and numeral constructions increases. With respect to the numeral construction, it was not determined whether such a change in *tul*-preference was in progress because there was no significant age effect. With respect to the 'a few' construction, on the other hand, there was a clear difference in the degree of preference for *tul* between the younger monolingual and the older monolingual groups, which was suggestive of a recent language change (Figure 6.23). There was a nearly significant age effect in the entire subject group as well (Figure 6.27), providing further evidence for the language change.

The second question that arises from the results of this experiment is what caused the reversed number-specificity effect in the attrition groups in the off-line task. The first possibility is transfer from the L2 representation on L1. The L2E speakers were more accepting of *tul*-nouns than bare nouns in numeral constructions, while the monolinguals did not show a preference for either of the nouns. This result might indicate that the L2E group's divergence was due to transfer from English. However, this conjecture is questionable considering that the L2J speakers also showed a preference for *tul*-nouns in the same contexts. The Japanese plural suffix *-tati* is known to be not preferred when there is a precise number (Nakanishi & Tomioka 2004), similarly to *tul*, therefore it is unlikely that the L2J group's divergence was due to L2 transfer. Then, the next possibility is that the attriters' divergence was due to the influence of English, under the assumption that the L2J speakers, like the L2E speakers, somehow had more exposure to English than the monolingual Koreans. However, this is also unlikely given that the L2J group and the monolingual group did not differ in terms of English proficiency¹³.

Different from the L2E group, the L2J group diverged from the monolinguals not just in numeral contexts but in 'many' contexts as well, displaying a strong preference for bare nouns over *tul*-nouns. Again, it might be suggested that their divergence was due to the influence of L2 Japanese, because the Japanese plural suffix *-tati* tends to be less productive than *tul* in general, and also because the L2E group did not exhibit a preference for bare nouns in the same contexts. Unfortunately, there is not much data available on the co-occurrence of *tati* and

¹³See Section 5.5 for the information about the attrition groups' English proficiency.

plural expressions, at least to my best knowledge, and thus it is not clear whether the occurrence of *tati* in the 'many' construction in Japanese (*takusan* + N + *tati*) is rarer than that of *tul* in the same construction in Korean. Therefore, it cannot be determined whether the L2J speakers' low acceptability of *tul*-nouns in 'many' contexts resulted from the difference in the frequency of *tul* and *tati*. However, it needs to be considered that the L2J speakers' preference for *tul* in the contexts negatively correlated with the amount of their L1 use. As shown in Figure 6.25, the L2J speakers with high L1 use displayed a lower preference for *tul* (a greater divergence from the monolingual mean). Since high L1 use typically leads to less severe attrition, not vice versa, and high L1 users are relatively less likely to be affected by L2, it is less convincing that transfer from L2 was the direct cause for the L2J speakers' low preference for *tul* in 'many' contexts. Even if L2 influence was responsible for the speakers' non-monolingual judgements in the contexts, it does not seem to be the only source for their divergence, since they showed a higher preference for *tul* than the monolinguals in numeral contexts in which Japanese *-tati* is not preferred.

It might be suggested that the reversed number-specificity effect in the L2J group's judgements was partly due to processing problems. I noted earlier (in Section 5.3) that any non-convergence of attrited speakers in an off-line judgement task cannot always be ascribed to representational underspecification, as the task does not tap directly into subjects' knowledge (nor does any tasks) and it involves language processing like on-line tasks do. In that regard, it is possible that the L2J speakers had difficulty accessing the knowledge of appropriate conditions for *tul* or processing the knowledge in off-line judgements. However, there was no evidence that this was the case, as their on-line processing times did not differ significantly from those of other groups. More on-line data from tasks other than a reading task (e.g. eye-tracking) will give a clearer answer for that matter.

A conclusion that can be drawn from the discussion thus far is that attrited speakers' mental representation of the felicitous conditions for *tul* may not be identical with that of non-attrited speakers. It seems that the attrited speakers' representations of the felicitous conditions for *tul*-marking had become underspecified and thus the attriters had to depend on their knowledge of L2 (in the case of L2E speakers) or impose a new constraint based on whatever metalinguistic knowledge available (in the case of L2J speakers). However, a further study

is needed to identify more clearly the causes for the attriters' divergent judgments of *tul*, especially those of the L2J speakers, and to determine whether the attriters' divergence is ascribable to processing difficulty.

Although the source of the attriters' divergence was unclear, an interesting fact to consider was that the speakers' preference for *tul* in numeral contexts positively correlated with the frequency of L1 use (Figure 6.26). This result indicated that attriters who used L1 more frequently tended to have a higher preference for *tul*. Apparently, the result was puzzling since, if attrition was responsible for the speakers' high preference for *tul*, a reversed pattern would have been found: a higher preference for *tul* (greater divergence from the monolingual norm) among speakers with low L1 use. However, it is important to note that the observed positive correlation might indicate that attriters who have a high preference for *tul* use L1 more frequently. If this is the case, the correlation would mean that there is a connection between attriters' high preference for *tul* and the rapid increase in the use of *tul* in contemporary Korean. That is, attrition causes a change in attriters' preference for *tul* first, and speakers whose L1 is affected facilitate the language change through their frequent contact with other Korean speakers in immigrants societies and in the home country. This conjecture, however, is also questionable given the fact that the L2J speakers with a larger amount of L1 use showed a lower preference for *tul* in 'many' contexts (Figure 6.25). Further research is needed to identify the discrepancy of the observed correlations.

6.6 Experiment 2c: Distributivity in *tul*-marking

6.6.1 Aims and research questions

Experiment 2c investigated how the non-distributive property of predicates influences *tul*-attachment in attrited grammar, as well as in unattrited grammar. As discussed earlier in Chapter 4, there have been different approaches in previous research regarding the function of *tul* and the denotation of *tul*-marked nouns. Some of the theories that I examined were that: i) *tul* is a simple plural marker that is similar to the English -s (e.g. Kim 2005); ii) *tul* is a distributive marker (e.g. Jun 2004, Park 2008); and iii) *tul* is a non-inflectional plural marker that triggers a rigidity effect (Kwon & Zribi-Hertz 2004). These theories take different views as

to whether *tul*-nouns can refer to kinds and whether they can co-occur with kind-level or collective predicates that cannot be applied to individual entities, such as *be rare* and *be a big group*. Under the ‘simple plural marker’ theory, *tul*-nouns are not semantically different from the plural nouns of number-marking languages, thus *tul*-nouns can freely co-occur with kind-level, collective predicates. According to other theories, on the other hand, *tul*-nouns do not have a reference to kinds, unlike bare nouns, and thus are incompatible with kind-level, collective predicates. In Park’s (2008) view, *tul* is associated with distributivity. Therefore, *tul*-NPs cannot be used with collective predicates that do not have distributive sub-entailment, for example, *be a group of four*. In Kwon & Zribi-Hertz’s (2004) claim, *tul* triggers a rigidity effect that individuates ‘sets into atoms’, thus *tul*-NPs can only have an atomised, non-kind reading (p. 145). According to Kwon & Zribi-Hertz’s proposal, therefore, *tul*-nouns are not compatible with kind-level, collective predicates.

One of the reasons for this disagreement on the denotation of *tul*-nouns was that researchers’ judgements on the acceptability of *tul* in non-distributive contexts differed greatly. However, there has been little experimental data available for the research of *tul*. Therefore, in Experiment 2c, I examined whether monolingual Korean speakers accept *tul*-nouns with non-distributive predicates¹⁴ and how the speakers process the felicity of *tul* in real-time. I also examined attrited speakers’ acceptability and processing of *tul*-nouns whether they behave differently from monolinguals. Since the compatibility of *tul* with a certain predicate is underspecified by grammar, bilingual speakers under attrition might experience difficulty in determining felicitous contexts for *tul*. The research questions addressed in the experiment were as follows:

- Do unattrited Korean speakers accept *tul* with non-distributive predicates?
- Does attrition affect the acceptability judgements and/or processing of *tul* in non-distributive contexts?
- If there is attrition, is the amount of attrition predicted by any extralinguistic factors?

¹⁴By ‘non-distributive’ predicates, I mean either kind-level predicates or a certain type of collective predicates that lack distributivity. Note that not all collective predicates are non-distributive: predicates that express actions or activities (e.g. *gather*, *surround*) do not lack distributive sub-entailment (Park 2008, p. 282).

6.6.2 *Design and materials*

The experiment was designed to include two types of items: sentences containing a non-distributive predicate and those containing a predicate that had distributivity. As both types of the sentences were presented in two different conditions (the zero-marking condition and the *tul*-marking condition), the experiment was a 2 x 2 design. Although the target items were constructed using different predicates, all of them contained the same noun *hankuksalam* ('Korean') as the target noun, so that the effect of animacy and other semantic factors would be restricted.

The non-distributive predicates used for the experiment were one kind-level predicate *tumwulta* ('be rare') and one collective predicate *... myeng-ita* ('be a group of ...'), both of which have previously been claimed to be incompatible with *tul*-nouns (Nemoto 2005, Park 2008). Using Kwon & Zribi-Hertz's (2004) term, these predicates force subject NPs to be interpreted *intensionally* as an open, de-atomised set, since they cannot be applied to individual members of a set. Therefore, if *tul* is a distributive marker or if it causes a rigidity effect, as claimed by a group of researchers, *tul*-nouns would not be acceptable with those predicates. Particularly, those predicates were less likely to allow a subkind reading of NPs, compared with others, for instance, *be extinct* or *be invented*. Although the predicate *be extinct* is also a kind-level predicate that disallows a distributive reading, it appears to be compatible with *tul*-NPs when the NPs are interpreted as subkinds, as shown in the example below. As this experiment was intended to test whether the interpretation in (78i) is acceptable, it was important to make the alternative interpretation difficult to obtain for readers. The predicates *be rare* and *be a group of ...* seemed less compatible with a subkind reading than other predicates, hence they were chosen for the experiment.

- (78) Konglyong-**tul**-un myelcongha-ess-ta.
 dinosaur-PL-TOP extinct-PST-DEC
 (i) ?'Dinosaurs are extinct.'
 (ii) 'Various kinds of dinosaurs are extinct.'

The possibility of a subkind reading was further reduced due to the pragmatic property of the noun *hankuksalam* ('Korean'). According to Nomoto (2010), generality of a noun is one of the factors that influence the interpretation of noun phrases: the more general a noun is, the easier a subkind reading for the noun becomes. For example, a subkind reading is more easily obtained for the noun *animal* than for *tiger* (see 4.3.3). Since the noun *Korean* was a relatively specific one, a subkind reading would not be easy to obtain for the NP *Korean-PL*.

The predicates that were used in comparison with the non-distributive ones were *sengsilhata* ('be diligent') and *coahata* ('be fond of ...'). These predicates did not necessarily force an intensional, kind reading of NPs. On the contrary, they seemed to be more compatible with an extensional, atomised reading of NPs, since pragmatically, it is more probable that being diligent or being fond of something is applied to various people of Korea, rather than the entire Korean ethnicity. Therefore, if *tul* indeed triggers a rigidity effect, as Kwon & Zribi-Hertz (2004) claimed, *tul*-nouns would be considered more felicitous as the subject of the two predicates, rather than bare nouns.

A total of 17 items (8 target items in 4 sets and 9 fillers) were used for the off-line judgement task. The target items for each predicate type are exemplified in (79) and (80). In contexts where predicates were non-distributive, the NPs were to be interpreted intensionally ('whoever is Korean'), whereas in other contexts, the NPs were to be interpreted extensionally ('the (various) people of Korea').

(79) Off-line items: Intensional context

a. Bare N:

Dublin-ey-nun **hankuksalam**-i tumwul-ese hankuk.ceypwum-ul
 Dublin-LOC-TOP Korean-NOM rare-so Korean.product-ACC
 cephaki elyep-ta.
 to find difficult-DEC

'Korean/Koreans are rare in Dublin, so it is difficult to find Korean products.'

b. N+*tul*:

Edinburgh-ey-nun **hankuksalam-tul**-i tumwul-ese
 Edinburgh-LOC-TOP Korean-PL-NOM rare-so
 hankuk.sikpwum-ul kuhaki elyep-ta.
 Korean.food-ACC to get difficult-DEC

'Koreans are rare in Edinburgh, so it is difficult to get Korean food.'

(80) Off-line items: Extensional context

a. Bare N:

Stefan-ssi-nun **hankuksalam-i** mwuchek sengsilhata-nun
 S-Mr.-TOP Korean-NOM very diligent-RL
 insang-ul pat-ass-ta-ko malha-ess-ta.
 impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Mr. Stefan said that he had the impression that Korean/Koreans are very diligent.'

b. N+tul:

Linda-ssi-nun **hankuksalam-tul-i** mwuchek sengsilhata-nun
 L-Ms.-TOP Korean-PL-NOM very diligent-RL
 nukkim-ul pat-ass-ta-ko malha-ess-ta.
 impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Ms. Linda said that she had the impression that Koreans are very diligent.'

The same number of target items as in the off-line task were used for the on-line task. The target items for the on-line task were paired with those for the off-line task, using the same noun and predicates. Examples of the target items are presented below:

(81) On-line items: Intensional context

a. Bare N:

(Context: Edinburgh is a popular destination for travelling in the UK.)

Kulena talun tosi-ey.pihay **hankuksalam-i** tumwul-ese
 but other city-compared.with Korean-NOM rare-so
 hankwuk.siktang-ul chacapoki elyep-ta.
 Korean.restaurant-ACC to find difficult-DEC

'But compared with other cities Korean/Koreans are rare there, so it is difficult to find Korean restaurants.

Statement: 'Edinburgh is a popular destination for travelling.' (True)

b. N+tul:

(Context: Dublin is a good place to study the English language.)

Kulena talun ciyek-ey.pihay **hankuksalam-tul-i** tumwul-ese
 but other area-compared.with Korean-PL-NOM rare-so
 hankwuk.ceypwum-ul kwuhaki elyep-ta.
 Korean.product-ACC to buy difficult-DEC

'But compared with other areas Koreans are rare there, so it is difficult to buy Korean products.'

Statement: 'Korean products are common in Dublin.' (False)

(82) On-line items: Extensional context

a. Bare N:

(Context: Mr. Howard briefly talked in his interview about what he felt while travelling.)

Ku-nun **hankuksalam-i** mwuchek chincelhata-nun
 he-TOP Korean-NOM very kind-RL
 nukkim-ul pat-ass-ta-ko ha-ess-ta.
 impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Mr. Howard said that he had the impression that Korean/Koreans are very kind.'

Statement: 'Mr. Howard has never travelled to Korea.' (False)

b. N+tul:

(Context: Mr. Matthew briefly expressed his feelings about his visit to Korea at an interview.)

Ku-nun **hankuksalam-tul-i** mwuchek chincelhata-nun
 he-TOP Korean-PL-NOM very kind-RL
 insang-ul pat-ass-ta-ko ha-n-ta.
 impression-ACC receive-PST-DEC-COMP say-IN-DEC

'He says that he had an impression that Koreans are very kind.'

Statement: 'Mr. Matthew talked about his impression of Korea.' (True)

6.6.3 Predictions

The main prediction was that the unattrited Korean speakers would display a different preference for bare nouns and *tul*-nouns, depending on the type of predicates. If *tul*-nouns are not compatible with non-distributive predicates, as claimed by several researchers, the monolingual speakers would prefer bare nouns to *tul*-nouns in non-distributive, intensional contexts. In extensional contexts, on the other hand, the speakers would not display such a preference.

Rather, they would show a preference for *tul*-nouns, if *tul* has a rigidity effect, as Kwon & Zribi-Hertz (2004) proposed. The attrited speakers were predicted to show less sensitivity to the predicate type in *tul*-attachment than the monolinguals, if they had difficulty in determining appropriate conditions for *tul* due to attrition effect.

Off-line task

- In the off-line task, the monolinguals' acceptability ratings of *tul*-nouns would differ in the two types of contexts: the monolinguals would rate bare nouns higher than *tul*-nouns in intensional contexts and rate *tul*-nouns higher in extensional contexts.
- If attrition affected the representation of *tul*, the attrited speakers' acceptability ratings would diverge from those of the monolinguals. Also, if the attrition effect was due to transfer from L2, the L2E speakers would show a higher preference for *tul*-nouns overall, compared with the L2J speakers.

On-line task

- In the on-line task, the monolinguals' RT for the VP region would vary, depending on the type of contexts and the condition of nouns: in intensional contexts, the RT would be smaller for the bare noun condition than for the *tul*-noun condition. In extensional contexts, on the other hand, the RT would be smaller for the *tul*-noun condition.
- If attrition affected the judgement and/or processing of *tul*, the attrited speakers would diverge from the monolinguals in *tul*-attachment, not showing the effect of contexts in *tul*-attachment. Especially, if the attriters' divergence was due to on-line processing difficulties, both attrition groups' RT would show different patterns from that of the monolingual group.

6.6.4 *Data analysis*

For the analysis of the on-line data of this experiment, residual RTs were calculated for the VP region that immediately followed the NP region. This was because the felicity of *tul* was determined at the VP region, depending on whether the predicate was biased for an intensional reading or an extensional reading.

An example below shows the critical region (i.e. the VP region) of the sentences in (81) in bold characters.

- (83) hankuksalam-(*tul*)-i / **tumwul-ese** ...
 Korean-(PL)-NOM / rare-so ...
 NP / **VP**

6.6.5 Results of the off-line task

The acceptability ratings obtained in the off-line task were submitted to three-way ANOVA in which Context (intensional context, extensional context) and Plural marking (zero-marking, *tul*-marking) served as within-subjects factors and Group as a between-subjects factor. The analysis revealed a significant main effect for Context ($F(1, 110)=9.958$; $p=.002$) but a non-significant effect for Plural marking ($F(1, 110)=2.260$; $p=.136$) which shows that subjects overall did not have a preference for either *tul*-nouns or bare nouns. The two-way interaction of Context and Plural marking was not significant ($F(1, 110)=.026$; $p=.873$), indicating that the acceptability of bare and *tul*-nouns did not differ significantly in the two kinds of contexts, unlike the prediction. The three-way interaction of Context, Plural marking and Group was not significant, either ($F(2, 110)=2.996$; $p=.054$). Figure 6.30 and Table 6.16 present the mean acceptability of target items by group.

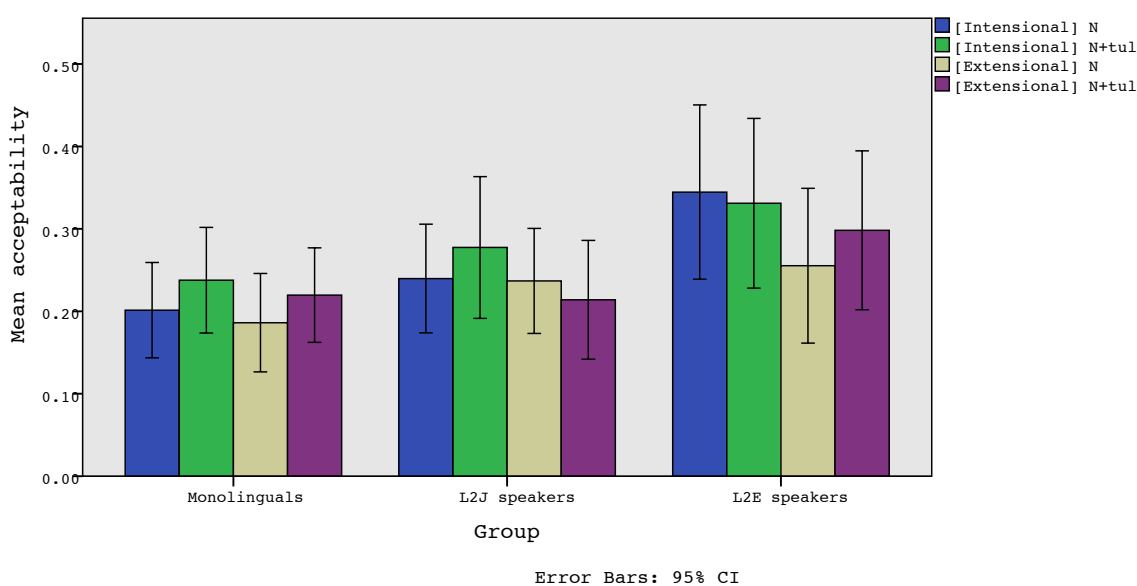


Figure 6.30: Mean acceptability of bare/*tul*-marked nouns (Experiment 2c)

Condition		Monolinguals	L2J speakers	L2E speakers
		(N=49)	(N=36)	(N=34)
		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Intensional	N	.20 (.17)	.24 (.19)	.32 (.28)
	N+tul	.24 (.25)	.29 (.26)	.33 (.29)
Extensional	N	.20 (.23)	.26 (.22)	.26 (.27)
	N+tul	.22 (.19)	.22 (.21)	.30 (.28)

Table 6.16: Mean acceptability of bare/*tul*-marked nouns (Experiment 2c)*Within-subjects factors*

Separate two-way ANOVAs were conducted to examine the interaction of Context and Plural marking within each group. However, the interaction did not reach significance either in the monolingual group ($F(1, 44)=.281$; $p=.599$) or in the attrition groups (L2J group: $F(1, 34)=2.157$; $p=.151$; L2E group: $F(1, 32)=2.468$; $p=.126$). This result shows that the acceptability of *tul*-nouns was not significantly influenced by the type of context in any of the groups.

T-tests within each context type revealed that the monolingual group's response patterns were different from the prediction: they did not show a preference for *tul*-nouns in either of the intensional contexts (paired $t(46)=-1.843$; $p=.072$) or the extensional contexts (paired $t(45)=-1.239$; $p=.222$). In the attrition groups, subjects' acceptability ratings did not vary much across conditions, the same as in the monolingual group. The L2J group's ratings for *tul*-nouns were not significantly different from those for bare nouns either in the intensional contexts (paired $t(34)=-.972$; $p=.338$) or in the extensional contexts (paired $t(35)=-1.334$; $p=.191$). Also in the L2E group, the ratings for bare nouns and *tul*-nouns did not differ in both contexts (intensional: paired $t(32)=.523$, $p=.605$; extensional: paired $t(33)=-1.779$, $p=.084$).

Between-subjects factors

As the three-way interaction of Context, Plural marking and Group approached significance ($p=.054$), the interaction was further explored in separate two-way (Plural marking \times Group) ANOVAs for each context. The analyses revealed a non-significant interaction of the variables in intensional contexts ($F(2, 111)=1.057$, $p=.351$), indicating that the monolingual group and the attrition groups did not

differ in terms of the preference for *tul* in the context. In extensional contexts, the Plural marking \times Group interaction showed a smaller p-value ($F(2, 113)=2.509$, $p=.086$). However, a post-hoc test revealed that neither the L2J group nor the L2E group significantly diverged from the monolingual group ($p=.721$; $p=.274$, respectively).

Sociolinguistic factors

To examine whether the preference for *tul* in each type of context can be predicted by extralinguistic variables, such as age or length of residence, correlations were calculated between the degree of *tul*-preference (which was obtained by subtracting the acceptability ratings of bare nouns from those of *tul*-nouns) and each sociolinguistic variable. However, none of the correlations reached significance. There was no effect of age that indicated ongoing language change, either.

To summarise, the results from the judgement task did not provide support for the prediction that unattrited Korean speakers' acceptability of *tul* would differ in intensional and extensional contexts: in the monolingual group, the effect of predicate type on the acceptability of *tul*-nouns was not significant, different from the prediction. The off-line results did not provide clear evidence for attrition, either: despite the nearly significant effect of Group, the difference between the attrition groups and the monolingual group did not reach significance in either of the intensional or extensional contexts, suggesting that attrition did not have a significant impact on the acceptability of bare nouns and *tul*-nouns in the contexts.

6.6.6 *Results of the on-line task*

Adjusted RTs for the VP region are presented in Figure 6.31 and Table 6.17. The RTs were submitted to a three-way ANOVA which included two within-subjects factors, Context (intensional, extensional) and Plural marking (zero-marking, *tul*-marking), and one between-subjects factor, Group. The analysis revealed a significant effect for Context ($F(1, 109)=6.180$, $p=.014$) but a non-significant effect for

Plural marking ($F(1, 109)=.701$; $p=.404$) and a non-significant interaction of Context x Plural marking ($F(1, 109)=1.382$, $p=.242$). These results indicated that subjects' RT for bare nouns and *tul*-nouns did not differ significantly in the two different contexts. The Group effect was not significant at all possible interactions with other factors (Group x Context: $F(2, 109)=.030$; $p=.970$; Group x Plural marking: $F(2, 109)=.114$; $p=.892$; Group x Context x Plural marking: $F(2, 109)=1.740$; $p=.180$), revealing no difference in the performances of the three groups.

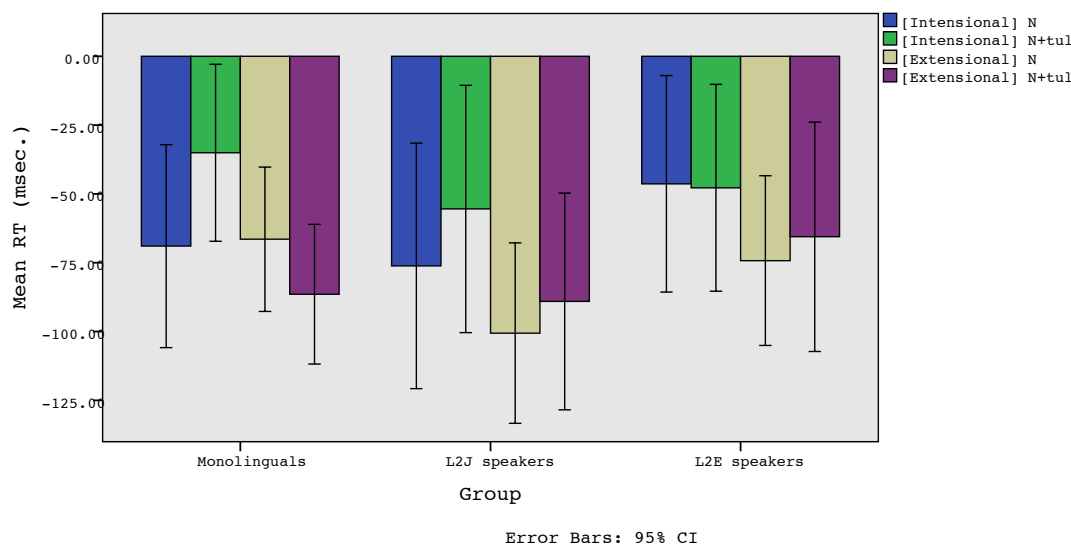


Figure 6.31: Mean residual RT for the VP region (Experiment 2c)

		Monolinguals (N=49)	L2J speakers (N=36)	L2E speakers (N=34)
Condition		Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Intensional	N	-73 (120)	-76 (123)	-44 (108)
	N+tul	-35 (104)	-59 (128)	-42 (108)
Extensional	N	-74 (92)	-107 (93)	-68 (88)
	N+tul	-92 (91)	-93 (108)	-68 (123)

Table 6.17: Mean residual RT for the VP region (Experiment 2c)

Within-subjects factors

The non-significant two-way interaction of Context and Plural marking was further explored in separate ANOVAs for each group. The analyses yielded a significant interaction effect for the monolingual group ($F(1, 47)=5.664$; $p=.022$), demonstrating that the group's RT was influenced by the type of predicates and the condition of nouns, as predicted. In intensional contexts, their RT for the

VP region was significantly smaller when the preceding NP was a bare noun than when the NP was a *tul*-marked noun. In extensional contexts, on the other hand, the RT was smaller when the preceding NP was a *tul*-noun. These results suggested that the monolinguals considered bare nouns more felicitous than *tul*-nouns in intensional contexts, vice versa in extensional contexts.

Unlike in the monolingual group, the Context \times Plural marking interaction was not significant in either of the L2J group ($F(1, 32)=.085; p=.773$) or the L2E group ($F(1, 31)=.193; p=.663$). This indicated that the attrited speakers' RT did not vary considerably across different noun conditions and contexts.

Between-subjects factors

Despite the different results of ANOVAs for the monolingual and the attrition groups, the effect of Group did not reach significance in either of the contexts: the Group \times Plural marking interaction was not significant either for the intensional context ($F(2, 112)=.494; p=.611$) or for the extensional context ($F(2, 113)=.538; p=.585$).

Sociolinguistic factors

As in the previous experiments, it was examined whether subjects' RTs can be predicted by sociolinguistic variables by calculating correlations between the variables and the degree of preference for *tul* (the value obtained by subtracting the RT for *tul*-nouns from the RT for bare nouns). The analysis for the entire subject group revealed no significant effect of extralinguistic variables, such as age and English proficiency, suggesting that those variables did not have much impact on informants' preference for *tul*.

However, an analysis for the L2E group revealed a significant positive correlation between an attitudinal factor with the preference for *tul* ($r(32)=.310; p=.011$). In Figure 6.32, the L2E speakers' preference for *tul* in intensional contexts is plotted against the speakers' attitude toward L2 (the attitudinal score indicates how much it is important for a speaker to have a high proficiency in L2). The figure illustrates that those who had a higher attitude score tended to show a higher preference for *tul*, which suggested that exposure to English might have influenced the L2E speakers' processing of *tul*. No such pattern was found for the L2J

group: the group's attitude score did not have a significant correlation with their preference for *tul* ($r(34)=-.135; p=.447$).

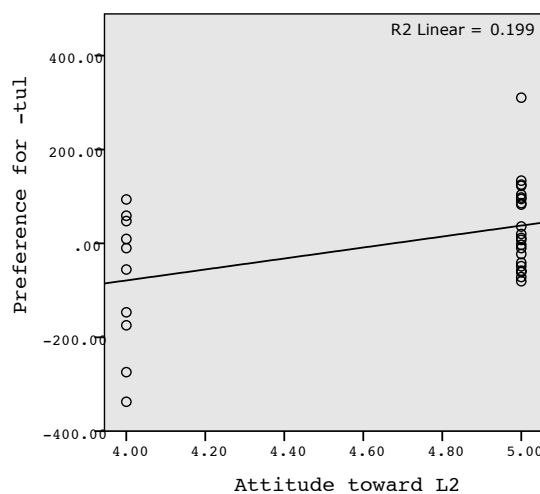


Figure 6.32: The L2E speakers' preference for *tul* in intensional contexts by attitude toward the L2

To summarise the results from the on-line task, it has been demonstrated that monolingual Korean speakers' real-time processing of *tul*-attachment is affected by a contextual factor — whether the predicate forces an intensional reading or an extensional reading of an NP: the monolingual group's RT showed a significant interaction of *tul*-marking and predicate type in the predicted way. The results also suggested that attrition might have had an impact on the processing of *tul*, at least to a certain degree. In both of the L2J and L2E groups, the RT for the VP region did not vary much across different noun and predicate conditions, indicating that the attrition groups were not influenced by the contextual factor when processing the felicity of *tul* in real time, unlike their monolingual peers. However, as the difference between the attrition groups and the monolingual group did not reach significance, the data did not provide conclusive evidence for attrition.

6.6.7 Discussion

Experiment 2c aimed to investigate i) whether unattrited Korean speakers accept *tul*-nouns in non-distributive contexts and ii) whether attrition affects the acceptability or processing of *tul* in those contexts. Two main predictions were made. First, if *tul*-NPs are not acceptable with kind-level or collective predicates that

cannot be applied to individual entities as claimed by a group of researchers (e.g. Jun 2004, Park 2008), the unattrited monolingual speakers would show a preference for bare nouns over *tul*-nouns in contexts that contained non-distributive predicates (which I referred to as *intensional* contexts). In other contexts that did not contain non-distributive predicates (which I referred to as *extensional* contexts), the monolinguals would not show a preference for bare nouns. Rather, they would prefer *tul*-nouns, if *tul* has a rigidity effect as Kwon & Zribi-Hertz (2004) claimed. Second, if attrition affected the acceptability or processing of *tul* in non-distributive contexts, the attrited speakers would be less sensitive to the predicate type than the monolinguals when deciding the felicity of *tul*-attachment.

The results from the experiment were in accord with the predictions partially: the monolingual group showed a significant effect of the predicate type on *tul*-attachment in the on-line task only, and the difference between the performances of the monolingual group and the attrition groups was not clearly exhibited. The monolingual group's preference for *tul* was significantly influenced by the type of predicates in the on-line task but not in the off-line task, posing problems to the claim that a certain type of predicates — those which lack distributivity — are incompatible with *tul*-nouns. The attrition groups showed slightly different response patterns from the monolingual group in the on-line task, but the group effect was not significant.

The off-line data revealed that none of the groups' acceptability of *tul* varied significantly depending on the context type, unlike the prediction. This indicated that the participants' acceptability of *tul*-nouns was not influenced by the semantic and pragmatic properties of predicates — whether the predicates force a de-atomised, kind reading of NPs ('*whoever is Korean*') or whether they encourage an atomised, closed reading of NPs ('*the (various) people of Korea*'). In intensional contexts where bare nouns were expected to be preferred over *tul*-nouns, neither the monolinguals nor attrited speakers rated bare nouns higher. In fact, the monolinguals' ratings for *tul*-nouns were higher than their ratings for bare nouns at approaching significance, showing that they accepted *tul*-nouns with non-distributive predicates as much as they accepted bare nouns. The attrited speakers did not rate *tul*-nouns lower than bare nouns, either. In extensional

contexts, *tul*-nouns were expected to be preferred over bare nouns, but both the monolingual group and the L2 groups showed no preference for either nouns.

The acceptability ratings in intensional contexts provide support for the 'simple plural marker' view that *tul*-nouns can freely occur with kind-level predicates, but they pose a problem to the 'distributive marker' view that *tul*-nouns cannot appear in non-distributive contexts. Not only the group results but also the individual results show that both attrited and unattrited speakers accepted *tul*-nouns in non-distributive predication sentences: all speakers except only two (a total of 117 speakers) gave ratings higher than their average (a z-transformed rating greater than zero) to the '*tul*-NPs + *be rare/be a group of* . . . ' construction. The above-average ratings indicate that the informants considered the construction relatively well-formed, thus are problematic to the claim that *tul* is a distributive marker. If the informants associated *tul* with distributivity, they would have assigned lower ratings to the construction. The high ratings for *tul*-nouns in intensional contexts also seem to question Kwon & Zribi-Hertz (2004)'s 'rigidity effect' view that *tul*-nouns cannot refer to an open kind. Despite the fact that the predicates *be rare* and *be a group of* . . . forced an open, intensional reading of NPs, all except two speakers were accepting of *tul*-nouns with those predicates, showing that they allow *tul*-nouns to have an intensional reading.

It is important, however, to note that the acceptability ratings in intensional contexts were not entirely against the distributivity view or the rigidity view. As indicated by large SDs of the ratings, the informants showed a considerable variability with respect to their preference for bare and *tul*-nouns. Although the majority of informants showed either a preference for *tul*-nouns or no clear preference in intensional contexts, about 8 percent of them (10 out of 119 speakers) rated bare nouns consistently higher than *tul*-nouns, providing support for the claim that bare nouns are more felicitous in those contexts. It is unclear why the informants showed varying degrees of preference for *tul* in the context. One possible explanation is that there is a language change in progress and *tul*-nouns are becoming more acceptable in non-distributive contexts. Previously in Experiments 2a and 2b, there was a strong age effect in the preference for *tul*, which evidenced ongoing changes in the use of *tul*. Although age was not proved to be a significant predictor for the preference for *tul* in this experiment, the variability among speakers might be attributable to language change. Another possible

cause for the informants' varying preferences for *tul*-nouns is their exposure to L2, particularly English: those who had less exposure to English might have shown a lower preference for *tul* than those who had more exposure. However, there was no evidence that the informants' English proficiency or their exposure to L2 influenced their preference for *tul*. Participants who showed a consistent preference for bare nouns were not just monolinguals or L2J speakers but also L2E speakers and their self-rated English proficiency ranged from beginner to near-native levels. In fact, there was no difference between those who preferred bare nouns and those who preferred *tul*-nouns in terms of the sociolinguistic background. This suggests that the representation of *tul* may differ in individual speakers' grammar and that the inter-speaker variability might not be due to a single factor but to a combination of several factors, such as age or exposure to English.

The acceptability ratings in extensional contexts also did not provide support for Kwon & Zribi-Hertz's (2004) rigidity view. While the predicates *be diligent* and *be fond of* . . . were pragmatically biased for an extensional reading of NPs, none of the subject groups showed a clear preference for *tul*-nouns. Even the L2E group who were under the influence of English did not display a preference for *tul*-nouns, and there was no evidence that the degree of their *tul*-preference was associated with their L2 proficiency or the amount/frequency of L2 use.

Unlike in the off-line data, there was a clear effect of the predicate type in the on-line data. The monolingual group's RT for bare nouns and *tul*-nouns differed significantly in intensional contexts and in extensional contexts, demonstrating that the monolinguals' on-line processing of *tul* was influenced by properties of the predicates. The monolinguals' RT was shorter for bare nouns in intensional contexts and for *tul*-nouns in extensional contexts. This result cannot be explained by the 'simple plural marker' theory since, according to the theory, the attachment of *tul* is equally optional in both contexts. On the other hand, the result gives support for Kwon & Zribi-Hertz's (2004) theory that bare nouns have an intensional reading and *tul*-nouns an extensional reading. The result also might be seen as supportive of Jun (2004) and others' distributivity view, in that the RT was shorter under the bare noun condition than the *tul*-noun condition in non-distributive contexts (which suggests that the monolingual group considered bare nouns more felicitous in the contexts). However, since the group's

adjusted RT for the *tul*-noun condition was below zero, it cannot be said that the monolinguals considered *tul*-nouns unacceptable in the contexts. Rather, it can be said that the monolinguals accepted both bare and *tul*-nouns, but preferred bare nouns.

Overall, the monolingual data from this experiment is not entirely compatible with all three views on *tul*. Firstly, the fact that the monolinguals accepted *tul*-nouns as much as bare nouns in non-distributive contexts gives support for the theory that *tul* is an inflectional plural marker that is optional in any plural contexts; however, the theory cannot account for the significant effect of predicate type within the on-line data. Secondly, it is problematic for the distributivity view that the majority of the monolingual participants did not consider *tul*-nouns unacceptable with non-distributive predicates in both the off-line and on-line tasks. Lastly, the effect of predicate type within the on-line data gives support for the rigidity theory; however, the theory cannot explain why the monolinguals' preference for *tul* did not vary across conditions in the off-line task. A possible explanation of the discrepancy between the monolinguals' off-line and on-line data is ongoing language change. That is, the status of *tul* might be changing from a non-inflectional (lexical) plural marker to an inflectional plural marker that is similar to the English plural *-s*. Therefore, the monolinguals' acceptability of *tul*-nouns in non-distributive contexts might be becoming higher. However, as there was no significant age effect, it could not be determined whether the use of *tul* in non-distributive contexts is on the increase.

Regarding attrition, the on-line data of this experiment suggests that the bilingual speakers' processing of *tul* might have been affected: the L2 groups' RT did not show a significant effect of the predicate type, unlike that of the monolingual group. Also, their preference for *tul* in intensional contexts calculated based on the difference in RTs for the bare noun condition and the *tul*-noun condition was in a significant positive correlation with their attitude toward L2: bilingual speakers who replied that it is "very important" to have a good proficiency in L2 (either English or Japanese) tended to show a higher preference for *tul* than other speakers (Figure 6.32). These results suggest that exposure to L2 might have caused less efficient processing of *tul*. However, the results do not serve as strong evidence for attrition, since the difference between the monolingual group

and the attrition groups was not significant, which suggests that the different response patterns of the groups might be simply due to individual differences than to attrition. Follow-up experiments using a larger number of materials or different methodologies are needed to confirm the effect of attrition on the processing of *tul*.

To conclude the discussion, Experiment 2c demonstrated that unattrited Korean speakers were influenced by properties of predicates when processing the felicity of *tul*: while they showed a preference for *tul*-nouns in extensional contexts, they showed a preference for bare nouns in intensional contexts where predicates were non-distributive. Importantly however, it has also been found that the monolinguals considered *tul*-nouns somewhat acceptable with non-distributive predicates. This result posed a problem to the distributivity view and the rigidity view, according to which *tul*-nouns are incompatible or less compatible with non-distributive predicates. It was proposed that the result might be due to the change in the status of *tul*; however, as there was no evidence for the conjecture, further research is needed.

A future research can also examine whether Korean speakers also accept non-human *tul*-nouns with kind-level or collective predicates, since animacy plays an important role in *tul*-attachment¹⁵. It also needs to be examined to what extent pragmatic knowledge influences the acceptability of *tul*. This experiment only compared predicates with distributivity and those without. However, predicates with distributivity seem to have varying degrees of compatibility with *tul* due to a pragmatic factor. For example, *be Mongoloids* and *be hard-working* both have distributivity, but an NP 'Korean + *tul*' seems less acceptable with the former than with the latter. This difference between the two predicates is that *be Mongoloids* is pragmatically biased for an intensional reading of the NP ('whoever is Korean') while *be hard-working* is not (it is difficult to imagine 'being Mongoloids' applied to some members of Korea only, because of the knowledge that Koreans are of a single ethnicity). Therefore, it seems worth examining how much pragmatic knowledge affects Korean speakers' *tul*-attachment.

¹⁵Nemoto (2005) argued that human *tul*-nouns are exceptional and they can appear in kind/generic predication sentences, unlike animal or inanimate nouns.

6.7 Summary

In this chapter, I have presented the two experiments of this thesis: Experiment 1 on reflexive binding, Experiment 2 on *tul*-marking with a focus on animacy (Experiment 2a), number-specificity (Experiment 2b) and distributivity (Experiment 2c). Unlike the prediction that attrition would be visible only with respect to *tul* whose distribution is underspecified by grammar, attrition effect was found in both *caki*-binding and *tul*-attachment. In the next chapter, I integrate the findings from the two experiments and discuss their implications.

CHAPTER 7

Discussion and conclusions

7.1 Introduction

This thesis has investigated the nature of L1 attrition in adult late bilinguals by addressing the following questions:

- What is the *extent* of L1 attrition? Is attrition restricted to structures whose distribution is underspecified by grammar? Or is attrition manifested in grammatically specified structures as well?
- What is the *source* of L1 attrition? If attrition is manifested in grammatically underspecified structures only, is its effect due more to underspecification of grammatical representation or to real-time language processing difficulties?
- To what extent is attrition a result of L2 transfer? Is the effect due partly to bilingualism itself?

In order to answer these questions, this thesis tested two groups of attrited speakers of Korean who had been exposed to different L2s (English and Japanese) and compared them with a group of non-attrited monolingual Korean speakers. The three groups of speakers were tested in two experiments that examined the properties of reflexive binding and plural marking in Korean.

In this chapter, I summarise the findings from the two experiments and discuss their implications. First, I give a summary of the theoretical and methodological discussions presented in Chapters 1 to 5. Next, I present a summary of the experimental results presented in Chapter 6 and discuss their contributions for

the research of L1 attrition and *tul*-attachment. Lastly, I discuss the limitations of this thesis and suggest directions for future research.

7.2 Summary of the theoretical and methodological discussions

In Chapter 2, I examined the patterns of attrition observed in prior studies and discussed the main issues regarding syntactic attrition. The general findings from attrition research to date are that mature L1 shows remarkable stability even under prolonged L2 influence, especially in the domains of morphology and syntax, and that despite the stability, particular areas of L1 grammar may be affected by attrition. These findings led to the discussion of what kinds of structures are susceptible to attrition and why they are more vulnerable than other structures. Among several linguistic and psycholinguistic models that allow the investigation of these questions, I focused on the IH because it provides a unified approach to various forms of bilingual development (Sorace 2011). Based on the observation of Sorace (2011), Sorace & Filiaci (2006) and many others that structures that are sensitive to discourse-pragmatic conditions are vulnerable to attrition, I hypothesised that attrition manifests selectively to structures whose distribution is underspecified by grammar.

Chapter 3 presented the theoretical background for Experiment 1, which investigated the attrition of core binding of the reflexive *caki*. Following Kim (2007) and Kim et al. (2010), I assumed that the crosslinguistic difference between English, Korean and Japanese with respect to reflexive binding lies on the constraints that define the GC for core anaphors. Whereas the GC for core binding in English is defined by the two Opacity Conditions (i.e. the TSC and SSC), the GC in Korean and Japanese is defined by the SSC only. Thus, TSC-violating anaphors are considered core anaphors and are acceptable in Korean and Japanese, while they are not acceptable in English, unless they are licensed as exempt anaphors by logophoric factors. Despite this crosslinguistic variation, the prediction for the attrition of reflexive binding was that core binding of *caki* would not be affected by attrition, since its felicity is determined by grammar and is not sensitive to discourse-pragmatic constraints.

Chapter 4 provided the background for Experiment 2 that investigated attrition effects on *tul*-attachment. *Tul* is a non-obligatory plural suffix that is distinguished from other plural markers (e.g. the English *-s*) for its peculiar distribution. Since there was a disagreement on the semantics of *tul* in the research, I first examined three different approaches to *tul*: i) *tul* as a simple plural marker; ii) *tul* as a distributive marker; and iii) *tul* as a non-inflectional plural marker. In examining these theories, I noted that the disagreement on the nature of *tul* is due, at least in part, to the assumption that judgements involving *tul* are categorical. Based on Duffield (2003), I proposed that judgements on *tul* are mostly gradient than categorical. Since the gradient acceptability is determined by a function of various semantic and pragmatic factors, I examined those factors in detail, in particular, animacy, number-specificity and distributivity. As the distribution of *tul* is underspecified by grammar, I predicted that the distribution would be susceptible to attrition.

In Chapter 5, I presented the methodology used in this thesis and provided an account for the choice of the methodology. The two tasks of different types, a Magnitude Estimation task and an on-line self-paced reading task, were chosen, as the combination of the tasks can give an insight to the source of any non-convergence observed between attriters and non-attriters. Since the on-line reading task, different from the off-line judgement task, provides information on temporal processing of linguistic structures, I argued that a comparison of data from the on-line and off-line tasks allows the examination of whether an attrition effect is more representational or more computational. The chapter also examined a variety of sociolinguistic factors and discussed how those factors may play a role in attrition.

7.3 Summary of the experimental results

Both experiments of this thesis yielded significant results that have implications for the nature of attrition. Table 7.1 presents a summary of non-monolingual performances of attriters observed in the two experiments. Experiment 1 provided evidence that attrition does not affect the grammatical representation of core binding of *caki* but it does influence the on-line processing of *caki*-binding. In the experiment, participants were presented with sentences containing *caki* of

Exp.	Phenomena	Tasks	L2J group	L2E group
1	Core binding of <i>caki</i>	Off-line judgement	-	-
		On-line reading	Larger RTs for proper nouns	Larger RTs for TSC-violating <i>caki</i>
2	<i>Tul</i> -marking	Off-line judgement	-	-
		On-line reading	No preference for <i>tul</i> -nouns	No preference for <i>tul</i> -nouns
	a. Animacy	Off-line judgement	-	Lower ratings for bare nouns
		On-line reading	-	Larger RTs for bare inanimate nouns
	b. Number-specificity	Off-line judgement	No preference for <i>tul</i> in 'a few' contexts / Reversed effect of number-specificity	No preference for <i>tul</i> in 'a few' contexts / Preference for <i>tul</i> -nouns in numeral contexts
		On-line reading	-	-
		c. Distributivity	Off-line judgement	-
	On-line reading		No effect of the predicate type	No effect of the predicate type

Table 7.1: Summary of non-monolingual performances of attriters

two different binding conditions: with the violation of the TSC and without. If there was attrition, attrited speakers, particularly the L2E speakers whose L2 had different binding constraints from L1, would be less accepting of TSC-violating *caki* and would spend more time processing it than *caki* that did not have the violation of the TSC. In the off-line judgement task, both of the L2 groups performed closely to the monolingual group, attesting no signs of attrition. In the on-line reading task, on the other hand, both the L2J group and the L2E group displayed divergent response patterns. The L2E group, unlike other groups, showed a significantly larger RT for *caki* with TSC-violation than *caki* without the violation. Given that the group did not treat *caki* of the two conditions differently in the off-line task, the group's behaviour in the on-line task suggested that their processing of *caki*-binding became less optimal due to interference from English. The L2J group also diverged from other groups by showing a significantly longer RT

for proper nouns. This suggested that their on-line processing of proper nouns became less efficient due to prolonged L2 influence and limited L1 use. From these results, it was concluded that attrition did not affect the representation of *caki*-binding, but it led to inefficient processing of *caki* or proper nouns, depending on the properties of attriters' L2.

In Experiment 2 that examined the properties of *tul*-attachment, there was evidence that attrition affected the grammatical representation of *tul*, as well as the on-line processing of *tul*. Firstly, when the general preference for *tul* in plural contexts was compared in the monolingual group and the two bilingual groups, it was found that the three groups behaved similarly in the off-line task, but not in the on-line task. In the off-line task, the monolingual group showed an overall preference for *tul* as expected and both the L2J and L2E groups showed a similar preference. In the on-line task, on the other hand, only the monolingual group showed a preference for *tul*. The L2 groups did not display a preference for either *tul*-nouns or bare nouns. The L2 groups' inconsistent responses in the on-line and off-line tasks suggested that the speakers' on-line processing of *tul* was not as efficient as that of the monolinguals.

In order to further examine the patterns of non-convergence between the monolinguals and the attrited speakers, Experiment 2 was divided into three parts with a focus on three specific factors that influence *tul*-attachment: animacy, number-specificity and distributivity. In Experiment 2a, it was examined whether bilingual speakers under attrition were less sensitive to the animacy factor in *tul*-attachment than unattrited monolinguals. The analysis showed that the bilinguals' divergence was not attested with respect to the sensitivity to animacy in either of the off-line and on-line tasks. The off-line data revealed that the animacy effect was even stronger in the attrition groups than in the monolingual group: the monolingual group showed a weaker animacy effect than expected, possibly because of the increased preference for *tul* on inanimate nouns in Korea. Nevertheless, there was evidence within the off-line data that the L2E speakers behaved differently from the speakers of other groups: the speakers showed a significantly lower acceptability of bare nouns across all conditions, compared with others. In the on-line task, the performance of the three groups could not be compared in terms of animacy because the effect of animacy was non-significant in all groups. However, the L2E group was distinguished from other groups

again, because they had a significantly larger RT for inanimate bare nouns than *tul*-marked ones, when other groups showed no difference in their RTs for those nouns. Moreover, the L2E group's preference for *tul* in the on-line task showed a significant correlation with their length of residence and the amount of unattracted L1 input that they received. The L2E group's divergent performances observed in the experiment suggested that English influenced the bilinguals' representation of felicitous conditions for *tul*-marking, as well as their real-time processing of the conditions.

Experiment 2b examined the attrition of *tul*-attachment with respect to number-specificity, under the prediction that attrited speakers would show less sensitivity to the number factor than monolinguals when deciding *tul*-attachment. The results, however, revealed that the monolinguals as well as the bilinguals did not display the predicted effect. The non-significant effect of number-specificity within the monolingual group suggested that number-specificity may be a less influential factor in the perception of *tul* than in the production of *tul*. It seemed possible that the number-specificity became weakened in the perception of *tul*, due to a recent increase in the use of *tul* for number agreement in Korean. Although the bilinguals could not be compared with the monolinguals with respect to number-specificity, they showed notable non-monolingual response patterns in the off-line judgements. The L2J group showed a reversed effect of number-specificity, with the lowest *tul*-preference in non-specific contexts and the highest preference in specific contexts. The L2E group displayed a preference for *tul*-nouns in numeral contexts, unlike the monolingual group. Although the causes for these divergent performances were unclear, the results indicated that the attriters' representation of felicitous conditions for *tul* differed from that of the non-attrited speakers.

Experiment 2c investigated whether Korean speakers accept *tul*-nouns in non-distributive contexts and whether the acceptability of *tul*-nouns in those contexts is affected by attrition. The results demonstrated that the unattracted speakers' on-line processing of *tul* was influenced by distributivity of predicates, as predicted: the monolinguals spent less time processing bare nouns than *tul*-nouns in non-distributive contexts, and vice versa in distributive contexts, showing that they preferred bare nouns in the former contexts and *tul*-nouns in the latter. Importantly, however, the monolinguals did not strongly disapprove *tul*-nouns in

non-distributive contexts in both the off-line judgements and the on-line processing. This result posed questions to the ‘distributive marker’ theory, according to which *tul*-NPs cannot appear with kind-level or collective predicates. The bilinguals performed similarly to the monolinguals in the judgement task, accepting *tul*-nouns with non-distributive predicates; however, they displayed non-monolingual patterns in the reading task. Whereas the monolinguals had significantly different RTs for bare nouns and *tul*-nouns depending on the predicate type, both the L2J and L2E speakers did not. The bilinguals’ divergent performance suggested that attrition might have influenced the attriters’ sensitivity to the contextual factor in the on-line processing of *tul*.

7.4 General discussion of the experimental results

7.4.1 *The extent and source of attrition*

This thesis tested the following hypotheses regarding the extent and source of attrition.

- **Hypothesis 1:** L1 attrition is restricted to structures whose distribution is grammatically underspecified. Therefore, the difference between attrited Korean speakers and non-attrited monolingual Korean speakers is manifested in *tul*-marking, but not in core binding of *caki*.
- **Hypothesis 2:** Attrition effect on grammatically underspecified structures is due not only to underspecification of mental representations, but also to on-line processing limitations. Therefore, the difference between attrited Korean speakers and the monolingual controls is attested in both on-line and off-line data.
- **Hypothesis 3:** Attrition effect on grammatically underspecified structures is not always a consequence of L2 transfer, but is also an effect of bilingualism. Therefore, attrition is exhibited not only by L2 English-speaking attriters, but also by L2 Japanese-speaking attriters whose L2 properties are similar to those of L1.

On the whole, the results of the two experiments were in accord with these hypotheses only partially. First of all, the results did not provide support for Hypothesis 1, since they revealed differences between the performance of attrited

and non-attributed speakers not only in *tul*-attachment that is underspecified by grammar, but also in core binding of *caki* that is specified by grammar. In the experiment on *tul*, attributed speakers behaved differently from their monolingual peers in both of the off-line judgement task and the on-line reading task, suggesting that attrition affected the representation of felicitous conditions for *tul* as well as the on-line processing of the conditions. In the experiment on *caki*-binding, attributed speakers did not diverge from the monolinguals in the judgement task, but exhibited a significant processing delay in the reading of TSC-violating *caki* (the L2E speakers) or proper nouns (L2J speakers). The attriters' divergence in the on-line task suggested that, although the attriters' representation of constraints for *caki*-binding remained unaffected, their real-time processing of *caki* was affected under prolonged influence from L2. From the results of the experiments, it can be concluded that attrition is exhibited in both grammatically specified and underspecified structures, but to a different degree: attrition is better attested in structures that are underspecified by grammar.

Secondly, the results were supportive of Hypothesis 2, since the attrition effects observed in this study were attributable not only to representational underspecification but also to computational problems. In Experiments 2a and 2b, the L2E group assigned significantly higher ratings to *tul*-nouns (or lower ratings for bare nouns), compared with the monolingual group. This result suggested that the L2E speakers' representation of the distribution of *tul* was affected under the influence from English. The L2E group's divergence in the experiments, however, did not seem to be due to representational problems only. In Experiment 2a, the L2E speakers demonstrated that they had the intact knowledge of appropriate conditions for *tul* by showing sensitivity to animacy in judgements of *tul*. In the on-line task, on the other hand, the speakers did not show sensitivity to animacy, exhibiting a strong preference for *tul* on inanimate nouns: the L2E speakers had a significantly shorter RT for *tul*-marked inanimate nouns than for bare ones, while the speakers of other two groups had similar RTs for both nouns. The discrepancy between the L2E speakers' performances in the on-line and off-line tasks suggested that English affected the speakers' processing of the conditions for *tul*, but not necessarily their knowledge representation of the conditions regarding animacy. The L2E speakers' on-line and off-line performances were at

odds in Experiment 1 as well. In the experiment, the L2E speakers showed inefficiency in the processing of TSC-violating *caki*, although they had no problems in accepting both *caki* with and without TSC-violation in the judgement task. These results demonstrate that the attriters' non-monolingual behaviours in this study was both representational and computational in nature. Further, the results suggest that attrition effect on grammatically underspecified structures is due to both representational and computational problems, whereas attrition effect on grammatically specified structures is due mainly to computational issues.

Lastly, the results were in line with Hypothesis 3, although they did not provide conclusive evidence for the hypothesis. In Experiments 2a and 2b, the attrited speakers' non-target performances were largely attributable to the influence of L2 on either the representation or the processing of L1 structures. In Experiment 2c, on the other hand, the attriters' divergent performances could not be explained by L2 influence. Experiment 2c showed different patterns in the performance of the monolingual group and the attrition groups with respect to the processing of *tul*: while the monolingual group's RT showed a significant interaction of the predicate type and *tul*-marking, the attrition groups' RT did not. The effect of predicate type on RT was non-significant in both attrition groups, despite the fact that the attriters' L2s, Japanese and English, differ with respect to the properties of plural marking: the felicity of plural marking is influenced by contextual factors in the former, but not in the latter. If the attriters' divergent performance was due to L2 transfer, the L2E group would have exhibited a greater degree of divergence from the monolingual performance than the L2J group, since plural marking in English is irrelevant to the semantic-contextual properties of predicates (e.g. distributivity), unlike in Japanese and Korean. Since the results showed a non-significant effect of predicates in both attrition groups, it can be suggested that the attrited speakers' insensitivity to the predicate type was due to processing inefficiency resulted from bilingualism itself, rather than due to L2 interference in L1 processing. The results, however, did not serve as strong evidence for Hypothesis 3, as they did not show a significant group effect. Further investigation will help to determine whether the divergent patterns found in the bilingual groups' performance were due to bilingualism itself that causes inefficiency in cognitive resource allocation or executive control of two

languages in real time, as proposed in other studies (Sorace & Serratrice 2009, Wilson 2009).

7.4.2 *Extralinguistic variables in attrition*

Although it was not the primary goal of this thesis to investigate in depth extralinguistic variables that play a role in attrition, the design of this study allowed the examination of the effect of some of the important variables. The questionnaire presented to participants provided information about the speakers' sociolinguistic background and their patterns of language use. The responses given in the questionnaire were turned into numerical values and were used for statistical analysis¹. I examined a total of 15 sociobiographical variables and calculated correlations between the variables and each dependent variable of the two experiments (i.e. acceptability ratings or RTs). The analysis revealed significant effects for 6 sociolinguistic variables: frequency of L1 use, age at migration, length of residence, amount of L1 input, amount of L1 use and attitude toward L2. Table 7.2 presents a summary of the results.

Overall, the results showed that one's patterns of L1 use — both the frequency and amount of use — were the most important factors in the attrition or maintenance of the grammatical structures examined in this study. These results are surprising because the informants of this study did not differ considerably with respect to L1 use. Almost all informants of this study (68 out of 70 speakers) had maintained contact with other Korean speakers in the immigrant communities and used Korean on a regular basis. The significant effect of L1 use observed in this study, therefore, demonstrates that L1 use is a powerful predictor for attrition and that even a slight difference in the frequency/amount of L1 use may lead to varying outcomes of attrition.

Firstly, the frequency of L1 use was found to be a significant factor for the attriters' RT for proper nouns in Experiment 1 (Figure 6.6) and for their acceptability ratings of *tul*-nouns in Experiment 2b (Figure 6.26). In Experiment 1, bilingual speakers who used L1 less frequently exhibited a greater degree of divergence from the monolinguals (i.e. a longer processing time for proper nouns), demonstrating that less frequent L1 use causes a higher level of processing inefficiency.

¹The data is presented in Table 5.3.

Exp.	Variable	Type of data	Sig. (2-tailed)
1	Frequency of L1 use	L2J speakers' RT for proper nouns	$r(35)=-.315; p=.065$
		L2J/L2E speakers' RT for proper nouns	$r(67)=-.255; p=.037^*$
2	Age at migration	L2J/L2E speakers' on-line preference for <i>tul</i>	$r(70)=-.241; p=.044^*$
2a	Length of residence	L2E speakers' off-line preference for <i>tul</i> on inanimate nouns	$r(34)=-.327; p=.063$
		L2E speakers' on-line preference for <i>tul</i> on inanimate nouns	$r(34)=.392; p=.026^*$
	Amount of L1 input	L2E speakers' on-line preference for <i>tul</i> on inanimate nouns	$r(34)=-.554; p=.001^{**}$
2b	Amount of L1 use	L2J speakers' off-line preference for <i>tul</i> on 'many' + N	$r(34)=-.384; p=.025^*$
	Frequency of L1 use	L2J/L2E speakers' off-line preference for <i>tul</i> on numeral + N	$r(68)=.245; p=.044^*$
2c	Attitude toward L2	L2E speakers' on-line preference for <i>tul</i> in intensional contexts	$r(32)=.310; p=.011^*$

Table 7.2: Summary of significant sociolinguistic variables

This result is in accord with the observation of other studies that less frequent L1 use typically leads to a greater amount of L1 loss (Cherciov 2011, de Bot et al. 1991, Hulsen 2000). However, it is important to note that the result does not indicate that frequent L1 use guarantees the retention of L1. In Experiment 1, several speakers of the L2J group showed a significantly longer RT for proper nouns than monolinguals, despite the fact that they used L1 on a daily basis. This finding confirms the observation of Tsimpli et al. (2004) that speakers who use L1 regularly may also experience attrition.

The effect of the frequency of L1 use was also reported significant in Experiment 2b. However, the effect was the opposite to what was found in Experiment 1. In Experiment 2b, bilinguals who used L1 more frequently tended to exhibit a larger deviation from the monolingual norm (i.e. a higher preference for *tul* in

numeral contexts). Although it was unclear what caused such a reversed pattern, I conjectured that the positive correlation between the frequency of L1 use and the preference for *tul* might indicate that attrited speakers who had a higher preference for *tul* tended to use L1 more frequently, rather than vice versa. That is, bilinguals whose *tul*-preference was heightened by attrition, made more frequent contact with other Korean speakers in immigrant communities or in the home country, and by doing so, contributed to language change in Korean. However, this assumption was questionable because, in the same experiment, the L2J speakers' preference for *tul* in 'many' contexts negatively correlated with their amount of L1 use (Figure 6.25). In 'many' contexts, the L2J speakers who used L1 more (in proportion to L2) in a more variety of social settings showed a lower preference for *tul*. This pattern is not in accord with the assumption that speakers whose *tul*-preference is higher use L1 more frequently. For now, it cannot be determined why there were contradicting patterns regarding L1 use and the preference for *tul* and the question remains for future research.

Along with the frequency/amount of L1 use, the amount of unattrited L1 input was also proved to be a significant predictor for the performance of attrited speakers. In the on-line task of Experiment 2a, bilinguals who were exposed to a smaller amount of unattrited L1 input displayed a greater degree of divergence from the monolinguals. The L2E speakers' preference for *tul* on inanimate nouns was significantly higher than that of the monolinguals, and the degree of their preference negatively correlated with the amount of unattrited input that the speakers received through media (e.g. TV, newspaper) or communication with family and friends in Korea (Figure 6.21). This result demonstrates that the quality of L1 input, as well as the quantity of input, is an important factor in the maintenance of L1.

There were variables other than the frequency/amount of L1 use that were reported significant: length of residence, age at migration and the attitude toward L2. In the on-line task of Experiment 2a, the L2E speakers' preference for *tul* on inanimate nouns positively correlated with the time they spent in the US (Figure 6.20): those who had a longer length of residence displayed a higher preference for *tul*. A similar correlation was also found in the off-line task, albeit at an approaching significance level: the L2E speakers who had a longer length of residence showed a higher preference for *tul* on inanimate nouns. Notably, in

both tasks, several L2E speakers whose length of residence was shorter than 10 years (which is often used as a criterion for subject selection in attrition research) showed a higher *tul*-preference than the monolingual mean, suggesting that attrition might take place earlier than 10 years, as proposed in other studies (e.g. de Bot & Clyne 1994).

Age at migration showed a significant correlation with attrited speakers' general preference for *tul* in Experiment 2: speakers who migrated to an L2 setting at a younger age had a higher preference for *tul* in the on-line task than those who migrated at an older age (Figure 6.14). This result might indicate that age of arrival was an important predictor for the amount of attrition regarding *tul*-attachment. However, given the nearly significant effect of age within the same on-line data ($p=.056$, Figure 6.13), it was possible that the observed effect of age at migration was due to language change in Korea, i.e. an increase in the use of *tul*. Since younger speakers are more innovative language users, immigrants who were younger at the point of emigration (before the onset of attrition) might have had a higher preference for *tul*. Therefore, it cannot be determined in this study whether age at migration played a crucial role in the attrition of *tul*-attachment.

The attitude toward L2 was a significant predictor for attrited speakers' performance in Experiment 2c. In the on-line task of the experiment, the L2E speakers who had a stronger motivation to achieve a high proficiency in L2 exhibited a higher preference for *tul*, compared with the monolinguals (Figure 6.32). In fact, all speakers of the L2E group reported in the questionnaire that it was important for them to attain a high proficiency in English. However, those who answered that it is "very important" showed a higher preference for *tul* than those who answered that it is "important". This result attests the importance of the attitudinal factor in attrition.

Other sociolinguistic variables than those mentioned above were not found to be significant for the amount of attrition observed in this study. For example, the level of education, which several studies (Clyne 1973, Jaspaert & Kroon 1989, Waas 1996) have found crucial, was not reported significant. The off-line judgement data of Experiment 2 revealed a significant effect of education in the entire subject group, which indicated that speakers who had postgraduate education

exhibited a higher preference for *tul* than those who had undergraduate education only ($p=.019$, Figure 6.11). However, the effect of education was not significant within the attrition groups, suggesting that education did not play an important role in the attrition of *caki*-binding or *tul*-attachment. The non-significant effect of education in the attrition groups might be due to the fact that all speakers of the groups had a relatively high-level education. The effect of education may be visible more clearly when subjects' level of education differs considerably, for instance, a primary level versus an undergraduate level.

7.4.3 *The distribution of tul*

The findings of this study regarding *tul*-attachment are summarised as follows. First of all, judgements on *tul*-attachment are, in most cases, far from categorical and there is a great deal of intra- and inter-subject variation in the judgements. In the previous research on *tul*, there was often a disagreement among researchers' acceptability judgements on *tul*, due to the subtlety of the judgements. This study found a similar disagreement among the participants' judgements. The performance of both the monolingual and bilingual groups varied considerably in the off-line judgements of *tul*, as well as in the on-line reading. This resulted in fairly large standard deviations across all conditions of the experiment. It was possible that the inter-subject variation, particularly the variation found in the on-line task, was partly due to methodological limitations. As most participants of this study were tested at a place of their choice, not in a lab-environment, they might have been distracted by external factors, such as small noises or movements of other people². Moreover, since the two experiments of this study were conducted in a single session for practicality, some subjects might have felt bored from the repetition of stimuli and thus have lost concentration during participation. However, considering that the results from Experiment 1 were highly significant, despite the inter-subject variation, it seems that the variation among individuals observed in the experiment on *tul* is attributable to the nature of judgements on *tul*. This conclusion gains support from Suh (2008) who also found wide inter-speaker variation in her subjects' production of *tul*.

In addition to the inter-speaker variation, the informants of this study also displayed a great deal of within-subject variation in *tul*-attachment. The speakers

²See 5.2.2 for more description of the procedure.

often showed inconsistency in their judgements on *tul* and in the reading of *tul*, and this caused statistically weak interactions between the variables examined. Again, it might be suggested that the underlying reason for the subjects' inconsistency is methodological, such as structural flaws of the target items or the monotonous nature of the tasks employed. However, it is important to note that the subjects did not exhibit indeterminacy equally in all conditions. In Experiment 2a, subjects' responses were fairly consistent when judging the felicity of *tul* on human nouns in anaphoric contexts (where the host noun referred to a previously mentioned entity), because *tul*-marking is required in those contexts. In Experiments 2b and 2c, on the other hand, subjects were, in general, less determinant in their judgements. Those different response patterns across conditions suggest that the subjects' inconsistency attested in this study reflects the non-categorical nature of the judgements involving *tul*.

Another finding from this study is that judgements on *tul* are non-categorical because the felicity of *tul*-attachment is influenced by various semantic/pragmatic factors. In this thesis, I divided the experiment on *tul* into three parts and attempted to examine three factors that affect *tul*-attachment, focusing on one factor at a time by controlling others as much as possible. The results demonstrated that the three factors investigated, animacy, number-specificity and distributivity, play a role in *tul*-attachment. Since the felicity of *tul* is determined by a function of those factors in real language use, judgements on *tul* are gradient, rather than categorical in nature.

With respect to animacy, the judgement task of this study yielded results that were consistent with the animacy hierarchy in which human nouns outrank non-human animates, which in turn outrank inanimates (Corbett 2000, Croft 2003). In anaphoric contexts where the host noun referred to a pre-identified set of entities, monolingual Korean participants were more reluctant to drop *tul* on a human noun than on an animal or an inanimate noun (Figure 6.15). This result indicated that the monolinguals were influenced by animacy when judging the felicity of omitting *tul* in the given contexts. The result is consistent with the corpus data (Table 4.2) that shows the highest occurrence of *tul* on human nouns and the lowest occurrence on inanimate nouns in classifier constructions. Notably, however, the effect of animacy was weaker in the monolingual group than in the L2 groups because the monolinguals showed a high preference for *tul* on

inanimate nouns. The observed high preference implied that the use of *tul* on inanimate nouns is on the increase among monolingual Koreans. Unlike in the off-line data, the effect of animacy was not attested in the on-line data of this study possibly due to methodological limitation. Therefore, other types of on-line data, such as eye-tracking data, will be useful to further investigate the role of animacy in the temporal processing of *tul*-attachment.

Along with the effect of animacy, this study showed a significant effect of number-specificity in *tul*-marking. In the on-line task, the (attrited/non-attrited) participants showed a smaller RT for *tul*-nouns than for bare nouns when the nouns were followed by a non-specific number expressions, *many* or *a few*. The participants showed no such preference for *tul*-nouns when the nouns were preceded by a precise number (numeral). These results demonstrated that the specificity of plurality-indicating expressions is a factor that influences the production or omission of *tul*, as suggested by corpus data (Table 4.3). However, the effect of number-specificity was not as robust as it was expected in both the off-line and on-line tasks of this study. Although it was possible that the weak effect was due to methodological limitation (e.g. the small number of test items), the result seems to imply that there is a dissociation between Korean speakers' perception of *tul* and their actual production of it. In Suh's (2008) experiment on *tul*, it has been observed that speakers' tendency for *tul*-marking is greatly influenced by the nature of the task employed. Suh's informants, heritage speakers of Korean in the US, did not produce *tul* in an elicited production task as often as it was expected, although they displayed a strong preference for *tul*-nouns over bare nouns in an acceptability judgement task. Suh noted that the speakers' low production of *tul* might be due to a flaw in the experiment design, but she also proposed that the result seemed to indicate a disparity in the speakers' perception and production of *tul*. In this study, both attrited and non-attrited Korean speakers readily accepted *tul* in numeral contexts although *tul* is known to occur infrequently in those contexts³, and this tendency led to the weak effect of number-specificity overall. Since this study used perception tasks only, it seems necessary to examine both perception and production data for further discussion on the role of number-specificity in *tul*-attachment.

³A corpus shows low occurrence of *tul* in numeral contexts (Table 4.3).

Regarding distributivity, this study suggested that *tul*-marking might be less preferred with a certain type of predicates than others. The monolingual Korean speakers of this study showed a larger RT for *tul*-marked nouns in non-distributive contexts than in distributive contexts. This effect of predicate type on the preference for *tul* posed a problem to the theory that *tul* is an optional plural marker that is equally acceptable in any plural contexts. The monolingual participants, however, did not strongly disapprove *tul*-nouns with non-distributive predicates in both the off-line and on-line tasks, contrary to a group of researchers' claim (e.g. Jun 2004, Park 2008) that *tul* is a distributive marker which is incompatible with non-distributive predicates. A conclusion drawn from these results was that the status of *tul* might be changing: *tul* may be a lexical plural marker that triggers rigidity effect, as Kwon & Zribi-Hertz (2004) proposed, but more and more speakers consider it an inflectional plural marker that is similar to the English plural *-s*. As a result, *tul*-nouns are becoming more acceptable with non-distributive, kind-referring predicates. However, as it was not attested in this study that the use of *tul* in non-distributive contexts is on the increase, further research is needed to confirm the conjecture.

Exp.	Subjects	Type of data	Results
2	Attrited/ non-attrited speakers	On-line preference for <i>tul</i>	by age group ^a : $F(2, 116)=2.765, p=.067$ by subject: $r(119)=-.176; p=.056$
2a	Attrited/ non-attrited speakers	Off-line preference for <i>tul</i> on inanimate nouns	by age group: $F(2, 112)=7.027, p=.001^{**}$ by subject: $r(110)=-.184; p=.053$
2b	Non-attrited speakers	Off-line preference for <i>tul</i> on 'a few' + N	by age group: $F(1, 44)=6.950, p=.012^*$ by subject: $r(49)=-.372; p=.011^*$
	Attrited/ non-attrited speakers	Off-line preference for <i>tul</i> on 'a few' + N	by age group: $F(2, 110)=1.642, p=.198$ by subject: $r(113)=-.183; p=.053$

^a three groups: under 30, between 31-39, over 40

Table 7.3: Summary of age effects in *tul*-attachment

Lastly, this study showed that there is language change in progress in the distribution of *tul*. Across different conditions of Experiment 2, there were statistically significant age effects that showed younger speakers had a stronger preference for *tul*-attachment than older speakers. Table 7.3 presents a summary of the effects by age group and individual subject. First of all, there was a nearly significant effect of age within the entire on-line data ($p=.056$, 6.13) which indicated a stronger *tul*-preference among younger speakers. Experiment 2a revealed a nearly significant negative correlation ($p=.053$) between subjects' age and their preference for *tul* on inanimate nouns (Figure 6.17). When the subjects were grouped into three age groups (under 30, between 31-39, over 40), there was a significant group effect in the preference for *tul* ($p=.001$). This result confirmed that younger speakers had a higher preference for *tul*-marking than older speakers and that the use of *tul* on inanimate nouns is becoming more frequent (Figure 6.18). In Experiment 2b, the younger monolingual group exhibited a significantly higher preference for *tul* in the 'a few'-CL-GEN + N construction than the older monolingual group, as shown by both group and individual results (Figure 6.23). The correlation between age and the preference for *tul* was nearly significant for the entire subject group as well ($p=.053$, Figure 6.27). In sum, the young informants of this study showed a high preference for *tul* on inanimate nouns in anaphoric contexts and on human nouns in a classifier construction. Since younger speakers are typically more adaptable to newer forms of language than older speakers (Labov 1994), these results serve as evidence that the occurrence of *tul* is on the increase in the Korean language, particularly in those two contexts. This finding confirms Noh's (2008) observation based on corpus data that the frequency of *tul* has doubled over the past few decades⁴. It was not confirmed in this study whether the change is due to influence from English, as Noh (2008) proposed, because this study did not observe a significant correlation between the monolinguals' English proficiency and the degree of preference for *tul*. However, this study showed that the language change is accelerated by attrited speakers, particularly Korean-English bilinguals, as I discuss in the next section.

⁴See Table 4.4 for the data.

7.4.4 Attrition and language change

The results of this thesis provide evidence for attrition at the individual level, language change at the societal level and the interaction of the two phenomena. Language change is a factor that needs to be controlled in attrition research, since any non-convergence between long-term immigrants and unattrited monolingual speakers may be due to language change in the home country, rather than attrition. This thesis faced a methodological challenge because the distribution of *tul* seemed to be undergoing a change in Korea. To remedy the problem, therefore, this thesis included two groups of monolinguals (younger speakers in their 20s and older speakers in their 40s) and two groups of bilinguals under the influence of different L2s. Comparison between these groups helped to determine whether the observed differences between the monolinguals and the long-term bilinguals (listed in Table 7.1) were consequences of language change or attrition or both. The analysis showed that there is an increasing tendency for *tul*-marking among the monolinguals and that there is the same tendency among the attriters living in an English-speaking environment. That is, language change and attrition have the same effect on one's L1 use: the increased use of *tul* in plural contexts.

When the three subject groups' general preference for *tul* was examined within the off-line judgement data, it was found that the preference for *tul* was strongest in the L2E group and weakest in the L2J group. The monolingual group was in-between the two groups. Although there was no significant group effect, the results showed the possibility that the patterns of *tul*-marking changed in both the monolingual group and the L2E group due to language change and L2 influence, respectively. Experiment 2a provided evidence for this conjecture. In the off-line task of the experiment, on the one hand, there was a sign of change within the monolingual group. The monolinguals showed a less clear animacy effect than expected, partly because they had a high preference for *tul* on inanimate nouns. The monolinguals' high preference for *tul* on those nouns was likely to be a result of language change in Korea, considering the fact that the bilingual groups showed no preference or a less strong preference for *tul* on the same nouns. In the on-line task, on the other hand, there was a sign of attrition within the L2E group. Although none of the groups showed the predicted effect of animacy, the L2E group was distinguished from others because of their preference for *tul*

on inanimate nouns. This result suggested that the L2E speakers' processing of *tul* was affected by English and consequently, the group might produce *tul* more frequently on inanimate nouns in real L1 use. The on-line result, along with the off-line result, led to the conclusion that both the monolingual speakers and the L2E speakers contribute to the increasing occurrence of *tul* on inanimate nouns.

The off-line task of Experiment 2b also yielded evidence for both language change and attrition, but in two different contexts. In the 'a few' construction, both the L2J and L2E speakers showed no preference for either *tul*-nouns or bare nouns, whereas the monolinguals showed a preference for *tul*-nouns. This difference between the monolingual and bilingual speakers seemed to be due to a language change in Korea, not attrition, because the preference for *tul* in the construction varied greatly within the monolingual group. Only the younger monolinguals had a clear preference for *tul*-nouns over bare nouns, indicating that the use of *tul* in the construction had recently increased. The bilinguals behaved similarly to the older monolinguals, since they had been away from the home country for a prolonged period and thus could not keep up with the change in the use of *tul*. In the numeral construction, the bilinguals performed differently from the monolinguals again, showing a preference for *tul*-nouns. This time, however, the bilinguals' divergence seemed to be due to the underspecification of their representation of *tul* rather than due to language change, given the fact that the performance of the younger and older monolinguals did not differ. Furthermore, the bilinguals' preference for *tul* in the context correlated with the frequency of their L1 use. The result suggested that attrited speakers, who use *tul* in numeral contexts more often than non-attriters, may facilitate language change through their frequent contacts with other speakers in the immigrant societies and in Korea.

7.4.5 L2 influence

This thesis demonstrated that L2 plays an important role in attrition at both the level of representation and the level of processing. Firstly, in Experiment 1, there was a visible L2 effect on the processing of reflexives and proper nouns. The L2E group showed a larger RT for *caki* with TSC-violation than without, unlike other two groups. The L2E speakers' divergence was apparently a consequence of L2 influence on the processing of *caki*-binding, because English differs from

Korean in terms of the constraints for core binding. The L2J speakers whose L2 has similar binding constraints to Korean performed closely to the monolinguals in *caki*-binding. The L2E speakers, however, were slower than the monolinguals and the L2E speakers in the reading of proper nouns. The L2J speakers seemed to have had a higher expectation for a reflexive at the critical region than the L2E speakers, due to the fact that their L2 allows reflexives to violate the TSC. The L2J speakers' inefficiency in the processing of proper nouns was comparable with the L2E speakers' inefficiency in the processing of TSC-violating *caki*, because both were consequences of L2 influence on L1.

In Experiment 2, both the L2J and L2E groups exhibited significant differences from the monolinguals, but the L2E speakers displayed greater divergence from the monolinguals than the L2J speakers at both the representational and computational levels because the properties of their L2 differed from those of Korean with respect to plural marking. The L2E group showed a higher preference for *tul* than the L2J group under several conditions of the experiment (e.g. Figure 6.16), and the degree of their preference significantly correlated with the length and amount of their exposure to English (see Figure 6.20 and Figure 6.21). In contrast with the L2E speakers, the L2J speakers were even more conservative than the monolinguals in their use of *tul*. Under most conditions, they showed the lowest preference for *tul* among the three groups (e.g. Figure 6.24) because Japanese plural markers are less productive than *tul* and have more restricted distributions. The results from Experiments 1 and 2 confirm that the outcome of attrition is determined to a large extent by crosslinguistic differences between L1 and L2: attrition is likely to occur when L1 and L2 have different properties for the same grammatical phenomenon.

7.5 Contribution

This thesis presents contributions to theories of L1 attrition, methodologies for attrition research and the theoretical discussion on the distribution of the suffix *tul*.

7.5.1 *Theories of L1 attrition*

This thesis contributes to attrition research by enhancing the understanding of the extent and source of attrition in adult late bilinguals. As for the extent of attrition, this thesis presents implications for the existing generalisation in the research that attrition is a selective process (Seliger 1991). Since previous studies have shown that attrition typically manifests in structures that are sensitive to discourse-pragmatic constraints (e.g. Tsimpli et al. 2004, Wilson 2009), this study hypothesised that attrition occurs selectively and only affects structures whose distributions are grammatically underspecified. Unlike the prediction, the results showed that attrited speakers exhibited non-monolingual behaviour with respect to the processing of both grammatically specified and underspecified structures. However, the results also showed that the representation of grammatically determined structures is resistant to attrition. Korean immigrants whose length of residence in an L2 setting was as long as 25 years showed that their representation of binding constraints remained intact despite reduced L1 use. Although this finding does not exclude the possibility that the attrition of the binding constraints occurs 25 years post-migration, that seems unlikely considering the observation of previous studies that attrition typically manifests within the first 10 years of immigration and the time effect beyond 10 years is very weak (Ammerlaan 1996, de Bot & Clyne 1994, Gürel 2002). Therefore, the results of this study suggest that attrition is selective at least at the level of representation.

Regarding the source of attrition, this thesis provides empirical evidence that the divergence of attrited speakers from the monolingual performance is due to processing problems as well as representational underspecification. More specifically, the results of this thesis suggest that attrition effects on grammatically underspecified structures are attributable to both representational and computational problems, whereas the effects on grammatically specified structures are attributable mainly to computational limitation, i.e. inefficiency in on-line processing. This finding helps to understand the nature of non-convergence between attrited and non-attrited speakers' L1 use.

The results of this thesis also present implications for the IH. The results are consistent with the general prediction of the IH that structures that are sensitive to discourse-pragmatic conditions are more vulnerable to attrition than

others, as attrition was more clearly manifested in *tul*-attachment than in *caki*-binding. However, the results do not support the strong version of the IH that attrition does not affect structures that are not sensitive to discourse-pragmatic constraints, since attrited speakers of this study exhibited attrition in the processing of core binding of *caki*. This finding helps to specify the prediction of the IH for attrition.

The data from this study also builds on previous findings on the role of extralinguistic variables in attrition. In statistical analyses of a variety of sociobiographical factors, this study has found significant correlations between the degree of attrition and L2 speakers' frequency and amount of L1 use, length of residence in an L2 setting, age at migration and attitude toward L2. These results contribute to the investigation of the extent and role that each variable plays in attrition.

7.5.2 Methodologies for attrition research

This thesis offers a methodological contribution to attrition research by demonstrating that the combination of on- and off-line methods can be useful for investigating the nature of attrition effects. There has been robust evidence in the literature that adult L1 attrition is, to a large extent, computational rather than representational in nature (Köpke & Schmid 2004). However, not only the use of combined on- and off-line methodologies, but also the use of on-line methodologies has been extremely limited in previous attrition studies. This thesis shows that the comparison of on- and off-line data can help determine to what extent the source of an attrition effect is representational or computational.

For an off-line method, I employed the Magnitude Estimation technique instead of the conventional Likert scale. Although the ME technique has the advantage of offering more fine-grained and reliable judgement data (Bard et al. 1996, Keller 2000, Sorace & Keller 2005), it has been rarely used for attrition research. In this thesis, I show that ME is a useful tool for observing the subtle differences between the judgements of attrited and non-attrited speakers. In addition to an off-line task, I used an on-line self-paced reading task which also has been underused for attrition research so far. This thesis demonstrates that the task allows an insight into attrition effects on real-time comprehension of L1.

7.5.3 *The distribution of tul*

This thesis also contributes to the theoretical discussion on the suffix *tul*. Previous research on *tul* has depended mainly on a few individual speakers' judgements, but the judgements were often not agreed upon by other speakers. This study has investigated the distribution of *tul* through an analysis of empirical data obtained from a large group of Korean speakers. The results showed that judgements on *tul* are gradient in nature because the judgements are influenced by a combination of several semantic/pragmatic factors, including animacy, number-specificity and distributivity. With respect to distributivity, in particular, the results demonstrated that unattrited Korean speakers' preference for *tul*-marking varies considerably depending on whether the target noun occurs with a distributive or non-distributive predicate. At the same time, however, the results also showed that the speakers do not reject *tul*-nouns with non-distributive predicates. These findings are meaningful for the discussion on the function of *tul* since they are against several researchers' claim (Jun 2004, Park 2008) that *tul* is a distributive marker rather than a plural marker.

Another contribution of this thesis to the research on *tul* is that the study provided empirical evidence that there is language change in progress in the distribution of *tul*. The discrepant response patterns of the monolingual participants in the off-line and on-line tasks with respect to distributivity suggested that the status of *tul*-might be changing from a non-inflectional plural marker to an inflectional one, emphasising the need for more up-to-date data for future research on *tul*.

7.6 Limitations of the present study and directions for future research

The findings from this thesis suggest directions for future research of L1 attrition and *tul*-attachment. In the attrition field, future work could examine whether bilingual speakers who have had little contact with L1 exhibit any attrition in core binding of *caki*, as the majority of the attrited speakers of this study reported that they used L1 on a daily basis. In fact, it is difficult nowadays to find immigrant speakers who do not use L1 regularly, since most speakers have extensive

access to L1 media (e.g. TV, Internet), even in an L2 setting. However, since the frequency and amount of L1 use play a crucial role in the retention of L1 as demonstrated in this study, it would be ideal to test bilingual speakers who had limited contact with L1 for the investigation of whether the constraints for core binding are unaffected by attrition.

Future research on attrition could also investigate further to what extent attrition can affect structures that are not sensitive to discourse-pragmatic conditions. Although this study has not found any evidence of attrition in the representation of *caki*-binding, it is possible that attrition manifests in the representation of other structures that are grammatically determined. Therefore, the investigation of more various structures could help to determine the scope of attrition.

With respect to *tul*-attachment, the findings from this study highlight the need to further investigate speakers' perception and production of *tul* experimentally. Few studies to date have investigated *tul* using empirical data obtained from a large group of speakers; however, since this thesis has shown that there is a great deal of inter-speaker variation in judgements on *tul* and that there is an ongoing change in the distribution of *tul*, further research using experimental methods would greatly contribute to the theoretical discussion on *tul*. Particularly, as this study presents perception data only, data from production tasks would be useful for the debate whether *tul* is a distributive marker or simply a plural marker.

7.7 Summary

In this final chapter, I have presented a summary of Chapters 1-6 and a general discussion of experimental findings. I have then discussed the implications of the findings for attrition research and the discussion of Korean plural marking and suggested directions for future work.

This thesis has researched the syntax, interfaces and processing in native language attrition. Through an extensive study of Korean monolingual speakers, Korean-English, and Korean-Japanese bilingual speakers, this thesis has investigated the extent and source of attrition and the role of L2 and various extralinguistic factors in attrition. The detailed study of the data has revealed that: i) attrition manifests in both grammatically specified and underspecified structures;

ii) attrition effects on grammatically specified structures are largely attributable to computational problems; iii) attrition effects on grammatically underspecified structures are due not only to representational underspecification but also to processing inefficiency which is, at least in part, a consequence of bilingualism; and iv) the degree of attrited speakers' divergence from the monolinguals is determined by several extralinguistic factors, such as frequency and amount of L1 use, length of residence in an L2 setting and attitude toward L2. The data from this thesis has also attested that the distribution of the Korean plural suffix *tul* is determined by a combination of several semantic/pragmatic factors including animacy, number-specificity and distributivity and that the distribution is currently undergoing language change. The conclusions of this thesis not only enhance our understanding of attrition and bilingual language development, but also contribute to the study of Korean grammar.

APPENDIX A

Consent form for experimental participants

A.1 Korean version

언어학 실험 참가에 대한 동의서

다음의 내용을 주의 깊게 읽으십시오. 추후 참조를 위해 사본을 요구하셔도 됩니다.

- 실험내용: 모국어 퇴화과정에서의 문법과 언어처리
- 실험자: 고보혜
- 관련기관: 에딘버러 대학교 (The University of Edinburgh)

실험 개요: 귀하께서는 퇴화과정에 있는 모국어의 문법과 언어 처리에 관한 연구에 참여하시게 되었습니다. 본 실험에서는 일련의 한국어 문장이 주어집니다. 귀하께서는 주어진 문장들을 읽고 그에 대한 간단한 질문에 답하시게 됩니다. 실험 결과는 외국에 장기간 거주한 화자가 모국어를 어떻게 이해하고 처리하는지 연구하는데 도움이 될 것입니다.

위험사항 및 혜택: 실험 과정에서 발생하는 위험은 전혀 없습니다. 실험에 참여하는 것으로 귀하께서는 소정의 현금 (7파운드 상당)을 받으시게 되며, 이외의 혜택은 없습니다.

소요시간: 실험 참여에는 약 60분이 소요됩니다.

참여자의 권리: 귀하께서 이 동의서를 읽으신 후 본 실험에 참여하기로 결정하신다면, 귀하의 참여는 자발적이며 귀하께는 아무런 불이익 없이 언제라도 결정을 철회하거나 실험참여를 중단할 권리가 있음을 상기하여 주시기 바랍니다. 또한 귀하께는 특정한 질문에 답변을 거절할 권리가 있습니다. 귀하의 성함 및 개인 정보는 본 연구의 어떤 학술자료에도 노출되지 않을 것이며, 귀하의 답안은 오로지 연구자료의 분석을 위해서만 사용될 것입니다.

귀하께서 위에 명시된 조건에 동의하고 실험에 참여하시기를 원하신다면 아래에 서명하여 주십시오. 동의서에 서명함으로써 귀하께서는 아래의 조건을 충족시킨다는 것을 확인하게 됩니다:

- ◇ 나의 모국어는 한국어입니다.
- ◇ 나는 만 18세 이상입니다.
- ◇ 나는 위의 동의서를 읽고 이해하였으며 이에 동의합니다.
- ◇ 나는 위의 실험에 참여하기 원합니다.

참여자 번호:
날짜:

이름:
서명:

A.2 English translation

Informed Consent Form for Experimental Participants

Please read the following information carefully. You can also request a copy for future reference.

- Experiment: First Language Attrition: Syntax, Interfaces and Processing
 - Experimenter: Bohye Ko
 - Affiliation: The University of Edinburgh
-

DESCRIPTION: You are invited to participate in a research study that investigates the syntax and processing of the first language under attrition. In the experiment, you will be presented with a set of Korean sentences. You will be asked to read the sentences and then to answer simple questions about them. The result of the experiment will help us study how long-term immigrants understand and process their first language.

RISKS AND BENEFITS: There are no known risks involved in this procedure. Beyond the remuneration that you will receive (£7), there are no benefits to participation.

TIME INVOLVEMENT: Your participation will take approximately 60 minutes.

PARTICIPANT'S RIGHTS: If you have read this form and have decided to participate in this experiment, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty. You also have the right to refuse to answer particular questions. Your individual privacy will be protected in all published and written data resulting from the study, and the data you provide will be used for research purposes only.

If you agree with the above-stated conditions and are willing to participate in the experiment, please sign below. By signing the form, you confirm that you meet the following conditions:

- ◇ You are a native speaker of Korean.
- ◇ You are at least 18 years old.
- ◇ You have read the above consent form, understood it and you agree to it.
- ◇ You want to participate in the above-mentioned experiment.

Subject Number:
Date:

Name:
Signature:

APPENDIX B

Questionnaire for the monolingual group

B.1 Korean version

한국어 화자의 언어 사용에 관한 설문지

본 설문지는 한국어 화자의 사회언어적 배경을 조사하기 위한 것입니다. 여러분은 자신의 언어사용에 대한 9개의 질문을 받게 될 것입니다. 설문지 작성 중에 궁금하신 점이 있으시면 주저하지 마시고 질문해 주십시오. 여러분께서 제공하시는 모든 정보는 안전하게 처리되며 연구의 목적으로만 사용될 것입니다.

1. 생년월일이 언제입니까? / / (년/월/일)
2. 성별이 무엇입니까? 남 / 여
3. 태어나 자란 곳이 어디입니까? (지역 혹은 도시)
4. 이제까지 받아본 최고 교육과정이 무엇입니까?
 초등학교 중/고등학교 대학교 대학원 (석/박사)
5. 초등학교에 들어가기 전 영어를 배웠습니까?
 아니요 예
 - ('아니요'라고 대답했다면) 학교에서 영어를 배웠습니까? 만약 배웠다면, 언제 처음으로 영어수업을 들었는지 기록해 주십시오.
 아니요 예 (만 세 때)
 - ('예'라고 대답했다면) 언제 처음으로 영어를 접했는지 기록해 주십시오.
 만 세 때
6. 현재 자신의 전반적인 영어 실력을 평가한다면 어떤 수준입니까?
 초급 중하급 중급 중상급 상급 원어민 수준
7. 평상시 영어를 얼마나 자주 사용합니까? (듣기, 말하기, 읽기, 쓰기 모두 포함해서)
 거의 하지 않음 일년에 몇 번 한 달에 여러 번
 한 주에 여러 번 거의 매일

(계속)

8. 영어를 사용한다면 그 이유가 주로 무엇입니까?

- 업무 관련 학습 관련 사교/친목 취미활동
 기타:

9. 영어 이외에 배웠던 언어가 있습니까? 만약 있다면 어떤 언어인지, 어느 정도 수준인지를 기록해 주십시오.

- 아니요
 예

• 언어 1:

- 초급 중하급 중급
 중상급 상급 원어민 수준

• 언어 2:

- 초급 중하급 중급
 중상급 상급 원어민 수준

이제 여러분은 설문지 작성을 완료하셨습니다. 혹시 추가하고 싶으신 내용이 있습니까? 언어와 관련된 내용을 비롯해 설문지 자체에 대한 어떤 의견이라도 괜찮습니다.

참여해 주셔서 감사합니다.

B.2 English translation

Sociolinguistic questionnaire for the monolingual speakers

This questionnaire is to investigate the sociolinguistic background of native Korean speakers. You will be asked 9 questions about your language use. Should you have any questions while completing the form, please do not hesitate to ask. All the information that you provide will be handled with confidentiality and will be used for research purposes only.

1. What is your date of birth? / / (Date/Month/Year)
2. What is your gender? Male / Female
3. Where did you grow up? / (Province or city)
4. What is the highest level of education you have received?
 Primary Secondary Undergraduate Postgraduate
5. Did you learn English before starting school?
 No Yes
 - (If you answered 'No') Did you learn English at school? If so, please indicate when you attended your first English class.
 No Yes (Age:)
 - (If you answered 'Yes') Please indicate when you were first exposed to the language.
 Age:
6. In general, how would you rate your English language proficiency at present?
 Beginner Low intermediate Intermediate High intermediate
 Advanced Native-like
7. How often do you use English? (Including listening, speaking, reading and writing)
 Almost never A few times a year Several times a month
 Several times a week Almost everyday

(Continued)

8. If you use English, what do you use it most for?
- Work Study Social activities Hobbies
- Other:
9. Did you learn any languages other than English? If yes, please indicate the language(s) you speak and your level of proficiency.
- No
- Yes
- Language 1:
 - Beginner Low intermediate Intermediate
 - High intermediate Advanced Native-like
 - Language 2:
 - Beginner Low intermediate Intermediate
 - High intermediate Advanced Native-like

You have reached the end of this questionnaire. Is there anything you would like to add? This can be anything from language-related comments to remarks about the questionnaire itself.

Thank you.

APPENDIX C

Questionnaire for the L2 English group

C.1 Korean version

영어권 거주자의 언어 사용에 관한 설문지

본 설문지는 미국 내의 한국인 이민자의 사회언어적 배경을 조사하기 위한 것입니다. 여러분은 자신의 언어사용에 대한 24개의 질문을 받게 될 것입니다. 설문지 작성 중에 궁금하신 점이 있으시면 주저하지 마시고 질문해 주십시오. 여러분께서 제공하시는 모든 정보는 안전하게 처리되며 연구의 목적으로만 사용될 것입니다.

1. 생년월일이 언제입니까? / / (년/월/일)

2. 성별이 무엇입니까? 남 / 여

3. 태어나 자란 곳이 어디입니까? (지역 혹은 도시)

4. 언제 미국으로 이주하셨습니까? / (년/월)

5. 미국으로 이주하신 이유가 무엇입니까?
 교육 취업/사업 결혼/가족 기타

6. 한국과 미국을 제외한 국가에 6개월 이상 체류하신 적이 있습니까? 만약 그렇다면 어느 나라에 얼마동안 머물렀는지 기록해 주십시오.
 아니요
 예 (국가: 기간:) (예시: 영국, 8개월)

7. 한국어와 영어 외에 배웠던 언어가 있습니까? 만약 있다면 어떤 언어인지, 어느 정도 수준인지를 기록해 주십시오.
 아니요
 예
 - 언어 1:

<input type="checkbox"/> 초급	<input type="checkbox"/> 중하급	<input type="checkbox"/> 중급
<input type="checkbox"/> 중상급	<input type="checkbox"/> 상급	<input type="checkbox"/> 원어민 수준
 - 언어 2:

<input type="checkbox"/> 초급	<input type="checkbox"/> 중하급	<input type="checkbox"/> 중급
<input type="checkbox"/> 중상급	<input type="checkbox"/> 상급	<input type="checkbox"/> 원어민 수준

(계속)

8. 미국으로 이주하기 전 한국에서 받았던 최고 교육과정이 무엇입니까?
 초등학교 중/고등학교 대학교 대학원 (석/박사)
9. 미국에서 받은 교육과정이 무엇입니까? 해당되는 모든 항목을 선택해 주십시오.
 없음
 초등학교 중/고등학교 대학교 대학원 (석/박사)
10. 미국으로 이주하기 전에 영어를 배웠습니까? 만약 배웠다면, 언제 처음으로 영어를 접했는지 기록해 주십시오.
 아니요 예 (만 세 때)
11. 미국으로 이주하기 전 자신의 전반적인 영어 실력을 평가한다면 어떤 수준입니까?
 초급 중하급 중급 중상급 상급 원어민 수준
12. 현재 자신의 전반적인 영어 실력을 평가한다면 어떤 수준입니까?
 초급 중하급 중급 중상급 상급 원어민 수준
13. 영어를 잘 하는 것이 스스로에게 어느 정도 중요하다고 생각합니까?
 전혀 중요하지 않음 중요하지 않음 의견 없음
 중요함 매우 중요함
14. 미국으로 이주하신 이후 자신의 한국어 실력이 변했다고 생각하십니까?
 아니요
 예, 더 나아졌습니다 아니요, 더 나빠졌습니다
15. 현재 자신의 전반적인 한국어 실력을 평가한다면 어떤 수준입니까?
 매우 부족함 부족함 보통 훌륭함 매우 훌륭함
16. 평상시 한국어와 영어 중 더 편하게 느껴지는 언어가 무엇입니까?
 한국어 영어 차이 없음

(계속)

17. 평상시 한국어를 얼마나 자주 사용합니까? (듣기, 말하기, 읽기, 쓰기 모두 포함해서)

- 거의 하지 않음 일년에 몇 번 한 달에 여러 번
 한 주에 여러 번 거의 매일

18. 다음의 장소에서 어떤 언어를 사용합니까? 다음 6가지 중 하나에 표시해 주세요.

	집	학교, 직장	교회, 지역 사회 모임	사교, 친목 모임
항상 한국어로				
영어보다 한국어로 더 많이				
영어와 한국어를 비슷하게				
한국어보다 영어로 더 많이				
항상 영어로				
해당사항 없음				

19. 다음의 활동을 얼마나 자주 합니까? 다음 5가지 중 하나에 표시해 주세요.

	한국어 TV 시청 또는 라디오 청취	한국어 웹사이트 보기	한국 신문, 책, 잡지 등 읽기	한국에 있는 가족, 친척 및 친구들과 연락
거의 매일				
한 주에 여러 번				
한 달에 여러 번				
일 년에 몇 번				
거의 하지 않음				

20. 한국을 얼마나 자주 방문합니까?

- 거의 하지 않음 5-10년에 한 번 정도 2-5년에 한 번 정도
 매년 1년에 두 번 이상

(계속)

21. 한국에 방문할 때 보통 얼마나 머무릅니까?
 2주 미만 2-4주 1-3개월
 3개월 이상
22. 미국으로 이주한 이후, 한국에 6개월 이상 체류한 적이 있습니까? 만약 있다면 언제였는지, 얼마나 머물렀는지, 그 이유가 무엇이었는지 기록해 주십시오.
 아니요
 예 (기간: _____ 이유: _____)
23. 자신의 한국어 실력을 유지하는 것이 중요하다고 생각합니까?
 전혀 중요하지 않음 중요하지 않음 의견 없음
 중요함 매우 중요함
24. 미래에 한국으로 돌아가서 생활할 의향이 있습니까?
 아니요, 한국으로 돌아갈 의향이 없습니다.
 별로 생각해본 적이 없습니다.
 예, 언젠가는 한국에 돌아가고 싶습니다.

이제 여러분은 설문지 작성을 완료하셨습니다. 혹시 추가하고 싶으신 내용이 있습니까? 언어와 관련된 내용을 비롯해 설문지 자체에 대한 어떤 의견이라도 괜찮습니다.

참여해 주셔서 감사합니다.

8. What is the highest level of education you received in Korea prior to immigration?
 Primary Secondary Undergraduate Postgraduate
9. What level of education have you received while living in the US? Please select all that apply to you.
 None
 Primary Secondary Undergraduate Postgraduate
10. Did you learn English before you moved to the US? If yes, please indicate when you were first exposed to the language.
 No Yes (Age:)
11. In general, how would you rate your English language proficiency before you moved to the US?
 Beginner Low intermediate Intermediate High intermediate
 Advanced Native-like
12. How would you rate your English language proficiency at present?
 Beginner Low intermediate Intermediate High intermediate
 Advanced Native-like
13. How important is it for you to speak English well?
 Not important at all Not very important No opinion
 Important Very important
14. Do you think your Korean language proficiency has changed since you moved to the US?
 No
 Yes, it has become better. Yes, it has become worse.
15. How would you rate your Korean language proficiency at present?
 Very poor Poor Average Good Very good
16. In which language do you feel more comfortable?
 Korean English No difference

(Continued)

17. How often do you use Korean? (Including listening, speaking, reading and writing)

- Almost never A few times a year Several times a month
 Several times a week Almost everyday

18. Which language do you use at the following places? Please tick one out of the six choices.

	Home	School, work-place	Church, community gatherings	Social gatherings
<i>Always in Korean</i>				
<i>More in Korean than in English</i>				
<i>In Korean and English almost equally</i>				
<i>More in English than in Korean</i>				
<i>Always in English</i>				
<i>Not applicable</i>				

19. How often do you do the following activities? Please tick one out of the five choices.

	Watching or listening Korean TV/radio programs	Surfing Korean websites	Reading Korean books, newspapers, or magazines	Contacting family or friends in Korea
<i>Almost everyday</i>				
<i>Several times a week</i>				
<i>Several times a month</i>				
<i>A few times a year</i>				
<i>Almost never</i>				

20. How often do you visit Korea?

- Almost never Once every 5-10 years Once every 2-5 years
 Every year More than twice a year

(Continued)

21. How long do you usually stay each time you visit Korea?
 Less than 2 weeks 2-4 weeks 1-3 months
 More than 3 months
22. Have you have stayed in Korea for more than 6 months since you moved to the US? If yes, please specify when it was, how long you stayed and why.
 No
 Yes (Period: _____ Reason: _____)
23. Is it important for you to maintain your Korean proficiency?
 Not important at all Not very important No opinion
 Important Very important
24. Do you intend to move back to Korea someday?
 No, I don't intend to return to Korea.
 I haven't given it much thought.
 Yes, I would eventually like to move back to Korea.

You have reached the end of this questionnaire. Is there anything you would like to add? This can be anything from language-related comments to remarks about the questionnaire itself.

Thank you.

APPENDIX D

Questionnaire for the L2 Japanese group

8. 일본으로 이주하기 전 한국에서 받았던 최고 교육과정이 무엇입니까?
 초등학교 중/고등학교 대학교 대학원 (석/박사)
9. 일본에서 받은 교육과정이 무엇입니까? 해당되는 모든 항목을 선택해 주십시오.
 없음
 초등학교 중/고등학교 대학교 대학원 (석/박사)
10. 일본으로 이주하기 전에 일본어를 배웠습니까? 만약 배웠다면, 언제 처음으로 일본어를 접했는지 기록해 주십시오.
 아니요 예 (만 세 때)
11. 일본으로 이주하기 전 자신의 전반적인 일본어 실력을 평가한다면 어떤 수준입니까?
 초급 중하급 중급 중상급 상급 원어민 수준
12. 현재 자신의 전반적인 일본어 실력을 평가한다면 어떤 수준입니까?
 초급 중하급 중급 중상급 상급 원어민 수준
13. 일본어를 잘 하는 것이 스스로에게 어느 정도 중요하다고 생각합니까?
 전혀 중요하지 않음 중요하지 않음 의견 없음
 중요함 매우 중요함
14. 일본으로 이주하신 이후 자신의 한국어 실력이 변했다고 생각하십니까?
 아니요
 예, 더 나아졌습니다 아니요, 더 나빠졌습니다
15. 현재 자신의 전반적인 한국어 실력을 평가한다면 어떤 수준입니까?
 매우 부족함 부족함 보통 훌륭함 매우 훌륭함
16. 평상시 한국어와 일본어 중 더 편하게 느껴지는 언어가 무엇입니까?
 한국어 일본어 차이 없음

(계속)

17. 평상시 한국어를 얼마나 자주 사용합니까? (듣기, 말하기, 읽기, 쓰기 모두 포함해서)

- 거의 하지 않음 일년에 몇 번 한 달에 여러 번
 한 주에 여러 번 거의 매일

18. 다음의 장소에서 어떤 언어를 사용합니까? 다음 6가지 중 하나에 표시해 주세요.

	집	학교, 직장	교회, 지역 사회 모임	사교, 친목 모임
항상 한국어로				
일본어보다 한국어로 더 많이				
일본어와 한국어를 비슷하게				
한국어보다 일본어로 더 많이				
항상 일본어로				
해당사항 없음				

19. 다음의 활동을 얼마나 자주 합니까? 다음 5가지 중 하나에 표시해 주세요.

	한국어 TV 시청 또는 라디오 청취	한국어 웹사 이트 보기	한국 신문, 책, 잡지 등 읽기	한국에 있는 가족, 친척 및 친구들과 연락
거의 매일				
한 주에 여러 번				
한 달에 여러 번				
일 년에 몇 번				
거의 하지 않음				

20. 한국을 얼마나 자주 방문합니까?

- 거의 하지 않음 5-10년에 한 번 정도 2-5년에 한 번 정도
 매년 1년에 두 번 이상

(계속)

21. 한국에 방문할 때 보통 얼마나 머무릅니까?
 2주 미만 2-4주 1-3개월
 3개월 이상
22. 일본으로 이주한 이후, 한국에 6개월 이상 체류한 적이 있습니까? 만약 있다면 언제였는지, 얼마나 머물렀는지, 그 이유가 무엇이었는지 기록해 주십시오.
 아니요
 예 (기간: 이유:)
23. 자신의 한국어 실력을 유지하는 것이 중요하다고 생각합니까?
 전혀 중요하지 않음 중요하지 않음 의견 없음
 중요함 매우 중요함
24. 미래에 한국으로 돌아가서 생활할 의향이 있습니까?
 아니요, 한국으로 돌아갈 의향이 없습니다.
 별로 생각해본 적이 없습니다.
 예, 언젠가는 한국에 돌아가고 싶습니다.

이제 여러분은 설문지 작성을 완료하셨습니다. 혹시 추가하고 싶으신 내용이 있습니까? 언어와 관련된 내용을 비롯해 설문지 자체에 대한 어떤 의견이라도 괜찮습니다.

참여해 주셔서 감사합니다.

8. What is the highest level of education you received in Korea prior to immigration?
 Primary Secondary Undergraduate Postgraduate
9. What level of education have you received while living in Japan? Please select all that apply to you.
 None
 Primary Secondary Undergraduate Postgraduate
10. Did you learn Japanese before you moved to Japan? If yes, please indicate when you were first exposed to the language.
 No Yes (Age:)
11. In general, how would you rate your Japanese language proficiency before you moved to Japan?
 Beginner Low intermediate Intermediate High intermediate
 Advanced Native-like
12. How would you rate your Japanese language proficiency at present?
 Beginner Low intermediate Intermediate High intermediate
 Advanced Native-like
13. How important is it for you to speak Japanese well?
 Not important at all Not very important No opinion
 Important Very important
14. Do you think your Korean language proficiency has changed since you moved to Japan?
 No
 Yes, it has become better. Yes, it has become worse.
15. How would you rate your Korean language proficiency at present?
 Very poor Poor Average Good Very good
16. In which language do you feel more comfortable?
 Korean Japanese No difference

(Continued)

17. How often do you use Korean? (Including listening, speaking, reading and writing)

- Almost never A few times a year Several times a month
 Several times a week Almost everyday

18. Which language do you use at the following places? Please tick one out of the six choices.

	Home	School, work-place	Church, community gatherings	Social gatherings
<i>Always in Korean</i>				
<i>More in Korean than in Japanese</i>				
<i>In Korean and Japanese almost equally</i>				
<i>More in Japanese than in Korean</i>				
<i>Always in Japanese</i>				
<i>Not applicable</i>				

19. How often do you do the following activities? Please tick one out of the five choices.

	Watching or listening Korean TV/radio programs	Surfing Korean websites	Reading Korean books, newspapers, or magazines	Contacting family or friends in Korea
<i>Almost everyday</i>				
<i>Several times a week</i>				
<i>Several times a month</i>				
<i>A few times a year</i>				
<i>Almost never</i>				

20. How often do you visit Korea?

- Almost never Once every 5-10 years Once every 2-5 years
 Every year More than twice a year

(Continued)

21. How long do you usually stay each time you visit Korea?
 Less than 2 weeks 2-4 weeks 1-3 months
 More than 3 months
22. Have you have stayed in Korea for more than 6 months since you moved to Japan? If yes, please specify when it was, how long you stayed and why.
 No
 Yes (Period: _____ Reason: _____)
23. Is it important for you to maintain your Korean proficiency?
 Not important at all Not very important No opinion
 Important Very important
24. Do you intend to move back to Korea someday?
 No, I don't intend to return to Korea.
 I haven't given it much thought.
 Yes, I would eventually like to move back to Korea.

You have reached the end of this questionnaire. Is there anything you would like to add? This can be anything from language-related comments to remarks about the questionnaire itself.

Thank you.

APPENDIX E

Test materials

(Note: All of the test materials were presented to participants using the Korean alphabet *Hankul*. The followings are target items transcribed following the Yale Romanization system. Filler items are not included. See <List of Abbreviations> (p. vii) for the abbreviations used for transcription.)

E.1 Experiment 1: Core binding of *caki*

E.1.1 *The off-line task*

Condition A: without the violation of the TSC

(1) a. Reflexive:

Tohyen-i Senhuy-eykey **caki**-uy sacin-ul poyecwu-ess-ta.
T-NOM S-DAT self-GEN picture-ACC show-PST-DEC
'Tohyen_i showed Senhuy_j self_{i/j}'s picture.'

b. Proper N:

Hyensek-i Yengmi-eykey **Minswu**-uy sacin-ul poyecwu-ess-ta.
H-NOM Y-DAT M-GEN picture-ACC show-PST-DEC
'Hyensek showed Yengmi Minswu's picture.'

(2) a. Reflexive:

Unyeng-i Hyengcwu-eykey **caki**-uy kongchayk-ul
U-NOM H-DAT self-GEN notebook-ACC
kenneycwu-ess-ta.
hand-PST-DEC

'Unyeng_i handed Hyengcwu_j self_{i/j}'s notebook.'

b. Proper N:

Sengun-i Seymi-eykey **Hyense**-uy kongchayk-ul
S-NOM S-DAT H-GEN notebook-ACC
kenneycwu-ess-ta.
hand-PST-DEC

'Sengun handed Seymi Hyense's notebook.'

- (3) a. Reflexive:
 Cwunhyek-i Cengswu-eykey **caki-uy** cemsu-lul
 C-NOM C-DAT self-GEN grade-ACC
 allyecwu-ess-ta.
 inform-PST-DEC
 'Cwunhyek_i told Cengswu_j self_{i/j}'s grade.'
- b. Proper N:
 Hyeyyeng-i Chelswu-eykey **Unse-uy** cemsu-lul allyecwu-ess-ta.
 H-NOM C-DAT U-GEN grade-ACC inform-PST-DEC
 'Hyeyyeng told Chelswu Unse's grade.'

Condition B: with the violation of the TSC

- (4) a. Reflexive:
 Minyeng-i Cwunsey-eykey [**caki-ka** ipen senke-eyse
 M-NOM C-DAT self-NOM this election-LOC
 tangsen-toy-ess-ta]-ko malha-ess-ta.
 elect-PAS-PST-DEC-COMP say-PST-DEC
 'Minyeng_i told Cwunsey_j that self_{i/j} won this election.'
- b. Proper N:
 Hyenseng-i Yenghuy-eykey [**Senmi-ka** ipen senke-eyse
 H-NOM Y-DAT S-NOM this election-LOC
 tangsen-toy-ess-ta]-ko malha-ess-ta.
 elect-PAS-PST-DEC-COMP say-PST-DEC
 'Hyenseng told Yenghuy that Senmi won this election.'
- (5) a. Reflexive:
 Minsek-i Ciswu-eykey [**caki-ka** ipen sihem-ey
 M-NOM C-DAT self-NOM this test-LOC
 hapkyekha-ess-ta]-ko malha-ess-ta.
 pass-PST-DEC-COMP say-PST-DEC
 'Minsek_i told Ciswu_j that self_{i/j} passed this test.'
- b. Proper N:
 Caysin-i Unhyey-eykey [**Hyengcwu-ka** ipen sihem-ey
 C-NOM U-DAT H-NOM this test-LOC
 hapkyekha-ess-ta]-ko malha-ess-ta.
 pass-PST-DEC-COMP say-PST-DEC
 'Caysin told Unhyey that Hyengcwu passed this test.'

- (6) a. Reflexive:

Tayseng-i Cina-eykey [**caki**-ka cinan tayhoy-eyse
 T-NOM C-DAT self-NOM last competition-LOC
 wusungha-ess-ta]-ko malha-ess-ta.
 win-PST-DEC-COMP say-PST-DEC

'Tayseng_i told Cina_j that self_{i/j} won the last competition.'

b. Proper N:

Minyeng-i Hyenci-eykey [**Songi**-ka cinan tayhoy-eyse
 M-NOM H-DAT S-NOM last competition-LOC
 wusungha-ess-ta]-ko malha-ess-ta.
 win-PST-DEC-COMP say-PST-DEC

'Minyeng told Hyenci that Songi won the last competition.'

E.1.2 The on-line task

Condition A: without the violation of the TSC

(7) a. Reflexive:

(Context: Senhuy opened an old album.)

Kuleca Tohyen-i Senhuy-eykey **caki**-uy sacin-ul
 then T-NOM S-DAT self-GEN picture-ACC
 poyecwu-ess-ta.
 show-PST-DEC

'Then Tohyen_i showed self_{i/j}'s picture to Senhuy_j.'

Statement: 'Senhuy opened an album.' (True)

b. Proper N:

(Context: Yengmi wanted to see her friends' pictures.)

Kuleca Hyensek-i Yengmi-eykey **Minswu**-uy sacin-ul
 then H-NOM Y-DAT M-GEN picture-ACC
 poyecwu-ess-ta.
 show-PST-DEC

'Then Hyensek showed Minswu's picture to Yengmi.'

Statement: 'Yengmi saw a picture of herself.' (False)

(8) a. Reflexive:

(Context: Hyengcwu said that he would write down the meeting's agenda.)

Kuleca Unyeng-i Hyengcwu-eykey **caki**-uy kongchayk-ul
 then U-NOM H-DAT self-GEN notebook-ACC
 kenneycwu-ess-ta.
 hand-PST-DEC

'Then Unyeng_i handed Hyengcwu_j self_{i/j}'s notebook.'

Statement: 'Unyeng said that she would write down the meeting's agenda.'
 (False)

- b. Proper N:
 (Context: Seymi said that she wanted to know what the lecture was about.)
 Kuleca Sengun-i Seymi-eykey **Hyense**-uy kongchayk-ul
 then S-NOM S-DAT H-GEN notebook-ACC
 kenneycwu-ess-ta.
 hand-PST-DEC
 'Then Sengun handed Seymi Hyense's notebook.'
 Statement: 'Sengun handed Seymi a notebook.' (True)
- (9) a. Reflexive:
 (Context: Cengswu asked about the result of the test.)
 Kuleca Cwunhyek-i Cengswu-eykey **caki**-uy cemsu-lul
 then C-NOM C-DAT self-GEN grade-ACC
 allyecwu-ess-ta.
 inform-PST-DEC
 'Then Cwunhyek_i told Cengswu_j self_{i/j}'s grade.'
 Statement: 'Cengswu asked about the result of the test.' (True)
- b. Proper N:
 (Context: Chelswu said that he didn't know his friends' grades.)
 Kuleca Hyeyyeng-i Chelswu-eykey **Unse**-uy cemsu-lul
 then H-NOM C-DAT U-GEN grade-ACC
 allyecwu-ess-ta.
 inform-PST-DEC
 'Then Hyeyyeng told Chelswu Unse's grade.'
 Statement: 'Hyeyyeng didn't tell Unse's grade to anyone.' (False)

Condition B: with the violation of the TSC

- (10) a. Reflexive:
 (Context: Cwunsey asked about the result of the election.)
 Kuleca Minyeng-i Cwunsey-eykey [**caki**-ka ipen senke-eyse
 then M-NOM C-DAT self-NOM this election-LOC
 tangsen-toy-ess-ta]-ko malha-ess-ta.
 elect-PAS-PST-DEC-COMP say-PST-DEC
 'Then Minyeng_i told Cwunsey_j that self_{i/j} won this election.'
 Statement: 'Cwunsey asked about the exam.' (False)
- b. Proper N:
 (Context: Yenghuy said that she wanted to know the ballot result.)
 Kuleca Hyenseng-i Yenghuy-eykey [**Senmi**-ka ipen senke-eyse
 then H-NOM Y-DAT S-NOM this election-LOC
 tangsen-toy-ess-ta]-ko malha-ess-ta.
 elect-PAS-PST-DEC-COMP say-PST-DEC

'Then Hyenseng told Yenghuy that Senmi won this election.'
Statement: 'Senmi won the election.' (True)

(11) a. Reflexive:

(Context: Ciswu asked who the final winner of the test was.)

Kuleca Minsek-i Ciswu-eykey [**caki**-ka ipen sihem-ey
 then M-NOM C-DAT self-NOM this test-LOC
 hapkyekha-ess-ta]-ko malha-ess-ta.
 pass-PST-DEC-COMP say-PST-DEC

'Then Minsek_i told Ciswu_j that self_{i/j} passed this test.'

Statement: 'Ciswu asked who the winner was.' (True)

b. Proper N:

(Context: Unhyey was about to check the pass list.)

Kuleca Caysin-i Unhyey-eykey [**Hyengcwu**-ka ipen sihem-ey
 then C-NOM U-DAT H-NOM this test-LOC
 hapkyekha-ess-ta]-ko malha-ess-ta.
 pass-PST-DEC-COMP say-PST-DEC

'Then Caysin told Unhyey that Hyengcwu passed this test.'

Statement: 'Hyengcwu failed the test.' (False)

(12) a. Reflexive:

(Context: Cina said that she wondered what the result of the competition was.)

Kuleca Tayseng-i Cina-eykey [**caki**-ka cinan tayhoy-eyse
 then T-NOM C-DAT self-NOM last competition-LOC
 wusungha-ess-ta]-ko malha-ess-ta.
 win-PST-DEC-COMP say-PST-DEC

'Then Tayseng_i told Cina_j that self_{i/j} won the last competition.'

Statement: 'Cina wanted to know the result of the competition.' (True)

b. Proper N:

(Context: Hyenci asked who the winner of the athletic meet was.)

Kuleca Minyeng-i Hyenci-eykey [**Songi**-ka cinan tayhoy-eyse
 then M-NOM H-DAT S-NOM last competition-LOC
 wusungha-ess-ta]-ko malha-ess-ta.
 win-PST-DEC-COMP say-PST-DEC

'Then Minyeng told Hyenci that Songi won the last competition.'

Statement: 'Minyeng didn't tell who the winner was.' (False)

E.2 Experiment 2a: Animacy in *tul*-markingE.2.1 *The off-line task**Human nouns*

(13) a. Bare N:

Iwuscip-ey elin nammay-ka salkoiss-nun-tey, ku
 next.door-LOC young brother.sister-NOM live-IN-and the
ai-nun mwuchek yamcena-ta.
 child-TOP very quiet-DEC

'A young brother and a sister live next door to me and the child/children are very quiet.'

b. N+*tul*:

Pan-ey ssangtwung.i hyengjey-ka cenhakwa-ss-nun-tey, ku
 class-LOC twin brother-NOM transfer-PST-IN-and the
ai-tul-un mwuchek yeyuypalu-ta.
 child-PL-TOP very polite-DEC

'A twin brother transferred to our class and the children are very polite.'

(14) a. Bare N:

Cinchalsil-ey ai-ka sey myeng iss-ess-nun-tey,
 examining.room-LOC child-NOM three CL exist-PST-IN-and
 ku **ai-nun** pohoca-lul kitali-nun cwung-i-ess-ta.
 the child-TOP guardian-ACC wait-IN PRG-be-PST-DEC

'There were three kids in the examining room and the child/children were waiting for their guardian.'

b. N+*tul*:

Wuntongcang-ey ai-ka ney myeng iss-ess-nun-tey, ku
 playground-LOC child-NOM four CL exist-PST-IN-and the
ai-tul-un pwumonim-ul kitali-nun cwung-i-ess-ta.
 child-PL-TOP parents-ACC wait-IN PRG-be-PST-DEC

'There were four kids in the playground and the children were waiting for their parents.'

Animal nouns

(15) a. Bare N:

Yepcip sonyen-eykeynun tokki-ka twu mali iss-nun-tey, ku
 next.door boy-DAT rabbit-NOM two CL exist-IN-and the
tokki-nun mwuchek salangsulep-ta.
 rabbit-TOP very adorable-DEC

'The boy next door has two rabbits and the rabbit/rabbits are very adorable.'

b. N+tul:

Nay tongsayng-eykeynun tokki-ka twu mali iss-nun-tey, ku
my younger.sibling-DAT rabbit-NOM two CL exist-IN-and the
tokki-tul-un mwuchek tosiltosilha-ta.
rabbit-PL-TOP very chubby-DEC.

'My younger brother/sister has two rabbits and the rabbits are very chubby.'

(16) a. Bare N:

Wuli sikolcip-eynun tokki-ka sey mali iss-nun-tey, ku
my cottage-LOC rabbit-NOM three CL exist-IN-and the
tokki-nun coka-ka matkikoka-n kes-i-ta.
rabbit-TOP nephew-TOP leave (temporarily)-RL thing-be-DEC

'There are three rabbits in my cottage and the rabbit/rabbits are what my nephew left to me (temporarily).'

b. N+tul:

Oysamchon tayk-eynun tokki-ta ney mali iss-nun-tey, ku
uncle house-LOC rabbit-NOM four CL exist-IN-and the
tokki-tul-un yepcip-eyse senmwul-lo cwu-n kes-i-ta.
rabbit-PL-TOP neighbour-from gift-as give-RL thing-be-DEC

'There are four rabbits in my uncle's house and the rabbits were given as a gift from a neighbour.'

Inanimate nouns

(17) a. Bare N:

Pang-eynun chayk-i twu kwen namaiss-ess-nun-tey, ku
room-LOC book-NOM two CL remain-PST-IN-and the
chayk-un koin-i cohaha-te-n kes-i-ess-ta.
book-TOP the.deceased-NOM like-PAS-RL thing-be-PST-DEC

'There were two books remaining in the room and the book/books were what the deceased liked.'

b. N+tul:

Chayksang-eynun chayk-i twu kwen nohyeiss-ess-nun-tey, ku
desk-LOC book-NOM two CL lie-PST-IN-and the
chayk-tul-un apeci-ka sata-cwu-si-n kes-i-ess-ta.
book-PL-TOP father-NOM buy-give-HON-RL thing-be-PST-DEC

'There were two books on the desk and the books were what my father had bought (for me).'

(18) a. Bare N:

Chimtay-eynun chayk-i sey kwen nohyeiss-ess-nun-tey, ku
 bed-LOC book-NOM three CL lie-PST-IN-and the
chayk-un ku-ka camtulki cen ilk-te-n
 book-TOP he-NOM fall.asleep before read-PST-RL
 kes-i-ess-ta.
 thing-be-PST-DEC

'There were three books on the bed and the book/books were what he had read before falling asleep.'

b. N+tul:

Takca-eynun chayk-i ney kwen nohyeiss-ess-nun-tey, ku
 table-LOC book-NOM four CL lie-PST-IN-and the
chayk-tul-un ku-ka cikcep penyekha-n kes-i-ess-ta.
 book-PL-TOP he-NOM by.oneself translate-RL thing-be-PST-DEC

'There were four books on the table and the books were what he himself had translated.'

E.2.2 *The on-line task*

Human nouns

(19) a. Bare N:

(Context: A few days ago, a young brother and a sister moved next door to me.)

Ku **ai-nun** mwuchek yamcenhay poi-ess-ta.
 the child-TOP very quiet/shy seem-PST-DEC

'The child/children seemed to be very quiet.'

Statement: 'An old couple moved next door to me.' (False)

b. N+tul:

(Context: Some time ago, twin brothers transferred to the class next to mine.)

Ku **ai-tul-un** mwuchek hwaltalhay poi-ess-ta.
 the child-PL-TOP very outgoing seem-PST-DEC

'The children seemed to be very outgoing.'

Statement: 'Twin brothers transferred some time ago.' (True)

(20) a. Bare N:

(Context: Three children of similar height were remaining in the classroom.)

Ku **ai-nun** meli-lul mattay-ko mwenka uynonhanun
 the child-TOP head-ACC put.together-and something discuss
 cwung-i-ess-ta.
 PRG-be-PST-DEC

'The child/children were putting their heads together and discussing something.'

Statement: 'There was no one in the classroom.' (False)

b. N+tul:

(Context: Four kids of similar age were remaining in the playground.)

Ku **ai-tul-un** meli-lul mattay-ko mwenka
the children-PL-TOP head-ACC put.together-and something
kyeyhoykhanun cwung-i-ess-ta.

plan PRG-be-PST-DEC

'The children were putting their heads together and planning something.'

Statement: 'The playground was empty.' (False)

Animal nouns

(21) a. Bare N:

(Context: The boy next door got two pet rabbits.)

Ku **tokki-nun** chesnal-pwute sonyen-uy salag-ul tumppwuk
the rabbit-TOP first.day-from boy-GEN affection-ACC generously
pata-ss-ta.

receive-PST-DEC

'The rabbit/rabbits received the boy's affection generously from the first day.'

Statement: 'The boy next door got pet rabbits.' (True)

b. N+tul:

(Context: My younger sibling got two pet rabbits.)

Ku **tokki-tul-un** cheum-pwute tongsayng-uy kukcinhan
the rabbit-PL-TOP beginning-from younger.sibling-GEN special
posalphim-ul pata-ss-ta.

care-ACC receive-PST-DEC

'The rabbits received my younger brother/sister's special care from the beginning.'

Statement: 'My younger brother/sister has one rabbit.' (False)

(22) a. Bare N:

(Context: There are three pretty rabbits in my cottage.)

Ku **tokki-nun** komo-ka twukoka-si-n ken-tey na-lul cal
the rabbit-TOP aunt-NOM left-HON-RL thing-and I-ACC well
ttalu-n-ta.

follow-IN-DEC

'The rabbit/rabbits are what my aunt left and they follow me well.'

Statement: 'There is a pet dog in my cottage.' (False)

b. N+tul:

(Context: There are four white rabbits in my grandmother's house.)

Ku **tokki-tul**-un yepcip.acessi-ka cwu-si-n ken-tey
 the rabbit-PL-TOP neighbour-NOM give-HON-RL thing-and
 mayil mekki-man ha-n-ta.
 everyday eating-only do-IN-DEC

'The rabbits are what my neighbour gave me and all they do everyday is eat.'

Statement: 'My neighbour gave me rabbits.' (True)

Inanimate nouns

(23) a. Bare N:

(Context: There were two old books left in the nun's room.)

Ku **chayk**-un koin-uy ttus-ey.ttala koawen-ey
 the book-TOP the.deceased-GEN will-following orphanage-DAT
 kicung-toy-ess-ta.
 donate-PAS-PST-DEC

'The book/books were donated to an orphanage according to the will of the deceased.'

Statement: 'There were two books in the room.' (True)

b. N+tul:

(Context: There were two thick books in the gift box.)

Ku **chayk-tul**-un nay chaykcang hankawuntey cosimsuley
 the book-PL-TOP my bookcase in the middle carefully
 kkot-hi-ess-ta.
 place-PAS-PST-DEC

'The books were carefully placed in the middle of my bookcase.'

Statement: 'There was a doll in the gift box.' (False)

(24) a. Bare N:

(Context: There are three small books in the corner of the attic.)

Ku **chayk**-un coka-lul wuhan kes-i-ess-ciman iceyn
 the book-TOP nephew-ACC for thing-be-PST-but now
 ssulmoepsse-ci-ess-ta.
 useless-become-PST-DEC

'The book/books were for my nephew but they have now become useless.'

Statement: 'The books were for the parents.' (False)

b. N+tul:

(Context: There are four old books on the desk in the study.)

Ku **chayk-tul**-un emeni-ka sa-cwu-si-n kes-ulo
 the book-PL-TOP mother-NOM buy-give-HON-RL thing-and
 nay-key mwuchek socwungha-ta.
 me-to very precious-DEC

'The books are what my mother bought for me and are very precious to me.'

Statement: 'My mother had bought me books.' (True)

E.3 Experiment 2b: Number-specificity in *tul*-marking

E.3.1 The off-line task

'Many' + N

(25) a. Bare N:

Tukpyelkangyen-eynun **manun haksayng-i** chamsekha-y
special.lecture-LOC many student-NOM attend-and
kwansim-ul poye-ss-ta.
interest-ACC show-PST-DEC

'Many student/students attended the special lecture and showed interest.'

b. N+*tul*:

Casenhayngsa-eynun **manun haksayng-tul-i** camyeha-y
charity.event-LOC many student-PL-NOM participate-and
mokum-ul towa-ss-ta.
fund.raising-ACC help-PST-DEC

'Many students participated at the charity event and helped with fundraising.'

(26) a. Bare N:

Kongyen-i kkutna-ko **manun haksayng-i**
performance-NOM finish-CNJ many student-NOM
kangtang-ul ttena-ss-ta.
auditorium-ACC leave-PST-DEC

'Many student/students left the auditorium after the performance was finished.'

b. N+*tul*:

Hayngsa-ka machi-ko **manun haksayng-tul-i** kyoceng-ul
event-NOM finish-CNJ many student-PL-NOM campus-ACC
ttena-ss-ta.
leave-PST-DEC

'Many students left the campus after the event was finished.'

'A few' + N

(27) a. Bare N:

Myut myeng-uy haksayng-i kyonay hakswultayhoy-uy
 a few CL-GEN student-NOM school's conference-GEN
 kihoyk-ey him-ul ssot-ko.iss-ta.
 planning-DAT effort-ACC exert-PROG-DEC

'A few student/students are putting their efforts into planning the conference of the school.'

b. *N+tul*:

Myut myeng-uy haksayng-tul-i kyonay
 a few CL-GEN student-PL-NOM school's
 casenkongyen-uy hongpo-ey nolyek-ul
 benefit.performance-GEN advertising-DAT effort-ACC
 kiwuli-ko.iss-ta.
 exert-PROG-DEC

'A few students are putting their efforts into advertising the benefit performance of the school.'

(28) a. Bare N:

Cinanpeney **myut myeng-uy haksayng-i** kapcaksuley nay
 last time a few CL-GEN student-NOM suddenly my
 yenkwusil-ul chaca-wa-ss-ta.
 lab-ACC visit-come-PST-DEC

'Last time a few student/students suddenly visited my lab.'

b. *N+tul*:

Cinancwuey **myut myeng-uy haksayng-tul-i** olaykanmaney
 last week a few CL-GEN student-PL-NOM after a long time
 nay samwusil-ul chaca-wa-ss-ta.
 my office-ACC visit-come-PST-DEC

'Last week a few students visited my office after a long time since their last visit.'

Numeral + N

(29) a. Bare N:

Ecey yellyessten malaton tayhoy-ey **447 myeng-uy**
 yesterday held marathon competition-LOC 447 CL-GEN
haksayng-i camyehay-ss-ta.
 student-NOM participate-PST-DEC

'Four hundred forty seven student/students participated in the marathon held yesterday.'

b. *N+tul*:

Ecey issessten pwulwuiwus.topki hayngsa-ey **382 myeng-uy**
 yesterday held charity event-LOC 382 CL-GEN

haksayng-tul-i camkahay-ss-ta.
 student-PL-NOM participate-PST-DEC

'Three hundred eighty two students participated in the charity event held yesterday'

- (30) a. Bare N:

Cinancwu palsaynggha-n poklyeksaken-ulo **37 myeng-uy**
 last week occur-RL violent.incident-due.to 37 CL-GEN

haksayng-i cosa-lul pat-ass-ta.
 student-NOM interrogation-ACC receive-PST-DEC

'Thirty seven student/students were interrogated due to the violent incident that occurred last week.'

- b. N+tul:

Ecey.cenyek palsaynggha-n pokpalsako-lo **28 myeng-uy**
 last night occur-RL explosion-due.to 28 CL-GEN

haksayng-tul-i mokswum-ul il-ess-ta.
 student-PL-NOM life-ACC lose-PST-DEC

'Twenty eight students lost their lives due to the explosion that occurred last night.'

E.3.2 The on-line task

'Many' + N

- (31) a. Bare N:

(Context: A national mathematics competition was held last Monday.)

Tayhoy-eynun **manun haksayng-i** camsekha-y sillyek-ul
 competition-LOC many student-NOM participate-and talent-ACC
 kyelwu-ess-ta.
 compare-PST-DEC

'Many students student/students participated in the event and competed with each other.'

Statement: 'There was a speech contest last month.' (False)

- b. N+tul:

(Context: An environmental forum was held last weekend.)

Tolon-eynun **manun haksayng-tul-i** camsekha-y yelki-lul
 debate-LOC many student-PL-NOM participate-and heat-ACC
 teha-ess-ta.
 add-PST-DEC

'Many students participated in the debate and made it more heated.'
Statement: 'The debate failed to attract attention.' (False)

(32) a. Bare N:

(Context: The downtown was much busier than usual today.)

Sihem-i kkutna-ko **manun haksayng-i** nol-e
 exam-NOM finish-CNJ many student-NOM chill.out-to
 naw-ass-ki ttamwun-i-ta.
 come.out-PST-CNJ because-be-DEC

'It was because the exam was finished and many student/students came out to chill out.'

Statement: 'The downtown was busy today.' (True)

b. N+tul:

(Context: The campus was much quieter than usual on that day.)

Hakki-ka machiko **manun haksayng-tul-i** hywuka-lul
 semester-NOM finish-CNJ many student-PL-NOM vacation-ACC
 ttena-ss-ki ttaymwun-i-ta.
 leave-PST-CNJ because-be-DEC

'It was because the semester ended and many students left for vacation.'

Statement: 'The campus was more crowded than usual.' (False)

'A few' + N

(33) a. Bare N:

(Context: The benefit performance didn't get any attention.)

Myut myeng-uy haksayng-i hongpo-ey
 a few CL-GEN student-NOM advertising-DAT
 cwulyekha-ess-ciman hyokwa-ka ep-ess-ta.
 make.all.effort-PST-but effect-NOM not.exist-PST-DEC

'A few student/students made a lot of effort for advertising but it was not effective.'

Statement: 'The benefit performance was very popular.' (False)

b. N+tul:

(Context: The conference was not popular at all.)

Myut myeng-uy haksayng-tul-i hongpo-ey
 a few CL-GEN student-PL-NOM advertising-DAT
 cwulyekha-ess-ciman soyong-i ep-ess-ta.
 make.all.effort-PST-but effect-NOM not.exist-PST-DEC

'A few students made a lot of effort for advertising but it was no use.'

Statement: 'The conference was not popular at all.' (True)

- (34) a. Bare N:
 (Context: It seemed that the culprit of the theft would never be identified.)
 Kuleten enu nal **myut myeng-uy haksayng-i**
 then one day a few CL-GEN student-NOM
 citokyoswu-lul chaca-wa-ss-ta.
 course.lecturer-ACC visit-come-PST-DEC
 'Then one day, a few student/students came to visit their course lecturer.'
 Statement: 'The culprit of the theft has long been identified.' (False)
- b. N+tul:
 (Context: It seemed that the back story of the crime would never be revealed.)
 Kuleten enu nal **myut myeng-uy haksayng-tul-i**
 Then one day a few CL-GEN student-PL-NOM
 sangtamkyosa-lul chaca-wa-ss-ta.
 advisor-ACC visit-come-PST-DEC
 'Then one day, a few students came to visit their advisor.'
 Statement: 'The back story of the crime was known from the beginning.' (False)

Numeral + N

- (35) a. Bare N:
 (Context: The charity event being held during this festival is popular.)
 Chetnal-eyman mwulye **351 myeng-uy haksayng-i** hayngsa-ey
 first.day-only as.many.as 351 CL-GEN student-NOM event-LOC
 chamyeha-ess-ta-ko hanta.
 participate-PST-DEC-QT be said
 'It is said that as many as 351 student/students participated in the event on the first day only.'
 Statement: 'The charity event is popular.' (True)
- b. N+tul:
 (Context: There is much interest in joining the quiz contest.)
 Halwu-eyman mwulye **479 myeng-uy haksayng-tul-i**
 one.day-only as.many.as 479 CL-GEN student-PL-NOM
 chamka-lul sinchengha-ess-ta-ko hanta.
 participation-ACC sign.up-PST-DEC-QT be said
 'It is said that as many as 479 students signed up for the quiz contest in just one day.'
 Statement: 'No one shows interests in the quiz contest.' (False)
- (36) a. Bare N:
 (Context: Recently a violent incident occurred at a nearby school.)

I il-lo 25 myeng-uy haksayng-i cingkye-lul
 the incident-due.to 25 CL-GEN student-NOM punishment-ACC
 pat-ass-ta.
 receive-PST-DEC

'Twenty five student/students were punished because of the incident.'

Statement: 'No one was punished.' (False)

b. N+tul:

(Context: A massive fire broke out at a school in Seoul last week.)

I il-lo 32 myeng-uy haksayng-tul-i
 this accident-due.to 32 CL-GEN student-PL-NOM
 cwungsang-ul ip-ess-ta.
 serious.injury-ACC get-PST-DEC

'Thirty two students were seriously injured in the accident.'

Statement: 'There was a massive fire.' (True)

E.4 Experiment 2c: Distributivity in *tul*-marking

E.4.1 The off-line task

Intensional contexts

(37) a. Bare N:

Dublin-ey-nun hankuksalam-i tumwul-ese hankuk.ceypwum-ul
 Dublin-LOC-TOP Korean-NOM rare-so Korean.product-ACC
 cephaki elyep-ta.
 to find difficult-DEC

'Korean/Koreans are rare in Dublin, so it is difficult to find Korean products.'

b. N+tul:

Edinburgh-ey-nun hankuksalam-tul-i tumwul-ese
 Edinburgh-LOC-TOP Korean-PL-NOM rare-so
 hankuk.sikpwum-ul kuhaki elyep-ta.
 Korean.food-ACC to get difficult-DEC

'Koreans are rare in Edinburgh, so it is difficult to get Korean food.'

(38) a. Bare N:

Ku ciyek-ey-nun hankuksalam-i 14 myeng-i-lako hanta.
 the area-LOC-TOP Korean-NOM 14 CL-be-QT be said

'It is said that Korean/Koreans in the area are a group of 14.'

b. N+tul:

Ku maul-ey-nun hankuksalam-tul-i 15 myeng-i-lako hanta.
 the village-LOC-TOP Korean-PL-NOM 15 CL-be-QT be said

'It is said that Koreans in the village are a group of 15.'

Extensional contexts

- (39) a. Bare N:

Stefan-ssi-nun **hankuksalam**-i mwuchek sengsilhata-nun
S-Mr.-TOP Korean-NOM very diligent-RL
insang-ul pat-ass-ta-ko malha-ess-ta.
impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Mr. Stefan said that he had the impression that Korean/Koreans are very diligent.'

- b. N+tul:

Linda-ssi-nun **hankuksalam-tul**-i mwuchek sengsilhata-nun
L-Ms.-TOP Korean-PL-NOM very diligent-RL
nukkim-ul pat-ass-ta-ko malha-ess-ta.
impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Ms. Linda said that she had the impression that Koreans are very diligent.'

- (40) a. Bare N:

Hankuksalam-i nongkwu-lul coaha-nun iyu-nun
Korean-NOM basketball-ACC like-RL reason-TOP
tanswunha-ta.
simple-DEC

'The reason why Korean/Koreans like basketball is simple.'

- b. N+tul:

Hankuksalam-tul-i paytuminten-ul coaha-nun iyu-nun
Korean-PL-NOM badminton-ACC like-RL reason-TOP
tanswunha-ta.
simple-DEC

'The reason why Koreans like badminton is simple.'

E.4.2 The on-line task

Intensional contexts

- (41) a. Bare N:

(Context: Edinburgh is a popular destination for travelling in the UK.)

Kulena talun tosi-ey.pihay **hankuksalam**-i tumwul-ese
but other city-compared.with Korean-NOM rare-so
hankwuk.siktang-ul chacapoki elyep-ta.
Korean.restaurant-ACC to find difficult-DEC

'But compared with other cities Korean/Koreans are rare there, so it is difficult to find Korean restaurants.

Statement: 'Edinburgh is a popular destination for travelling.' (True)

b. N+tul:

(Context: Dublin is a good place to study the English language.)

Kulena talun ciyek-ey.pihay **hankuksalam-tul-i** tumwul-ese
but other area-compared.with Korean-PL-NOM rare-so
hankwuk.ceypwum-ul kwuhaki elyep-ta.
Korean.product-ACC to buy difficult-DEC

'But compared with other areas Koreans are rare there, so it is difficult to buy Korean products.'

Statement: 'Korean products are common in Dublin.' (False)

(42) a. Bare N:

(Context: Korean products were often spotted in the area.)

Yehayng.kaitu-nun ku ciyek-ey **hankuksalam-i** 12 myeng-i-lako
travel.guide-TOP the area-LOC Korean-NOM 12 CL-be-QT
malha-ess-ta.
say-PST-DEC

'The travel guide said that Korean/Koreans in the area are a group of 12.'

Statement: 'There are Koreans in the area.' (True)

b. N+tul:

(Context: Korea was not an unfamiliar country there.)

Hyenci.annayin-un ku maul-ey **hankuksalam-tul-i** 13
local.travel.guide-TOP the village-LOC Korean-PL-NOM 13
myeng-i-lako malha-ess-ta.
CL-be-QT say-PST-DEC

'The local travel guide said that Koreans in the village are a group of 13.'

Statement: 'There are no Koreans in the village.' (False)

Extensional contexts

(43) a. Bare N:

(Context: Mr. Howard briefly talked in his interview about what he felt while travelling.)

Ku-nun **hankuksalam-i** mwuheck chincelhata-nun
he-TOP Korean-NOM very kind-RL
nukkim-ul pat-ass-ta-ko ha-ess-ta.
impression-ACC receive-PST-DEC-COMP say-PST-DEC

'Mr. Howard said that he had the impression that Korean/Koreans are very kind.'

Statement: 'Mr. Howard has never travelled to Korea.' (False)

b. N+*tul*:

(Context: Mr. Matthew briefly expressed his feelings about his visit to Korea at an interview.)

Ku-nun **hankuksalam-tul**-i mwuchek chincelhata-nun
 he-TOP Korean-PL-NOM very kind-RL
 insang-ul pat-ass-ta-ko ha-n-ta.
 impression-ACC receive-PST-DEC-COMP say-IN-DEC

'He says that he had an impression that Koreans are very kind.'

Statement: 'Mr. Matthew talked about his impression of Korea.' (True)

(44) a. Bare N:

(Context: There is a golf craze in the young generation these days.)

Hankuksalam-i kolpu-lul coaha-nun iyu-nun kantanha-ta.
 Korean-NOM golf-ACC like-RL reason-TOP simple-DE C

'The reason why Korean/Koreans like golf is simple.'

Statement: 'There is a craze for stock investment in the young generation.'
 (False)

b. N+*tul*:

(Context: There is a figure skating craze among teens.)

Hankuksalam-tul-i phikye-lul coaha-nun iyu-nun
 Korean-PL-NOM figure.skating-ACC like-RL reason-TOP
 kantanha-ta.
 simple-DEC

'The reason why Koreans like figure skating is simple.'

Statement: 'Figure skating is popular among teens.' (True)

References

- Altenberg, E. (1991), Assessing first language vulnerability to attrition, in H. Seliger & R. Vago, eds, 'First Language Attrition', Cambridge: Cambridge University Press, pp. 189–206.
- Ammerlaan, A. (1996), 'You Get a bit Wobbly...' Exploring Bilingual Lexical Retrieval in the Context of First Language Attrition, PhD thesis, Nijmegen: Katholieke Universiteit Nijmegen.
- An, Y. (2007), Korean *tul* and English *all*, in 'LSO Working Papers in Linguistics: Proceedings of WIGL 2007', Vol. 7, pp. 1–16.
- Baek, M.-H. (2002), 'A study on Korean plural senses', *Discourse and Cognition* 9(2), 59–78.
- Bard, E., Robertson, D. & Sorace, A. (1996), 'Magnitude estimation of linguistic acceptability', *Language* 72(1), 32–68.
- Belletti, A., Bennati, E. & Sorace, A. (2007), 'Theoretical and developmental issues in the syntax of subjects: Evidence from near-native Italian', *Natural Language & Linguistic Theory* 25(4), 657–689.
- Berwick, R. (1985), *The Acquisition of Syntactic Knowledge*, Cambridge, MA: MIT Press.
- Brisson, C. (2003), 'Plurals, *all*, and the nonuniformity of collective predication', *Linguistics and Philosophy* 26, 129–184.
- Broselow, E. & Finer, D. (1991), 'Parameter setting in second language phonology and syntax', *Second Language Research* 7, 35–59.
- Burke, D. M. & Shafto, M. A. (2008), 'Language and aging', *The Handbook of Aging and Cognition* 3, 373–443.
- Burkhardt, P. (2005), *The Syntax-Discourse Interface: Representing and Interpreting Dependency*, Amsterdam: John Benjamins.
- Bylund, E., Abrahamsson, N. & Hyltenstam, K. (2010), 'The role of language aptitude in first language attrition: The case of pre-pubescent attriters', *Applied Linguistics* 31(3), 443–464.
- Caplan, D., DeDe, G., Waters, G., Michaud, J. & Tripodis, Y. (2011), 'Effects of age, speed of processing, and working memory on comprehension of sentences with relative clauses.', *Psychology and Aging* 26(2), 439–450.

- Cherciov, M. (2011), *Between Attrition and Acquisition: The Dynamics between Two Languages in Adult Migrants*, PhD thesis, University of Toronto.
- Chierchia, G. (1998), 'Reference to kinds across languages', *Natural Language Semantics* 6, 339–405.
- Cho, Y. (2007), *The Diaspora of Korean Children: A Cross-cultural Study of the Educational Crisis in Contemporary South Korea*, PhD thesis, University of Montana.
- Choi, K. & Kim, Y. (2007), 'Ambiguity resolution process of reflexives: Eye-tracking data', *The Korean Journal of Experimental Psychology* 19(4), 263–277.
- Chomsky, N. (1973), Conditions on transformation, in M. Anderson & P. Kiparsky, eds, 'A Festschrift for Morris Halle', New York: Holt, Rinehart, and Winston, pp. 81–160.
- Chomsky, N. (1980), 'On binding', *Linguistic Inquiry* 11, 1–46.
- Chomsky, N. (1981), *Lectures on Government and Binding*, Dordrecht: Foris.
- Chomsky, N. (1995), *The Minimalist Program*, Cambridge, MA: MIT Press.
- Chung, S. (2000), 'On reference to kinds in Indonesian', *Natural Language Semantics* 8, 157–171.
- Chung, S. & McCloskey, J. (1983), 'On the interpretation of certain Island facts in GPSG', *Linguistic Inquiry* 14, 704–713.
- Clahsen, H. & Felser, C. (2006), 'Grammatical processing in language learners', *Applied Psycholinguistics* 27, 3–42.
- Clyne, M. (1973), Thirty Years later: Some observations on "Refugee German" in Melbourne, in H. Scholler & H. Reilly, eds, 'Lexicography and Dialect Geography: Festgabe for Hans Kurath', Wiesbaden: Steiner, pp. 96–106.
- Clyne, M. (1977), 'Bilingualism in the elderly', *Talanya* 4, 45–65.
- Cole, P., Hermon, G. & Huang, C.-T. J. (2001), Introduction. Long-distance reflexives: The state of the art, in P. Cole, G. Hermon & C.-T. J. Huang, eds, 'Long-distance Reflexives', Vol. 33, Academic Press, pp. xiii–xivii.
- Cole, P., Hermon, G. & Sung, L.-M. (1990), 'Principles and parameters of long-distance reflexives', *Linguistic Inquiry* 21, 1–22.
- Cole, P. & Sung, L.-M. (1994), 'Head movement and long-distance reflexives', *Linguistic Inquiry* 25, 355–406.
- Corbett, G. (2000), *Number*, Cambridge: Cambridge University Press.
- Croft, W. (2003), *Typology and Universals*, Cambridge: Cambridge University Press.
- Current Status of Overseas Compatriots* (2011), Republic of Korea: Ministry of Foreign Affairs and Trade.

- Cuza-Blanco, A. (2008), *The L2 Acquisition and L1 Attrition of the Interpretation and Use of Aspectual Properties in Spanish among English-speaking L2 Learners and Long-term Spanish Immigrants*, PhD thesis, University of Toronto.
- de Bot, K. & Clyne, M. (1994), 'A 16 year longitudinal study of language attrition in Dutch immigrants in Australia', *Journal of Multilingual and Multicultural Development* 15(1), 17–28.
- de Bot, K., Gommans, P. & Rossing, C. (1991), L1 loss in an L2 environment: Dutch immigrants in France, in H. Seliger & R. Vago, eds, 'First Language Attrition', Cambridge: Cambridge University Press.
- de Bot, K. & Weltens, B. (1991), Recapitulation, regression and language loss, in H. Seliger & R. Vago, eds, 'First Language Attrition', Cambridge: Cambridge University Press, pp. 31–51.
- de Leeuw, E. (2009), *When Your Native Language Sounds Foreign: A Phonetic Investigation into First Language Attrition*, PhD thesis, Queen Margaret University.
- DeDe, G., Caplan, D., Kemtes, K. & Waters, G. (2004), 'The relationship between age, verbal working memory, and language comprehension', *Psychology and Aging* 19(4), 601–616.
- Duffield, N. (2003), Measures of competent gradience, in R. v. Hout, ed., 'The Lexicon-Syntax Interface in Second Language Acquisition', John Benjamins, pp. 97–128.
- Eckman, F. (1994), Local and long-distance anaphora in second-language acquisition, in 'Research Methodology in Second Language Acquisition', Hillsdale, NJ: Erlbaum, pp. 207–226.
- Ellis, R. (1994), *The Study of Second Language Acquisition*, Oxford Applied Linguistics, Oxford: Oxford University Press.
- Finer, D. (1991), Binding parameters in second language acquisition, in L. Eubank, ed., 'Point Counterpoint: Universal Grammar in the Second Language', Amsterdam: John Benjamins.
- Foursha, C., Austin, J. & Van de Walle, G. (2006), 'Is language processing identical in monolinguals and early, balanced bilinguals', *BUCLD* 30, 1–10.
- Gürel, A. (2002), *Linguistic Characteristics of Second Language Acquisition and First Language Attrition: Turkish Overt Versus Null Pronouns*, PhD thesis, McGill University, Montreal.
- Gürel, A. (2004), 'Selectivity in L2-induced L1 attrition: A psycholinguistic account', *Journal of Neurolinguistics* 17, 53–78.
- Gürel, A. (2007), (Psycho)linguistic determinants of L1 attrition, in B. Köpcke, M. S. Schmid, M. Keijzer & S. Dostert, eds, 'Language Attrition: Theoretical Perspectives', Amsterdam: John Benjamins, pp. 99–120.

- Gürel, A. (2008), 'Research on first language attrition of morphosyntax in adult bilinguals', *Second Language Research* 24(3), 431–449.
- Gürel, A. (2011), 'In search for a unified model of L2 acquisition and L1 attrition: A commentary for the Interface Hypothesis', *Linguistic Approaches to Bilingualism* 1(1), 39–42.
- Hansen, L., ed. (1999), *Second Language Attrition in Japanese Contexts*, Oxford: Oxford University Press.
- Harley, B. & Wang, W. (1997), The Critical Period Hypothesis: Where Are We Now?, in A. de Groot & J. Kroll, eds, 'Tutorials in Bilingualism: Psycholinguistic Perspectives', Mahwah: Lawrence Erlbaum, pp. 19–51.
- Hirakawa, M. (1990), 'A study of the L2 acquisition of English reflexives', *Second Language Research* 6, 60–85.
- Hopp, H. (2007), *Ultimate Attainment at the Interfaces in Second Language Acquisition: Grammar and Processing*, PhD thesis, University of Groningen.
- Huang, C. & Liu, C. (2001), 'Logophoricity, attitudes, and *ziji* at the interface', *Syntax and Semantics* 33, 141–195.
- Hulsen, M. (2000), *Language Loss and Language Processing: Three Generations of Dutch Migrants in New Zealand*, PhD thesis, Universiteit Nijmegen.
- Hutz, M. (2004), *Is there a natural process of decay?*, in M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, eds, 'First Language Attrition: Interdisciplinary Perspectives on Methodological Issues', Amsterdam: John Benjamins, pp. 189–206.
- Ishii, Y. (2000), *Plurality and Definiteness in Japanese*. Unpublished ms. Kanda University of International Studies.
- Jakobson, R. (1941/1968), *Child Language, Aphasia and Phonological Universals*, The Hague: Mouton.
- Jarvis, S. (2003), Probing the effects of the L2 on the L1: A case study, in V. Cook, ed., 'Effects of the Second Language on the First', Clevedon: Multilingual Matters, pp. 81–102.
- Jaspaert, K. & Kroon, S. (1989), 'Social determinants of language loss', *Review of Applied Linguistics* 83–84, 75–98.
- Jaspaert, K., Kroon, S. & van Hout, R. (1986), Points of reference in first-language loss research, in B. Weltens, K. de Bot & T. v. Els, eds, 'Language Attrition in Progress', Dordrecht, Holland: Foris Publications.
- Jiménez, A. (2004), A sociocultural approach to language attrition, in M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, eds, 'First Language Attrition: Interdisciplinary Perspectives on Methodological Issues', Amsterdam: John Benjamins.

- Johnson, J. & Newport, E. (1989), 'Critical period effects in second language learning: The influence of maturational state on the acquisition of ESL', *Cognitive Psychology* **21**, 60–99.
- Juffs, A. & Harrington, M. (1995), 'Parsing effects in second language sentence processing: Subject and object asymmetries in wh-extraction', *Studies in Second Language Acquisition* **17**, 483–516.
- Juffs, A. & Harrington, M. (1996), 'Garden path sentences and error data in second language sentence processing', *Language Learning* **46**, 283–326.
- Jun, Y. (2004), 'Plurality and its effect on genericity and definiteness in Korean', *Language and Information* **8**(2), 27–44.
- Jun, Y. (2007), 'A semantics of plural expressions in Korean: A unificational interpretation of *tul*', *Eoneohak (Journal of the Linguistic Society in Korea)* **49**, 325–347.
- Kang, B.-M. (1988), 'Unbounded reflexives', *Linguistics and Philosophy* **11**(4), 415–456.
- Kang, B.-M. (1994), 'Plurality and other semantic aspects of common nouns in Korean', *Journal of East Asian Linguistics* **3**, 1–24.
- Kang, B.-M. (1998), Three kinds of Korean reflexives: A corpus linguistic investigation on grammar and usage, in 'Proceedings of the 12th Pacific Asia Conference on Language, Information and Computation', pp. 10–19.
- Kang, B.-M. (2007), 'Plurality and the plurality marker *'deul'*', *Eoneohak (Journal of the Linguistic Society in Korea)* **47**, 3–31.
- Keijzer, M. (2007), Last in First Out? An Investigation of the Regression Hypothesis in Dutch Emigrants in Anglophone Canada, PhD thesis, Utrecht: Lot Publications.
- Keijzer, M. (2009), 'The regression hypothesis as a framework for first language attrition', *Bilingualism: Language and Cognition* **13**(1), 9–18.
- Keller, F. (2000), Gradience in Grammar, PhD thesis, University of Edinburgh.
- Kiaer, J. (2010), 'On the meaning and distribution of TUL in Korean: Evidence from corpora', *Language Research* **46**(2), 257–272.
- Kim, C. (2003), Classifiers and Plural Marking. Paper presented at the 13th Japanese and Korean Linguistics Conference, Unpublished ms.
- Kim, C. (2005), The Korean Plural Marker *Tul* and Its Implications, PhD thesis, University of Delaware.
- Kim, J.-H. (2007), Binding Interpretations in Adult Bilingualism: A Study of Language Transfer in L2 Learners and Heritage Speakers of Korean, PhD thesis, University of Illinois, Urbana-Champaign.
- Kim, J.-H. (2008), When a local anaphor is not locally bound: Understanding Korean exempt binding by bilinguals, in M. Bowles, ed., 'Selected Proceedings of the 2007 Second Language Research Forum', pp. 86–96.

- Kim, J.-H., Montrul, S. & Yoon, J. (2005), Binding interpretations by Korean heritage speakers and adult L2 learners of Korean, in 'Proceedings of 29th Annual Boston University Conference on Language Development', Somerville, MA: Cascadilla Press.
- Kim, J.-H., Montrul, S. & Yoon, J. (2009), 'Binding interpretations of anaphors by Korean heritage speakers', *Language Acquisition* **16**, 1–33.
- Kim, J.-H., Montrul, S. & Yoon, J. (2010), 'Dominant language influence in acquisition and attrition of binding: Interpretation of the Korean reflexive *caki*', *Bilingualism: Language and Cognition* **13**(1), 73–84.
- Kim, J.-H. & Yoon, J. (2009), 'Long-distance bound local anaphors in Korean – an empirical study of the Korean anaphor *caki-casin*', *Lingua* **119**(5), 733–755.
- Kim, K.-S. (2009), 'On the distribution of the Korean plural marker *tul*', *The Journal of Studies in Language* **24**(4), 665–684.
- Kim, S. & You, S.-H. (2011), L1 Acquisition of Binding Principles A and B in Korean, in 'Proceedings of the 16th Conference of Pan-Pacific Association of Applied Linguistics', pp. 103–108.
- Kim, Y. & Choi, K. (2003), 'Ambiguity resolution process of reflexives', *The Korean Journal of Experimental Psychology* **15**(2), 239–257.
- Kim, Y.-S. (2000), 'A morpho-syntactic analysis of reflexives: A minimalist approach', *Studies in Modern Grammar* **19**, 1–26.
- Köpke, B. (1999), *L'attrition de la première langue chez le bilingue tardif: Implications pour l'étude psycholinguistique du bilinguisme*, PhD thesis, Université de Toulouse-Le Mirail.
- Köpke, B. (2004), 'Neurolinguistic aspects of attrition', *Journal of Neurolinguistics* **17**, 3–30.
- Köpke, B. (2007), Language attrition at the crossroads of brain, mind, and society, in B. Köpke, M. S. Schmid, M. Keijzer & S. Dostert, eds, 'Language Attrition: Theoretical Perspectives', Amsterdam: John Benjamins, pp. 9–37.
- Köpke, B. & Schmid, M. (2004), Language attrition: The next phase, in M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, eds, 'First Language Attrition: Interdisciplinary Perspectives on Methodological Issues', Amsterdam: John Benjamins, pp. 1–43.
- Kurafuji, T. (1999), *Japanese Pronouns in Dynamic Semantics: The Null/Overt Contrast*, PhD thesis, Rutgers University.
- Kurafuji, T. (2004), 'Plural morphemes, definiteness and the notion of semantic parameter', *Language and Linguistics* **5**, 211–242.
- Kwak, E.-J. (2003), 'Interpretations of plural noun phrases in Korean', *Eoneohak (Journal of the Linguistic Society in Korea)* **35**, 3–38.

- Kwon, S.-N. & Zribi-Hertz, A. (2004), 'Number from a syntactic perspective: Why plural marking looks 'truer' in French than in Korean', *Empirical Issues in Formal Syntax and Semantics* 5, 133–158.
- Labov, W. (1990), 'The intersection of sex and social class in the course of linguistic change', *Language Variation and Change* 2(2), 205–254.
- Labov, W. (1994), *Principles of Linguistic Change: Internal factors*, Language in Society, Oxford: Blackwell.
- Lakshmanan, U. & Teranishi, K. (1994), Preferences versus grammaticality judgments: some methodological issues concerning the governing category parameter in second language acquisition, in 'Research Methodology in Second Language Acquisition', Hillsdale, NJ: Erlbaum, pp. 185–206.
- Laleko, O. (2010), The Syntax-Pragmatics Interface in Language Loss: Covert Restructuring of Aspect in Heritage Russian, PhD thesis, The University of Minnesota.
- Link, G. (1984), Hydras: On the logic of relative clause constructions with multiple heads, in F. Landman & F. Veldman, eds, 'Varieties of Formal Semantics', Foris, Dordrecht.
- Lleó, C., ed. (2006), *Interfaces in Multilingualism: Acquisition and Representation*, Amsterdam: John Benjamins.
- Long, M. (1990), 'Maturational constraints on language development', *Studies in Second Language Acquisition* 12(03), 251–285.
- Marinis, T. (2003), 'Psycholinguistic techniques in second language acquisition research', *Second Language Research* 19(2), 144–161.
- Marinis, T. (2010), 'Using on-line processing methods in language acquisition research', *Experimental Methods in Language Acquisition Research* 27, 139.
- Montrul, S. (2002), 'Incomplete acquisition and attrition of Spanish tense/aspect distinctions in adult bilinguals', *Bilingualism: Language and Cognition* 5(1), 39–68.
- Montrul, S. (2006), 'On the bilingual competence of Spanish heritage speakers: Syntax, lexical-semantics and processing', *International Journal of Bilingualism* 10(1), 37–69.
- Montrul, S. (2008), *Incomplete Acquisition in Bilingualism: Re-examining the Age Factor*, Studies in Bilingualism, Amsterdam: John Benjamins.
- Montrul, S. (2011), 'Multiple interfaces and incomplete acquisition', *Lingua* 121(4), 591–604.
- Mulder, K. & Hulstijn, J. (2011), 'Linguistic skills of adult native speakers, as a function of age and level of education', *Applied Linguistics* 32(5), 475–494.

- Müller, N. & Hulk, A. (2001), 'Crosslinguistic influence in bilingual language acquisition: Italian and French as recipient languages', *Bilingualism: Language and Cognition* 4(1), 1–21.
- Nakanishi, K. & Ritter, E. (2009), Plurality in Languages Without a Count-mass Distinction. Paper presented at Mass-Count Workshop, Unpublished ms.
- Nakanishi, K. & Tomioka, S. (2004), 'Japanese plurals are exceptional', *Journal of East Asian Linguistics* 13, 113–140.
- Nemoto, N. (2005), 'On mass denotations of bare nouns in Japanese and Korean', *Linguistics* 43(2), 383–413.
- Noh, E.-J. (2008), 'A study on the meaning of Korean \emptyset -marked and 'tul'-marked nouns', *Discourse and Cognition* 15(1), 43–62.
- Nomoto, H. (2010), Reference to Subkinds, General Number and the Role of Classifiers. Unpublished ms. Tokyo University of Foreign Studies.
- Pallier, C. (2007), Critical periods in language acquisition and language attrition, in B. Köpke, M. S. Schmid, M. Keijzer & S. Dostert, eds, 'Language Attrition: Theoretical Perspectives', Amsterdam: John Benjamins.
- Paradis, J. & Navarro, S. (2003), 'Subject realization and crosslinguistic interference in the bilingual acquisition of Spanish and English: What is the role of the input?', *Journal of Child Language* 30, 1–23.
- Paradis, M. (1997), The cognitive neuropsychology of bilingualism, in A. de Groot & J. Kroll, eds, 'Tutorials in Bilingualism: Psycholinguistic Perspectives', Mahwah: Lawrence Erlbaum, pp. 331–354.
- Paradis, M. (2007), L1 attrition features predicted by a neurolinguistic theory of bilingualism, in B. Köpke, M. S. Schmid, M. Keijzer & S. Dostert, eds, 'Language Attrition: Theoretical Perspectives', Amsterdam: John Benjamins, pp. 121–134.
- Park, S.-Y. (2008), 'Plural marking in classifier languages: A case study of the so-called plural marking *-tul* in Korean', *Toronto Working Papers in Linguistics* 28, 281–295.
- Patkowski, M. (1980), 'The sensitive period for acquisition of syntax in the second language', *Language Learning* 30, 449–472.
- Pavlenko, A. (2003), 'I feel clumsy speaking Russian': L2 influence on L1 in narratives of Russian L2 users of English, in V. Cook, ed., 'Effects of the Second Language on the First', Clevedon: Multilingual Matters, pp. 32–61.
- Pavlenko, A. (2004), L2 influence and L1 attrition in adult bilingualism, in M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, eds, 'First Language Attrition: Interdisciplinary Perspectives on Methodological Issues', Amsterdam: John Benjamins.
- Piñango, M. & Burkhardt, P. (2005), Pronominal interpretation and the syntax-discourse interface: Real-time comprehension and neurological properties, in

- A. Branco, T. McEnery & R. Mitkove, eds, 'Anaphora Processing: Linguistic, Cognitive and Computational Modelling', Amsterdam: John Benjamins, pp. 221–238.
- Pinker, S. (1994), *The Language Instinct: How the Mind Creates Language*, New York: Harper Perennial Modern Classics.
- Pollard, C. & Sag, I. (1992), 'Anaphors in English and the scope of binding theory', *Linguistic Inquiry* 23, 261–303.
- Pollard, C. & Xue, P. (2001), 'Syntactic and nonsyntactic constraints on long-distance reflexives', *Syntax and Semantics* pp. 317–342.
- Radford, A. (1997), *Syntax: A Minimalist Introduction*, Cambridge textbooks in linguistics, Cambridge: Cambridge University Press.
- Ramchand, G. & Reiss, C. (2007), Introduction, in G. Ramchand & C. Reiss, eds, 'The Oxford Handbook of Linguistic Interfaces', Oxford: Oxford University Press, pp. 1–13.
- Reinhart, T. & Reuland, E. (1993), 'Reflexivity', *Linguistic Inquiry* 24(4), 657–720.
- Ribbert, A. & Kuiken, F. (2010), 'L2-induced changes in the L1 of Germans living in the Netherlands', *Bilingualism: Language and Cognition* 13(1), 41–48.
- Schaeffer, J. (2000), *The Acquisition of Direct Object Scrambling and Clitic Placement: Syntax and Pragmatics*, Amsterdam: John Benjamins.
- Schmid, M. (2002), *First Language Attrition, Use, and Maintenance: The Case of German Jews in Anglophone Countries*, Amsterdam/Philadelphia: John Benjamins.
- Schmid, M. (2005), *The Language Attrition Test Battery: A Research Manual*. ms, University of Groningen.
- Schmid, M. (2011), *Language Attrition*, Cambridge: Cambridge University Press.
- Schmid, M. & Dusseldorp, E. (2010), 'Quantitative analyses in a multivariate study of language attrition: The impact of extralinguistic factors', *Second Language Research* 26(1), 125–160.
- Seliger, H. (1991), Language attrition, reduced redundancy, and creativity, in H. Seliger & R. Vago, eds, 'First Language Attrition', Cambridge: Cambridge University Press.
- Seliger, H. (1996), Primary language attrition in the context of bilingualism, in W. Ritchie & T. Bhatia, eds, 'Handbook of Second Language Acquisition', San Diego: Academic Press, pp. 605–626.
- Seliger, H. & Vago, R. (1991), *First Language Attrition*, Cambridge: Cambridge University Press.
- Serratrice, L., Sorace, A. & Paoli, S. (2004), 'Crosslinguistic influence at the syntax–pragmatics interface: Subjects and objects in English–Italian bilingual and monolingual acquisition', *Bilingualism: Language and Cognition* 7(3), 183–205.

- Sharwood Smith, M. (1983a), On explaining language loss, in S. Felix & H. Wode, eds, 'Language Development at the Crossroads', Tübingen: Gunter Narr, pp. 49–69.
- Sharwood Smith, M. (1983b), On first language loss in the second language acquirer: Problems of transfer, in S. Gass & L. Selinker, eds, 'Language Transfer in Language Learning', Rowley, MA: Newbury House, pp. 222–231.
- Sharwood Smith, M. & van Buren, P. (1991), First language attrition and the parametersetting model, in H. Seliger & R. Vago, eds, 'First Language Attrition', Cambridge: Cambridge University Press, pp. 17–30.
- Smits, C. (1996), Disintegration of Inflection: The Case of Iowa Dutch, PhD thesis, Amsterdam: Vrije Universiteit.
- Sohn, H.-M. (1999), *The Korean Language*, Cambridge: Cambridge University Press.
- Sorace, A. (2000), Differential effects of attrition in the L1 syntax of near-native L2 speakers, in C. Howell, S. Fish & T. Keith-Lucas, eds, 'Proceedings of the 24th Boston University Conference on Language Development', Somerville, MA: Cascadilla Press, pp. 719–725.
- Sorace, A. (2003), Ultimate L2 attainment, in M. Long & C. Doughty, eds, 'Handbook of Second Language Acquisition', Malden, MA: Blackwell, pp. 130–151.
- Sorace, A. (2004), 'Native language attrition and developmental instability at the syntax-discourse interface: Data, interpretations and methods', *Bilingualism: Language and Cognition* 7(2), 143–145.
- Sorace, A. (2005), Selective optionality in language development, in L. Cornips & K. Corrigan, eds, 'Syntax and Variation: Reconciling the Biological and the Social', Amsterdam: John Benjamins, pp. 46–111.
- Sorace, A. (2011), 'Pinning down the concept of "interface" in bilingualism', *Linguistic Approaches to Bilingualism* 1(1), 1–33.
- Sorace, A. (2012), 'Pinning down the concept of interface in bilingual development: A reply to peer commentaries', *Linguistic Approaches to Bilingualism* 2(2), 209–217.
- Sorace, A. & Filiaci, F. (2006), 'Anaphora resolution in near-native speakers of Italian', *Second Language Research* 22(3), 339–368.
- Sorace, A. & Keller, F. (2005), 'Gradience in linguistic data', *Lingua* 115(11), 1497–1524.
- Sorace, A. & Serratrice, L. (2009), 'Internal and external interfaces in bilingual language development: Beyond structural overlap', *International Journal of Bilingualism* 13(2), 195–210.
- Sorace, A., Serratrice, L., Filiaci, F. & Baldo, M. (2009), 'Discourse conditions on subject pronoun realization: Testing the linguistic intuitions of older bilingual children', *Lingua* 119, 460–477.

- Stevens, S. (1975), *Psychophysics: Introduction to Its Perceptual, Neural, and Social Prospects*, New York: John Wiley.
- Suh, E. (2008), The usage and interpretation of Korean *-tul* 'plural' by heritage language speakers, in M. Bowles, R. Foote, S. Perpiñán & R. Bhatt, eds, 'Selected Proceedings of the 2007 Second Language Research Forum', Somerville, MA: Cascadilla Proceedings Project, pp. 239–251.
- Tsimpli, I. M. (2007), First language attrition from a minimalist perspective, in B. Köpke, M. S. Schmid, M. Keijzer & S. Dostert, eds, 'Language Attrition: Theoretical Perspectives', Amsterdam: John Benjamins, pp. 99–120.
- Tsimpli, I. M. & Sorace, A. (2006), Differentiating interfaces: L2 performance in syntax-semantics and syntax-discourse phenomena, in D. Bamman, T. Mag-nitskaia & C. Zaller, eds, 'Proceedings of the 30th Annual Boston University Conference on Language Development', Vol. 30, Cascadilla Press, Somerville, MA, pp. 653–664.
- Tsimpli, I. M., Sorace, A., Heycock, C. & Filiaci, F. (2004), 'First language attrition and syntactic subjects: A study of Greek and Italian near-native speakers of English', *International Journal of Bilingualism* 8(3), 257–277.
- Waas, M. (1993), *Language Attrition Among German Speakers in Australia: A Sociolinguistic Inquiry*, PhD thesis, Macquarie University, Sydney.
- Waas, M. (1996), *Language Attrition Downunder: German Speakers in Australia*, Frankfurt: Peter Lang.
- Weltens, B. & Cohen, A. (1989), 'Language Attrition Research: An Introduction', *Studies in Second Language Acquisition* 11(02), 127–133.
- Weltens, B., de Bot, K. & van Els, T., eds (1986), *Language Attrition in Progress*, Dordrecht, Holland: Foris Publications.
- Wexler, K. & Manzini, R. (1987), Parameters and learnability in binding theory, in T. Roeper & E. Williams, eds, 'Parameter Setting', Dordrecht: Reidel, pp. 41–76.
- White, L. (1989), *Universal Grammar and Second Language Acquisition*, Amsterdam: John Benjamins.
- White, L. (2003), *Second Language Acquisition and Universal Grammar*, Cambridge University Press.
- Wilson, F. (2009), *Processing at the Syntax-discourse Interface in Second Language Acquisition*, PhD thesis, The University of Edinburgh.
- Yağmur, K. (1997), *First Language Attrition Among Turkish Speakers in Sydney*, Tilburg: Tilburg University Press.
- Yağmur, K. (2004), Issues in finding the appropriate methodology, in M. S. Schmid, B. Köpke, M. Keijzer & L. Weilemar, eds, 'First Language Attrition: Interdisciplinary Perspectives on Methodological Issues', Amsterdam: John Benjamins.

- Yamamoto, M. (1999), *Animacy and Reference: A Cognitive Approach to Corpus Linguistics*, Amsterdam: John Benjamins.
- Yim, C. (2002), 'The semantics of non-nominal *tul* in Korean', *Korean Linguistics* **11**, 183–202.
- Yuan, B. (1998), 'Interpretation of binding and orientation of the Chinese reflexive *ziji* by English and Japanese speakers', *Second Language Research* **14**(4), 324–340.
- Zhang, X. (2008), 'Chinese *-men* and associative plurals', *Toronto Working Papers in Linguistics* **28**, 407–425.