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ABSTRACT

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By

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Korean is one of the languages that has non-obligatory, semantically and syntaxtically complex pluralizers. There are two pluralizers *–deul* and *–ne* in Korean. They are both considered as pluralizers since they deliver a more-than-one interpretation of a noun that it is attached to. However, while *–deul* is claimed as having universal quantification properties (Park 2008) which can generate exhaustive reading or specificity properties (Kim 2008), *–ne* has been known as allowing associative interpretation.

In this study, we first discuss the different interpretation of *–deul* and *–ne* by showing the two distinct syntactic positions of the two Korean pluralizers, and then ask questions if Korean children have a more-than-one interpretation, exhaustive interpretation and associative reading. Regarding the questions, the three experiments were conducted with Korean children from age 4:0 to 5:0 and 5:0 to 6:0 and adults. Our study results give empirical evidence that shows the properties of *–deul* and *–ne* have and shows how 4 to 6 years old Korean children treat the morphemes, *–deul* and *–ne*. It supports the claim that optionality plays an important role delaying acquisition.

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INTRODUCTION

Studies of child language acquisition have shown that the basic interpretation of plural morphology is mastered early in English and Spanish. (Bybee 1985; Dressler 1989, Brown 1973, Barner and Snedeker 2005, Kouider et al. 2006, Miller 2007). Less is known about acquisition of non-obligatory plurals. In this thesis we describe the Korean pluralizers which are distinct from obligatory pluralizers and present three experiments testing children's ability to interpret various properties of the Korean *–deul* and *–ne* pluralizers. To our knowledge no previous study of the acquisition of plurals in Korean has been done.

–deul and *–ne* are the only plural morphemes in Korean and they are interesting from the acquisition point of view because they have complex properties and many restrictions in their distribution. First of all, unlike English and Spanish pluralizers, Korean pluralizers are optional, and bare noun phrases can mean either singular or plural. In addition to this, with their tendency to appear mainly with animate nouns, Korean pluralizers are consequently not as frequent when compared to obligatory pluralizers. Secondly, researchers have argued that *–deul* has distributive and universal quantification properties (Park 2008) or specificity (Kim 2008) properties and *–ne* has been known as allowing an associative interpretation (Madigan, Yamada and Peng 2008). In other words *–ne* produces the reading that takes the form: x and those associated with x in some context c.

Based on these properties of Korean pluralizers, it is possible that children's acquisition of plural marking systems such as Korean will pose special problems because these morphemes are semantically and syntactically complex and distinct from plural

marking in languages that have semantically regular, obligatory and generally applicable plural morphology.

In this study, we ask the following questions: (i) do children treat *–deul* and *–ne* as associated to a more-than-one interpretation? (ii) do children and adults interpret *–deul* as associated to an exhaustive interpretation? (iii) do children have associative readings of *–ne*? (iv) do children have more difficulty learning one pluralizer morpheme than the other?

To investigate these questions, we propose a set of three experiments testing children's interpretation of the properties associated to these two morphemes. The results will contribute to give us a better understanding of the acquisition of complex pluralizers and complex morphology in general.

The thesis is organized as follows. In chapter I, we discuss the semantic properties of Korean pluralizers, *–deul* and *–ne*, and their syntactic position in a structure of DP. In chapter II, we present an overview of plural acquisition studies and then introduce the acquisition model and the hypotheses tested in the three experiments. Chapter III presents the three experiments, and finally in chapter IV we re-examine our hypotheses and predictions and draw our conclusions.

CHAPTER 1

LINGUISTIC DESCRIPTION

In this chapter, we will first introduce the Korean plural morphemes, discuss the semantic properties of the morphemes *–deul* and *–ne*[1] have and then propose an analysis of the positions of *–deul* and *–ne* in a DP structure.

1.1 Korean pluralizers

Chierchia (1998) distinguishes languages with and without a mass-count distinction. He argues that all nouns are mass in languages without a mass-count distinction such as Japanese, Chinese and Korean (Classifier languages), and derives the following facts from this: first, languages without a mass-count distinction lack a plural marking system; and second, they obligatorily require classifiers for counting. However, it has been argued that the existence of (optional) plural marking in classifier languages challenges Chierchia's analysis (e.g., Chung 2000). In Korean, plural is optionally marked by *–deul* and/or *–ne*. These morphemes can give a more-than-one interpretation to the noun phrases they are attached to as in (1).

(1) a. Hakseng-deul-i iss-da.
Student-PL-NOM EX-DEC
'There are students.'

[1] The transcription of Korean follows the revised romanization of Korean (National Academy of the Korean Language. Seoul, Ministry of Culture and Tourism, 2000). Abbreviations used in the glosses of the Korean examples: ACC=accusative ; CL= classifier ; DEC=declarative ; Q=question ; EX=existential verb ; LOC=locative ; NEG=negation ; NOM=nominative ; GEN=genitive ; PL=plural ; PRS=present ;PST=past ; REL=relative marker ; SG=singular ; TOP=topic. Hyphens in the Korean examples indicate suffixation.
#: syntactically well-formed but infelicitous in the discourse context.

b. Hakseng-ne-ga iss-da.
Student-PL-NOM EX-DEC
'There are students.'
'There is a student and those associated with that student.'

However, although Korean has these morphemes which allow a more-than-one interpretation like in English or Spanish, *–deul* and *–ne* are not considered as regular plurals in a number of ways. One reason is the fact that they tend to pluralize animate nouns and not inanimate nouns. Among the two morphemes, *–deul* is mainly associated to animate nouns as shown in (2), and the distribution of *–ne* is strictly restricted to animate nouns as in (3).

(2) a. Hakseng-deul-i man-da.
People-PL-NOM many-DEC
'There are many students.'

b. # Moga-deul-i man-da.
Hat-PL-NOM many-DEC
'There are many hats.'

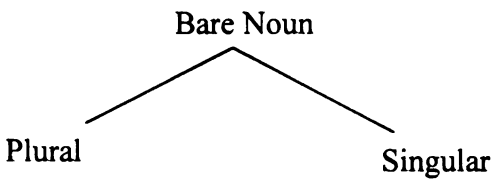
(3) a. Hakseng-ne-ga man-da.
People-PL-NOM many-DEC
'There are many students.'

b. *Moga-ne-ga man-da.
Hat-PL-NOM many-DEC
'There are many hats.'

Because of the animacy restriction, they are less frequent than English plural. On top of that, bare nouns in Korean are neutral in number and can be interpreted as either plural or singular as presented in (4). The diagram in (5) shows schematically the ambiguity between singular and plural.

(4) Haksaeng-i iss-ta.
Student-NOM EX-DEC
'There is a student.'
'There are students.'

(5)



However, a bare noun phrase in Korean is ambiguous not just in number. It is also ambiguous between a definite, a specific indefinite, and nonspecific indefinte. There are no articles to give a definite reading in Korean and the source of a definite or a specific reading has been controversial. Some researchers argued that the Korean plural *–deul* is associated to specificity (Kim, 2008) and some argued that *–deul* is associated to distributivity (An 2007, Park 2008, Joh 2009) and universal quantification (Park, 2008) which can give an exhaustive reading. *–ne* has not been considered as a morpheme that gives specificity or exhuastivity but known as having an associativity (Madigan, Yamada and Peng 2008).

In the following section, we will discuss these semantic properties of Korean plural morphemes in detail and then we will ask questions about the plural morpheme acquisition concerning these properties.

1.2 Semantic Property of *–deul* and *–ne*

1.2.1 *–deul*

Kim (2005) argues that the Korean noun denotation universally includes both singularities and pluralities. As in (6), his analysis of the plural marker *–deul* explains the fact that bare plurals in Korean are ambiguous between a plural and singular reading. In Kim (2005), *–deul* is a marker whose denotation serves to filter out the atomic (i.e. singular) entities from the extension of the noun with which it combines and this is illustrated in (7). The dots in (7) indicate the elimination of the possible semantic interpretation of the noun.

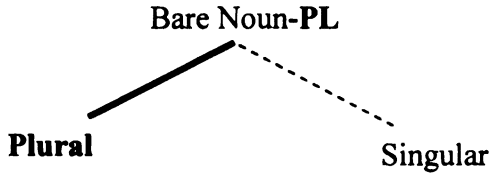
(6)

Pati-e	haksayng-eul	codae-hae-ss-da.
Party-to	student-ACC	invite-do-PST-DC

'(We) invited a student/students to the party.'

(Song 1975, 20)

(7)



We believe his claim is correct and can be supported by the examples in (8). The sentence (8a) is ambiguous since the bare noun *haksaeng* 'student' can refer to either singular or pluralized entities. However the sentence (8b) unambiguously delivers the meaning that 'Inho saw more than one student' since the plural morpheme *–deul* filters out the singular interpretation. The sentence (8c) shows the negation of the sentence in (8b) and it shows that the negation only removes the plural reading. In English, the sentence 'John didn't see students.' will be considered false if John saw one student. In Korean, however, (8c) is true in the situation when John saw one student. This interpretation of (8c) is due to the fact that *–deul* filters out the singular interpretation and it tells us that *–deul* gives a more-than-one interpretation.

(8) a. Inho-ga haksaeng-eul bo-ass-da.
Inho-NOM student -ACC see-PST-DEC
'Inho saw (a) student(s).'

b. Inho-ga haksaeng-*deul* -eul bo-ass-da.
Inho-NOM student-PL -ACC see-PST-DEC
'Inho saw more than one student.'

c. Inho-ga haksaeng-*deul*-eul bo-jian-ass-da.
Inho-NOM student-PL-ACC see-NEG-PST-DEC
'Inho did not see more than one student.'

In Park (2008), the plural morpheme *–deul* is also analyzed as optional since the bare noun can express the property that the plural morpheme has. However, she claims that the plural morpheme *–deul* has more than a mere pluralizing effect and therefore its

properties cannot be fully captured under the simple plurality analysis. She argues that *–deul* has a link to distributivity, which involves universal quantification in the course of interpretation and for that reason she claims that nouns with *–deul* exhibit different semantic properties from those of English-like plural noun phrases. The following examples from Park (2008) in (9) support this idea. In (9b) *–deul* is attached to the noun phrase in the subject of the sentence and the interpretation is that all the faculty members 'took part in' the gathering event. Sentence (9a) does not have the reading that requires all the faculty members to take part in the event. Sentence (9a) only means that 'mathematics department professors gathered in the classroom as a group', which is vague as to whether all math professors participated.

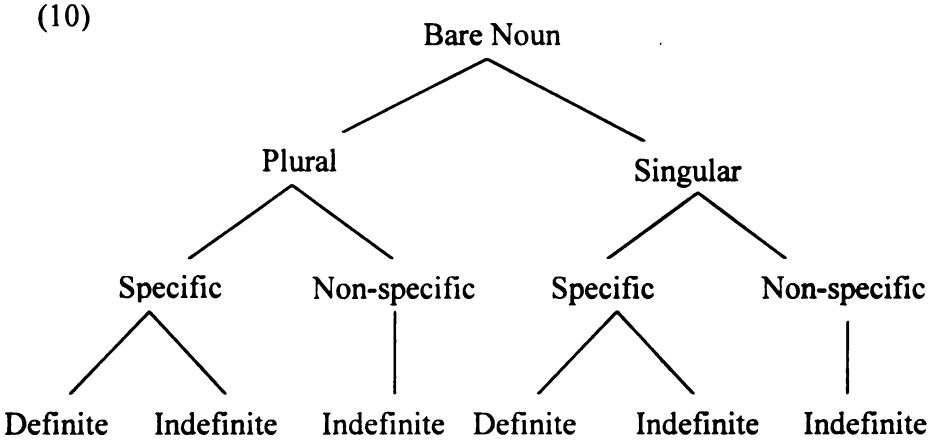
(9) a. Suhakkwa gyosu-ga gyosil-e mo-yess-da.
Math-dept. professor-NOM classroom-DAT gather-PST-DEC
'Professors of a math-department gathered in the classroom.'

b. Suhakkwa gyosu-*deul*-i gyosil-e mo-yess-da.
Math-dept. professor-PL-NOM classroom-DAT gather-PST-DEC
'(All) the professors of a math-department gathered in the classroom.'
(Park 2008, 282)

However, this claim about *–deul* is controversial. One of the conflicting analyses comes from Kim (2008). Her arguments accord with Park's (2008) in that plural markers in classifier languages mark more than the plurality of referents of the nouns they attach to, but she claims that the markers in classifier languages not only mark plurality but also definiteness/specificity of their base nouns.

In her analysis, the concept of the specificity has been used to describe a situation 'when the speaker refers to a particular entity in the universe of discourse, which may be identifiable or non-identifiable.' 'Identifiable' here is used as denoting a pragmatic concept of the definiteness. Therefore, specificity implies that a specific expression can be definite or indefinite and it follows that all definite NPs are specific. Definite expressions are used when the referent is identifiable to both the speaker and the hearer; indefinite specific expressions are used when the referent is identifiable only to the speaker; and indefinite non-specific ones are used when the referent is identifiable to neither the speaker nor the hearer. This notion is represented schematically in (10).

(10)



Given this distinct interpretation of specific and definite above, Kim (2008) claims that specificity in Korean can be marked through the presence of the plural marker *–deul* (11).

(11) a. Mary-neun gae-leul kileugo-sipohan-da.
Mary-TOP dog-ACC raise-want-DEC
'Mary wants to raise (a) dog(s).' (non-specific)

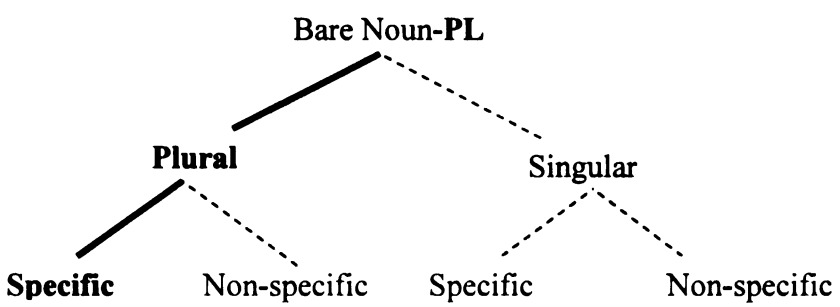
b. Mary-neun gae-deul-eul kileugo-sipohan-da.
Mary-TOP dog-PL-ACC raise-want-DEC
'Mary wants to raise certain dogs.' (specific)

c. Mary-neun keun gae-deul-eul kileugo-sipohan-da.
Mary-TOP big dog-PL-ACC raise-want-DEC
'Mary wants to raise big dogs.' (specific)

(Kim 2008, 168)

In her analysis, (11a) illustrates that the bare singular noun *gae* 'dog' can be construed as a singular or plural. Whether it gets a singular reading or a plural reading, this bare nominal is interpreted in a non-specific way only. When the plural marker *–deul* is suffixed to the bare noun *gae* 'dog' as in (11b), however, it is construed to be plural specific, i.e, 'some specific dogs'. Therefore, (11c) cannot be used as an answer to a question, 'what kind of dog do you want to have?' and it supports the indication that *–deul* gives a specific reading. This schematic of*–deul* are shown in (12).

(12)



From the claims about semantic properties of *–deul*, we found that a more-than-one interpretation of *–deul* has not been controversial. Its pluralizing property is agreed by all (Kang 1994, Im 2000, Baek 2002, Kwak 2003, Kim 2005, Park 2008). So we ask a question if a more-than-one interpretation of *–deul* shows up in children's language and if the acquisition of these pluralizers is slower in comparison to the plurals that have more semantically regular, obligatory and generally applicable plural morphology.

The definite/specific interpretation of *–deul*, however, has been controversial. However these claims about semantic properties of *–deul* can converge to a question of whether *–deul* generates an exhaustive interpretation or not. If universality or definiteness is one of the properties that *–deul* has, it will require an exhaustive interpretation since both universality and definiteness require a set that contains all and only individuals with a certain property. However, if *–deul* has only specificity as Kim (2008) claims, it would not demand exhaustive interpretation. Therefore, to have more empirical evidence to support the claims about *–deul*, we ask a question to both adults and children. Do adults and children interpret *–deul* as having an exhaustive interpretation?

1.2.2 *–ne*

Not much has been written about the pluralizer *–ne*. *–ne* is also a pluralizer which gives a more-than-one interpretation and it is also known to be semantically distinct from additive plurals like English *–s* (Corbett 2000, Moravcsik 2003). Informally, an associative plural is comprised of a focal individual and his or her associates (Nakanishi and Ritter, 2008). In Vassilieva (2008), an associative plural is defined as a

nominal expression that refers to a group by naming its most salient member. An example of this interpretation is shown in (13).

(13) a. Inho-*ne*-ga belsso ttona-ass-da.
Inho-PL-NOM already leave-PST-DEC
'Inho and those associated with him already left.'

b. Geu ai-*ne*-ga belsso ttona-ass-da.
That child-PL-NOM already leave-PST-DEC
'That child and those associated with him/her already left.'

In (13a), *Inho–ne* refers to a group consists of a focal individual named *Inho* and his associates. *–ne* only allows the associative reading, even when it combines with a common noun. *ai-ne* 'child-PL' in (13b) is interpreted as 'that child and those associated with him/her'. The construction with an associative plural is used to name a new group into discourse, a group that is understood to be contextually or inherently associated with its named protagonist (Vassilieva, 2008). 'Contextually associated' means that the group represented by the protagonist is determined from the context and 'inherently associated' means that the group will be interpreted as, for example, *x* and *x*'s family. Studies of the acquisition of the associative morpheme in Korean have not been done as far as we know. The pluralizer *–ne* which has different semantic properties from *–deul* or any other regular plurals raise the following questions. First, do children have a more-than-one interpretation of *–ne*? Second, do they have an associative reading for *–ne*?

1.3 Syntactic positions of *–deul* and *–ne*

Before we discuss the syntactic position of the pluralizers, *–deul* and *–ne*, we want to point out that there is another morpheme which appear to be the same on the surface as *–deul*. However, although the two morphemes appear to be the same, their distribution is not the same. The morpheme that we have been discussing up until now is also known as the Intrinsic Plural Marker (IPM) or Nominal *deul*. The other morpheme is known as the Extrinsic Plural Marker (EPM) or Non-Nominal *deul*. Example (14) shows the position of the IPM and (15) shows all the possible positions of the EPM. The IMP is a morpheme that is immediately preceded by a noun and pluralizes the noun it attaches to whereas the EPM is a morpheme that can be optionally concatenated with any phrase such as adverbial, verbal, or prepositional phrases regardless of the number of its appearance. But the difference between the IPM and the EPM is not limited to their distribution. They have different interpretations. While IPM delivers a more-than-one interpretation to the noun it is attached to, the EPM does not give rise to the pluralizing effect for the phrase it attaches to. No matter where the EPM appears, it indicates the plurality of the subject of the matrix clause. As a result, we consider the EPM as an agreement marker rather than a pluralizer. The IPM *–deul* is the pluralizer that we study and therefore the EPM will not be included to our discussion since it is irrelevant to our study.

(14) Haksaeng-deul-i gongbu-leul han-da.
Student-PL-NOM study-ACC do-DEC
'More than one student are studying.'

(15) Haksaeng-deul-i gongbu-leul(-deul) yeolsimhi(-deul)
Student-PL-NOM study-ACC hard

gyosileseo(-deul) han-da(-deul).
in classroom do-DEC
'Students are studying hard in the classroom.'

In this section, we argue that the two morphemes, *–deul* and *–ne* should be distinguished and be considered as morphemes occupying different syntactic positions in a DP structure even though they both are the pluralizers that mark plurality. This argument is based on the following descriptions.

Madigan, Yamada and Peng (2008) suggest that *–ne* is a simple associative plural marker and the distribution of *–ne* is different from *–deul*.

As for *–deul*, it appears that it is not an associative plural marker since it cannot yield an associative reading when attached to a proper noun or a common noun as shown in (16). The only reading we can obtain from *Inho-deul* in (16a) is one in which there are multiple people who are all named *Inho*. The only reading available for *ai-deul* 'child-PL' in (16b) is one where the children, who do not necessarily need to be closely associated to one another, already left.

(16) a. Inho-*deul*-i beolsso ttona-ass-da.
Inho-PL-NOM already leave-PST-DEC
*'Inho and those associated with him already left.'
'More than one person named Inho already left.'

b. Geu ai-*deul*-i beolsso ttona-ass-da.
That child-PL-NOM already leave-PST-DEC
*'That child and those associated with him/her already left.'
'The children already left.'

The distribution of *–deul* and *–ne* with personal pronouns also gives a piece of evidence to say that they have a different function. Since plural personal pronouns are interpreted as a group of a focal individual and his/her associates, the interpretation of them is said to be similar to that of associative nominals. For example, the second person plural pronoun 'you (pl)' is interpreted as the listener and the associates who cannot be all referred as 'you'. As shown in Table 1, the second person pronoun *no* has a pluralized form *nohi*, however, while *–deul* cannot pluralize the second person pronoun, *no*, *–ne* can pluralize it.

Table 1. *Singular and plural personal pronouns*

	1st person pronoun	**2nd person pronoun**	**3rd person pronoun**
Singular	*Na*	*No*	*Geu*
Plural	√ *Uli*	√ *Nohi*	√ *Geu-deul* √ *Geu-ne*
	* *Na-deul* * *Na-ne*	**No-deul* √ *No-ne*	

The possibility for *–ne* to pluralize second person pronoun would be because of the fact that *–ne* creates associative reading. The second person plural pronoun *nohi* and *no-ne* basically deliver the same meaning but show slight difference in their usage as

shown in (17). The derived second person plural pronoun *no-ne* as in (17a) is preferred when compared to *nohi* as in (17b) when the referred group is significantly distinguished from other groups or has more tight relationship among the associates of the group.

(17) a. No-ne-ui tim-eun ig-yess-ni?
You-PL-Gen team-Top win-PST-Q?
'Did your team win?'

b. Nohi-ui tim-eun ig-yess-ni?
You(pl.)-Gen team-Top win-PST-Q?
'Did (each of) your team(s) win?'

As for the third person pronoun *geu*, *–deul* and *–ne* both can be suffixed to pluralize the bare form. For a plural interpretation to be obtained the third person has to have a plural morpheme to be pluralized. However, the first person pronoun cannot appear with pluralizers. Both *–ne* and *–deul* cannot be suffixed to pluralize the bare form. We assume that *uli* blocks *–ne* to pluralize the first person pronoun, *na*.

Now, according to the different behavior of *–deul* and *–ne* described so far, we propose a basic syntactic analysis for the two morphemes.

First, we propose that *–deul* and *–ne* occupy different syntactic positions. The co-occurrence of *–deul* and *–ne* in (18) supports this claim.

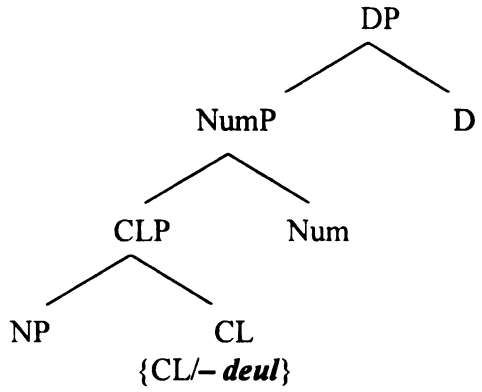
(18) a. Geu salam-*deul-ne*-neun chaek-eul ilg-oss-da.
That person-PL-PL-TOP book-ACC read-PST-DEC
'Those people and their associates read (a) book(s).'

b. Geu salam- *ne-deul*-neun chaek-eul ilg-oss-da.[2]
That person-PL-PL-TOP book-ACC read-PST-DEC
'Those people and their associates read (a) book(s).'

From this, we assume that there must be two positions for the two morphemes.

Among the two positions, first we propose the position of *–deul*. There is a piece of syntactic evidence that leads us to assume that *–deul* takes the same syntactic position as the Classifier Phrase (CLP). The following structure in (19) represents the position of *–deul* that we are proposing.

(19)



As has been introduced in the previous section, Korean is a language that has a classifier system. Therefore a particular classifier is required for counting nouns. Borer (2005) argues that both plurals and classifiers serve to create count nouns from unstructured stuff. That is, plural inflection in non-classifier languages such as *–s* in English, for instance, is classifier inflection which corresponds to classifiers in classifier

[2] The two morphemes can be reversed but it is not clear if this reversed order tells anything about their syntactic position. Madigan, Yamada and Peng (2008) say that the use of multiple plural markers is also grammatical with no reported change in meaning.

languages such as Korean. Her analysis and the fact that *–deul* exhibits complementary distribution with a classifier such as in (20) lead us to claim that *–deul* and classifiers in Korean belong to the same functional category.

(20) a. Inho-ga haksaeng-*deul*-eul bo-ass-da.
Inho-NOM student-PL-ACC see-PST-DEC
'Inho saw more than one student.'

b. Inho-ga hakseng du-myeong-eul bo-ass-da.
Inho-NOM student two-CL-Acc see-PST-DEC
'Inho saw two students.'

c. *Inho-ga haksaeng-deul-du-myeong-eul bo-ass-da.
Inho-NOM student-PL-two-CL-ACC see-PST-DEC
'Inho saw two students.'

The sentences in (20a, b) are good since *–deul* and the classifier did not occur in a single DP structure. (20c) is ungrammatical if we treat ***haksaeng-deul-du-myeong-eul*** 'two students' as a single DP. However it can be acceptable if we have two separately generated DPs, *haksaeng-deul(-eul)* and *du-myeong-eul*, as in (21).

(21) Inho-ga haksaeng-deul(-eul) du-myeong-eul bo-ass-da.
Inho-NOM student-PL(-ACC) two-CL-ACC see-PST-DEC
'Inho saw two students.'

Because case on *haksaeng-deul(-eul)* can be dropped in Korean, it is possible that (20c) could also have the structure of (21). However, if case is dropped in (20c), it appears as a pause between the two DPs (Kim, 2005) and there is evidence to show they are not a single DP. The sentence in (22a) shows the same sentence in (21) but with two separately generated DPs with overt cases. To support that there are two separately generated DPs, we give evidence of double object construction and a topic-comment relation construction. (22b) shows a double object construction and it shows the appearance of an adverb between the direct and indirect object. The adverb *joyonghi* 'quietly' between the two DPs in the example in (22c) confirms that they are the separate DPs. These two DP constructions have been claimed as having a topic-comment relation and therefore Kim (2005) says the interpretation of a sentence with two DPs such as in (21) is more appropriate if we interpret it as 'Inho – as for students – saw two (of them).' (23) is the structure of the two DPs that she is proposing.

(22) a. Inho-ga haksaeng-deul-eul du-myeong-eul[3] bo-ass-da.
Inho-Nom student-PL- ACC 2-CL-Acc see-PST-DEC
'Inho saw students and they were two.'

b. Inho-ga haksaeng-deul-ege joyonghi
Inho-Nom student-PL- DAT quiet

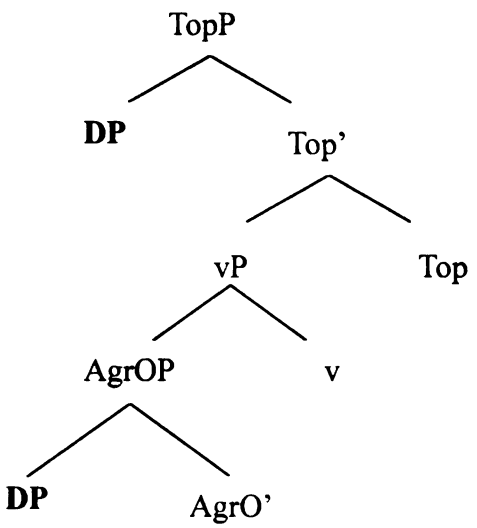
cheak-eul ju-ass-da.
book-ACC give-PST-DEC
'Inho gave students books silently.'

[3] Kim (2005) suggested that the apparent 'Accusative Case-doubling' construction contains two separately base-generated DPs, which form a Topic-Comment structure, and give rise to a partitive interpretation.

c. Inho-ga haksaeng-deul-eul joyonghi
Inho-Nom student-PL- ACC quiet

du-myeong-eul bo-ass-da.
2-CL-ACC see-PST-DEC
'Inho saw students silently and they were two.'

(23)



The structure in (23) was proposed by Kim (2005) to explain the two DPs and their relationship. This structure also can explain the appearance of adverbial material between the first and the second DP shown in (22b).

The syntactic position of *–deul* occupying the position of a classifier is also supported by Park (2008). She argues that *–deul* is incompatible with a classifier and they have an identical function. She argues that if *–deul* appears with classifier, it gives rise to a conflict with the complex of number and classifier which already resides in CL. The

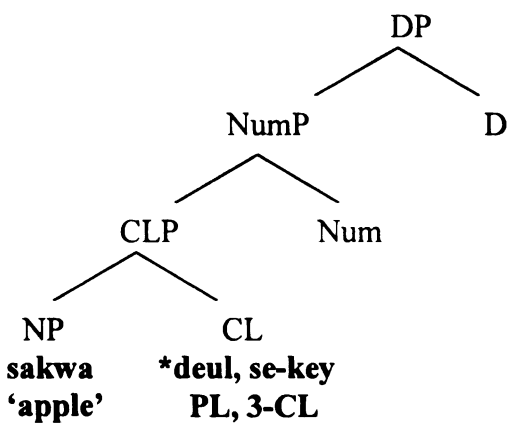
structure of (24) is shown in (25) and (26). (25) and (26) show the co-occurrence of *–deul* and classifier and their conflict due to the violation of the Head-Movement Constraint. This shows that *–deul* cannot be allowed in a single DP structure with classifier and supports our claim that *–deul* and classifier occupies the same position. To have a proper structure of an example (24), the structure should be as in (27).

(24) * Sakwa-deul-se-kay.
Apple-PL-three-CL
'Three apples.'

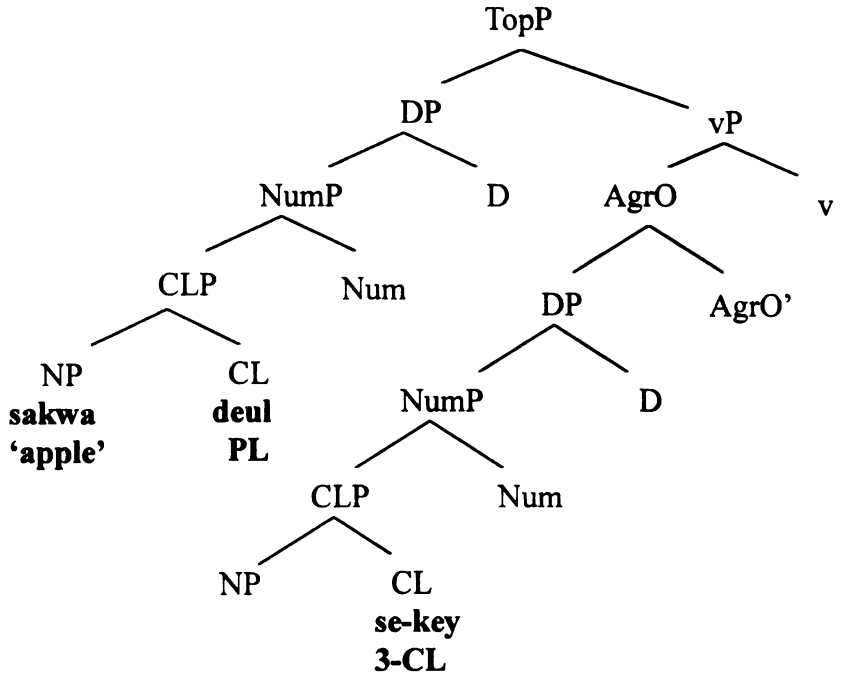
▼***conflict***

(25) $[_{DP}[_{NumP}[_{CLP}[_{NP}$ ~~sakwa deul~~$]_{NP}$ *sakwa-deul ~~se kay~~$]_{CLP}$ se-kay$]_{NumP}]_{DP}$
apple-PL apple-PL three-CL

(26)

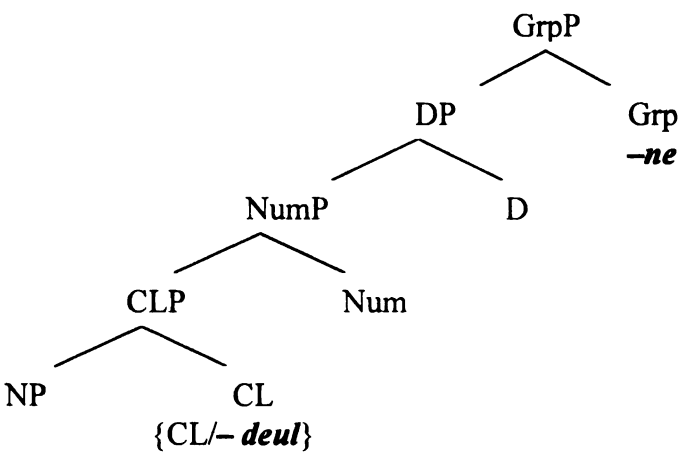


(27)



For the position of the associative morpheme *–ne*, we adopt the analysis of Nakanishi and Ritter (2008) and propose that *–ne* belongs to a category GROUP which is merged above D. (28) is the tree structure of DP with *–deul* and *–ne* that we are proposing.

(28)



The first piece of evidence that supports the position of *–ne* as in (26) can be found from its occurrence with proper names. Longobardi (1994) shows N-to-D movement in a DP structure of Italian and argues that nouns that are proper names can move to a D position. D has been considered as an operator position which binds an NP and turns it into an argument (Stowell 1989, 1991, Longobardi 1994, 1996). This assumption amounts to the claim that D is obligatorily present in argumental noun phrases across all languages if arguments are to be treated as entities or generalized quantifiers. In the Korean case, based on the fact that *–ne* only selects the entities of type <e>, as the example below show (29), we assume that the proper name in Korean occupies a D position. Consequently *–ne* must be the head of the GrP since its interpretation requires the entity to form a group out of entities. This is why it can appear with proper names and pronouns. And this structural notion explains why the entities selected by this associative pluralizer *–ne* are interpreted as 'a group with the focal individual' as in (30).

(29) a. *Manheun salam-ne-ga wa-ss-da.
Many person-PL-NOM come-PST-DEC
Many people came.

b. Geu salam-ne-ga wa-ss-da.
That person-PL-NOM come-PST-DEC
That person and his/her associates came.

(30) Inho-ne
Inho-PL
'Inho and his associates.'

This claim can be further supported by the discussion of personal plural pronouns. The interpretation of plural personal pronouns is said to be similar to that of associative nominals and therefore it has been differentiated from other plural nominals. Like the associative nominals, plural personal pronouns are interpreted as a group of a focal individual and his/her associates. This is not true for other plural nominals because they can only refer to every identically named element. For example, the second person plural pronoun 'you (pl)' indicates a listener and the associates. But it is impossible for plural nominal 'cups' to refer any other item other than 'cup'. For this, Panagiotidis (2002) proposed a structure of personal pronoun which supports our analysis of the position of associative pluralizer. In his analysis, all pronouns consist of two functional shells (a DP layer and a NumP layer) and one lexical NP layer. This is shown in (31). His claim is that all pronouns are definite descriptions and [person] is a special type of deictic (definite) feature.

(31) $[_{DP}\ D^{\circ}$ [person] $[_{NumP}\ Num^{\circ}$ [number] $[_{NP}\ N^{\circ}$ [gender]]]]

Adopting this analysis, the interpretation of pluralization of personal pronouns with the associative pluralizer *–ne* can be explainable with the structure that we are proposing. Among the three personal pronouns in Korean, the associative pluralizer *–ne* is allowed to be attached and pluralize the second and third person pronoun *no* and *geu*.

And when *–ne* is attached to the second or third person pronoun, it is interpreted 'associatively' in a context; *No-ne* as 'you and your associates.' and *geu-ne* as 'he/her and his/her associates.' The second person pronoun has a lexicalized plural form, *nohi* 'you (pl)', and *nohi* also means 'you and your associates.' Based on the analysis of personal pronoun, the structure would be as in (32).

(32) $[_{DP}\,[_{NumP}\,[_{CLP}\,[_{NP}\,\sout{\text{nohi}_i}]\ CLP\ t_i\,]_{NumP}\,t_i\,]_{DP}\,\text{nohi}_i\,]$

The personal pronoun with an associative pluralizer such as *no-ne* 'you (pl)', a derived plural pronoun, which gives the same meaning as *nohi* can be analyzed as shown in (33).

(33) $[_{GrpP}\,[_{DP}\,[_{NumP}\,[_{CLP}\,[_{NP}\,\sout{\text{no}_i}]\ CLP\ t_i\,]_{NumP}\,t_i\,]_{DP}\,\text{no}]_{GrpP}\,\text{ne}\,]$

In sum, the two different position of *–deul* and *–ne* in the structure of DP correctly captures the semantic differences of the two morphemes and it was supported by the two-DP structure and the structure of proper names and personal pronouns. *–deul* only can appear with third person pronouns while *–ne* can appear with second and third person pronouns.

In the next section, we will present the overview of the acquisition of plurals and the hypotheses based on the previous plural acquisition studies.

CHAPTER 2

PLURAL MORPHEME ACQUISITION

The experimental studies presented in this thesis examine the acquisition of the two different plural morphemes, *–deul* and *–ne*. In this chapter, to be able to test subjects' specific knowledge or lack of knowledge of the two morphemes, we first overview the previous studies of plural morpheme acquisition and present our hypotheses based on the current findings.

2.1 Acquisition Background

There have been no studies about acquisition of Korean pluralizers but studies of plural morpheme acquisition in other languages have shown how children learn plural morphemes.

Studies of the acquisition of the plural morpheme in English (Ferenz and Prasada, 2002; Wood, Kouider, and Susan 2009) have found that English-learning toddlers begin to mark the singular-plural distinction after 20 months of age and before 24 months of age. Furthermore, Koider, Halberada, Wood and Careyet 2006, using a preferential looking paradigm, suggest that most three-year-olds (but not two-year-olds) comprehend the morpheme *–s* on novel word forms as indicating more than one.

Recent studies of children learning plurals in a language with inconsistent input such as Chilean Spanish showed a different acquisition pattern from that of English speaking children. Miller and Schmitt 2009, Miller 2007 show that Chilean Spanish children's comprehension of plural morphology has not been completed even at around age five. The plural morpheme in Chilean Spanish is not consistently produced on all

elements within the noun phrase and therefore its presence is more variable. The results from Chilean Spanish confirm the hypothesis adapted from Yang's (2002) Variation Model of language acquisition which says variability in the input will delay child comprehension of grammatical morphemes when the variability causes unreliability in the input.

Little is known about the acquisition of optional pluralizers like *–deul* but there is one study of the acquisition of the Chinese pluralizer *–men* which has properties similar to those of *–deul* (Munn, Zhang and Schmitt, 2009). *–men* is a morpheme which is interpreted as both definite and plural and can also create associative meanings when attached to a proper noun. Importantly, it cannot appear with numerals or classifiers. In this study, the experiment tested whether children know the plurality, and definiteness of *–men* noun phrases and whether there are differences in the learning of the semantic parts that *–men* encodes. The experiment was done with 3 to 10-year old children and the results showed that Mandarin speaking children do not fully acquire definiteness of *–men* until 7 to 10 years of age. However the different behavior between the 5-6-year-olds and the 7-10-year-olds indicated that there is a clear developmental pattern. While 7-10-year-olds behaved like adults treating *–men* as plural and maximal, the 5-6-year-olds barely treated *–men* as plural or as maximal. They only distinguished between the singular and plural conditions. The 3-4-year-olds did not seem to distinguish the singular from the plural, nor treat *–men* as maximal. The fact that the 5-6-year-old group distinguished the singular from the plural, but did not treat *–men* as maximal supports the idea that the component parts of portmanteau morphemes are learned separately and that plurality is learned before definiteness. This study suggests that the different properties of a

morpheme are likely to be learned at different times by children and the children's deviation from the adult patterns reflects a different preference of interpretation rather than some property of the linguistic representation that is learned very late.

No study has been conducted about associative pluralizers such as *–ne* which include exceptional associates as a member of the set. However Zapf and Smith (2009) showed that two-year-old English speaking children had knowledge of the plural requirement when two identical instances of an object were presented but had difficulty in generating labels when presented two of a different kind. This study suggests that young children may have difficulty in pluralizing non identical sets of objects, which might extend to difficulties with associative plural, in languages such as Korean.

2.2 Hypotheses and Prediction

Given the previous studies of plurals and the behavior of Korean pluralizers, we propose the following hypotheses.

1. If variable and unreliable input delays the acquisition of the morpheme and a non obligation of plurality also hinders acquisition, the mastery of Korean pluralizers will be protracted in comparison with the mastery of obligatory plurals such as English *–s*.

2. If age differences affect the ability to use language during the earliest stages of language acquisition, young children will have more errors interpreting the pluralizers than older children.

3. If children make a distinction between one and more-than-one of the same kind prior to learning the rule that pluralizes, the acquisition of the pluralizer *–deul* will be faster than the acquisition of *–ne* since *–deul* refers to the identical elements while *–ne* creates a group of associates of the referred elements which may not be identical.

CHAPTER 3

STUDIES

The study is comprised of three experiments and we used the Truth Value Judgment Task (TVJT) as described in Gordon (1996) and Crain and Thornton (1998). The TVJT was used to test both children and adult's knowledge of pluralizers on the interpretation of referring expressions such as *gore-deul* or *gore-ne*. For examples, the pluralizer *–deul* rules out certain interpretations of sentences like:

(34)	Gore-deul-i	mul-eul	ppum-ess-da.
	Whale-PL-NOM	water-ACC	blow-PST-DEC
	'Whales blew water.'		

Since *–deul* is a morpheme which gives a more-than-one interpretation *gore-deul* in (34) cannot refer to a singular whale.

During the test, the subject must decide whether a statement such as in (34) is true or false as a description of a particular situation. The sentences will be asked to both adults and children and their answers will let us to tap into the participants in a different age group's knowledge or lack of knowledge of the properties of the pluralizers, *–deul* and *–ne*.

Using the TVJT, we created experimental protocols (stories + test sentences) that can be used to test whether adults and children know the following:

(a) *–deul/–ne* must be used to refer a plural entity.

(b) *–deul/–ne* cannot be used to refer a singular entity.

(c) *–deul* is interpreted as having an exhaustive reading.

(d) *–ne* is interpreted as having an associative reading.

The first experiment tested (a) and (b), the second experiment tested (c) and the third experiment tested (d).

3.1 Participants

For the present study, 58 children and 60 adults were tested. The children were 4 to 6-year-old monolingual Korean speakers. Adults were also monolingual Korean speakers and they were first year college students at Dankook University, Korea. Table 2 shows the number of participants, the range, mean and standard deviations. Adults were tested in university classrooms and children were tested individually in kindergarten classrooms. All the children and adults participated in the three experiments. Child participants' performance was videotaped. Adults participated in a paper and pencil version of the children's task.

Table2.
Subjects

Group	n	Range	Mean	Std. Deviation
4 year-olds	31	4;0-5;0	4.1	.31
5 year-olds	27	5;1-6;0	5.1	.18
Adults	60	20	20	.00

3.2 Experiment 1

The first experiment was designed to determine whether children interpret the morphemes, *–deul* and *–ne* as associated to a more-than-one interpretation.

3.2.1 Materials and Methods

In the first experiment, four stories tested the interpretation of *–deul* and four stories tested the interpretation of *–ne*. There were three pictures for each story. The first picture shows two animals of the same species performing the same activity, and the second picture shows one of the animals leaving. In the third picture, the animal that is in the picture is performing a different activity from the animals' activity in the first picture. Example (35) is one example story that was used in the first experiment. See Appendix I for all the stories.

(35)

Bada-e	gore du-mari-ga	suyeong-eul	hago-iss-oss-da.
Ocen-LOC	whale two-CL-NOM	swim-ACC	do-PRE-PST-DEC

'In the ocean, two whales swam.'

Gore	han-mari-nun	nasgam-eul-garo	tto-nass-da.
Whale	one-CL-TOP	nap-ACC-for	leave-PST-DEC

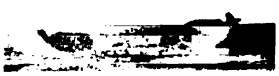
'One of them went away to take a nap.'

Nameun	gore-nun	mul-eul	ppum-ess-da.
Left	whale-TOP	water-ACC	blow-PST-DEC

'The other one blew water.'

After the story, the target (i) or (ii) was given. Table 3 shows one example of the testing materials. To the child participants, the targets were given by a puppet and the children were told to answer if the puppet was correct or not. Adults were told to mark as true or false the targets on an answer sheet based on what they had heard and seen in the story. No subject heard both targets with the same story. Group A heard (i) and group B heard (ii) so that all the materials were counterbalanced.

Table 3.
An example of a more-than-one interpretation task.

Condition	**Stimulus**	**Study sentence**
(i) using *–deul* indicating more than one entity		Gore-deul-i suyeong-eul ha-ess-da. Whale-PL-NOM swim-ACC do-PST-DEC 'The whales swam.'
(ii) using *–deul* indicating singular entity		Gore-deul-i mul-eul ppum-ess-da. Whale-PL-NOM water-ACC blow-PST-DEC 'The whales blew water.'

The adult participants heard one additional filler sentence after or before they heard a target sentence (i) or (ii). For one story, there are two filler sentences, true and false, and their distribution was counterbalanced. The filler sentences were not given to the child participants. See Appendix IV for all the filler sentences.

3.2.2 Predictions

In this experiment, the participants heard a story as above. When the story ended, the participants were asked to judge a target sentence based on what they have heard and seen. If participants heard the target (i) 'Whale-*deul* blew water.' and if they know the morpheme *–deul* has more-than-one interpretation, they should reject sentence (i) because there was only one whale that blew water. Target (ii) is 'Whale-*deul* swam.' If the participants heard this sentence and know the plural morpheme *–deul* has a more-than-one interpretation, they should accept sentence (ii) since there were two whales swimming in the story. The test for a more-than-one interpretation of *–ne* is the same kind as the test of *–deul*. In this experiment, we expect adults to reject (i) but accept (ii). For 4-year-old children, we expect their correct answers to be significantly worse than adults and 5-year-old children's correct answers to be significantly better than 4-year-old children's answers.

3.2.3 Results

We compared the responses of three different age groups, 4 year-olds, 5 year-olds and adults to see the developmental pattern of the children. We separated the experimental items that had true as the target answer from the false ones. The target sentence with a true answer had a pluralizer *–deul* to describe a more-than-one animals in the picture story and the target sentence with a false answer had a pluralizer *–deul* to describe a singular animal in the picture story. Descriptive statistics for the adults and children's more-than-one interpretation of *–deul* and *–ne* are presented in Table 4.

Table 4.
Descriptive statistics for subject's performance correctly interpreting *–deul* and *–ne*

More-than-one interpretation	Age Group **Adult**	4 year-olds	5 year-olds	**Children**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
DEUL (i. True answer)	0.95 (0.17)	0.91 (0.22)	0.90 (0.19)	0.91 (0.21)
DEUL (ii. False answer)	0.94 (0.18)	0.44 (0.40)	0.38 (0.40)	0.40 (0.40)
NE (i. True answer)	0.67 (0.43)	0.80 (0.35)	0.83 (0.36)	0.81 (0.35)
NE (ii. False answer)	0.77 (0.31)	0.48 (0.42)	0.40 (0.42)	0.43 (0.41)
N	60	31	27	58

First, a between-subject one way ANOVA analysis was conducted to see the difference between children's age groups. The results indicated that the pattern of responses of 4 year-olds and 5 year-olds did not show significant main effect in both targets with true answer (*–deul*: $F(1, 56) = 0.45$, $p = .833$/ *–ne*: $F(1, 56) = 0.124$, $p = .726$) and with false answer (*–deul*: $F(1, 56) = 0.81$, $p = .776$/ *–ne*: $F(1, 56) = 1.230$, $p = .272$). Therefore, for the further analysis of children's more-than-one interpretation of *–deul* and *–ne* in comparison with adults' interpretation, we combined 4 and 5 year-olds' responses.

The analysis of children's responses shows that the mean of target (i), true answer, is (0.91) for *–deul* and is (0.81) for *–ne*. Children's mean of target (ii), false answer, however, has a mean of (0.40) for *–deul* and is (0.43) for *–ne*.

For adults the mean for the true answer is (0.95) and the mean for the false answer is (0.94) for *–deul*. For *–ne*, the mean values are lower than *–deul*: (0.67) for the targets, true answer, and (0.77) for the false answer.

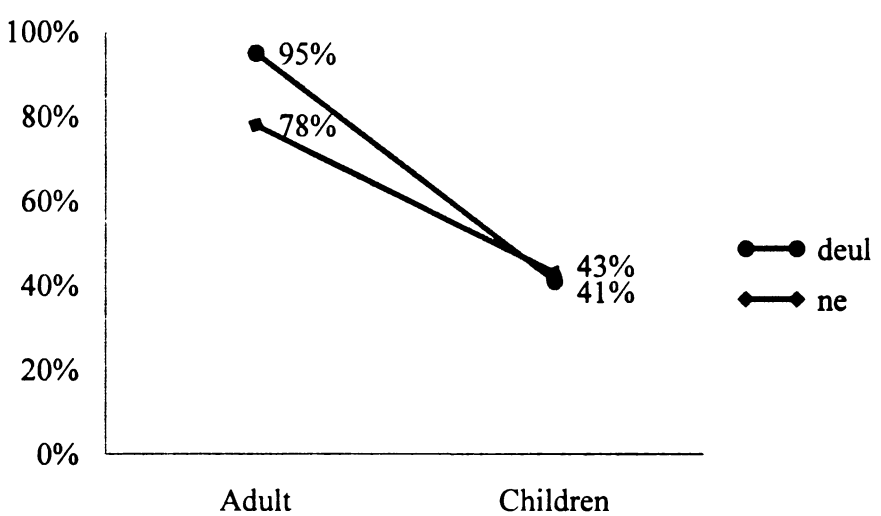
A between-subjects one way ANOVA indicated that children's responses of target (i), true answer, were not significantly different from adult's responses (*–deul*: $F(1, 116) = 1.015$, $p = .316$/ *–ne*: $F(1, 116) = 3.584$, $p = .061$). A between-subjects one way ANOVA result for children's responses of target (ii), false answer, however, were

significantly different from adult's responses (*–deul*: $F(1, 116) = 87.337$, $p < .001$ / *–ne*: $F(1, 116) = 26.220$, $p < .001$).

Next, a 2 x 2 mixed-design ANOVA was conducted to see if children acquired one morpheme faster than the other. Age group is the between subjects variable with two levels (adults and children); Type of morpheme in the experimental items where the answer was false is the within subjects variable with two levels (*–deul* and *–ne*). For this analysis, we chose target (i), false answer, since the true answer target (ii) reveals a yes-bias.

Figure 1 shows the percentage of adults and children's correct interpretation of both *–deul* and *–ne* as associated to more-than-one interpretation. A between-subjects ANOVA of children revealed no significant effect of type of morpheme ($F(1, 57) = 0.269$, $p = .606$). However, the results of the adults showed a significant effect between the type of morpheme ($F(1, 59) = 13.409$, $p < .001$).

Figure 1.
Percentage of *–deul* and *–ne* interpretation (False answer) for adults and children.



3.2.4 Discussion

The adults' results in the first experiment showed that the Korean morphemes *–deul* and *–ne* are associated to a more-than-one interpretation and this result is consistent with the claims about the properties of Korean pluralizers (Kang 1994, Im 2000, Baek 2002, Kwak 2003, Kim 2005, Park 2008). Although the mean of a more-than-one interpretation of the morpheme *–ne* was not as high as *–deul*, we still consider *–ne* as pluralizer morpheme in adults' language since we regard the lower mean value of *–ne* as due to interference from the 'inherent associated' interpretation. Vassilieva (2008) suggested that in an associative interpretation, a group can be understood by the context or a group can be understood to be inherently associated with its named protagonist, such as *x* and *x*'s family. For example, in the story, there were two whales in the ocean. Later the participants saw a singular whale which blew water. The context did not give any evidence to make the participants recognize the whales as a family or friends. But because of the fact that they are the same species the participants might have made an association between the whale which blew water with the other whale which also blew water in some place or other. This explanation is compatible with the meaning of the morpheme *–ne* itself which requires an association. If subjects made such an association between the two animals, they would be more likely to judge the singular *–ne* items as True, thus lowering the mean plural responses for that morpheme.

From the children's result in this experiment, we did not find any developmental pattern of morpheme acquisition and could not confirm Hypothesis 2, whether the age impacts the acquisition of a more-than-one interpretation. However, our results show that

4 and 5-year-olds do not interpret the morphemes *–deul* and *–ne* as having a more-than-one interpretation. This result is very much like what was found for Chinese pluralizer *–men* that 5-6-year-olds barely treated *–men* as plural (Munn, Zhang and Schmitt, 2009). The results support Hypothesis 1; mastery of Korean plurals will be protracted in comparison with the acquisition of obligatory plural morphemes.

Finally, we did not find any different behavior in children comparing *–deul* and *–ne* and therefore Hypothesis 3 was not confirmed.

3.3 Experiment 2

The second experiment was designed to test if the participants interpret *–deul* as associated to an exhaustive interpretation. The adult data will provide evidence to argue for or against the claims in the theoretical literature about the meaning of *–deul*. In this experiment, Hypothesis 2, allows us to predict a more adult-like performance of 5 years old participants than 4 years old participants.

3.3.1 Materials and Methods

There were four stories in this experiment and each story included two pictures. The first picture showed five animals of the same species. In the second picture, four animals possess the same object each and only one animal possesses a different object from the other four. Example (36) is one example story that was used in Experiment 2. See Appendix II for all the stories.

(36)

Namgeuk-e	paengguin	dasos-mali-ga	iss-oss-da.
Antarctica-LOC	penguin	five-CL-NOM	EX-PST-DEC

'In Antarctica, there were 5 penguins.'

Oneu gyeoul	paengguin	ali-ga	al-eul	pum-oss-da.
One winter	penguin	four-CL-NOM	egg-ACC	warm-PST-DEC

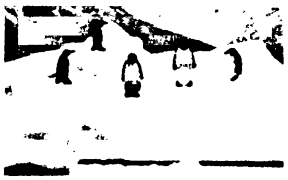
'In one winter, 4 penguins kept their eggs warm.'

Geuronde	paengguin	han-mali-nun	sagwa-leul	pum-oss-da.
But	penguin	one-CL-TOP	apple-ACC	warm-PST-DEC

'But 1 penguin didn't have an egg, so she warmed an apple.'

Table 5 shows one example of the testing materials. After the story, sentence (i) or (ii) was given. Sentence (i) is the experimental sentence and sentence (ii) is the control sentence. To the child participants, the sentences were given by a puppet and they were told to answer if the puppet was correct or not. Adults were told to mark true or false of the given sentences on the answer sheet based on what they have heard and seen. No subject heard both the test sentence and the control sentence with the same story. Group A heard the test sentence and group B heard control sentence so that all the materials were counterbalanced.

Table 5.
An example of the materials from Experiment 2.

Condition	Stimulus	Study sentence
(i) using – *deul* indicating five animals		Paengguin-deul-i al-eul pum-oss-da. Penguin-PL-NOM egg-ACC warm-PST-DEC 'The penguins warmed the eggs.'
(ii) using – *deul* and *all* indicating five animals		Panguin-deul-i modu al-eul pum-oss-da. Penguin-PL-NOM all egg-ACC warm-PST-DEC 'The penguins all warmed the eggs.'

Adult participants heard one additional filler sentence after or before they heard a test sentence (i) or a control sentence (ii). For each story, there were two filler sentences, true and false, and their distribution was counterbalanced. No filler sentences were used with the child participants. See Appendix V for all the filler sentences.

3.3.2 Predictions

In this experiment, participants heard 4 stories as above. After they heard each story, the participants were asked to judge a test sentence (i) 'Penguin-*deul* warmed the eggs.' or a control sentence (ii) 'All the penguins warmed the eggs.' If the participants interpret *–deul* as associated to some condition (universal quantification on definiteness) that forces all members of the set to be included, they should reject the test sentence (i) because not all the penguins warmed the eggs. But if they do not interpret *–deul* as

forcing an exhaustive interpretation, they should accept the test sentence (i). For the control sentence (ii), participants should reject the sentence because the universal quantifier *all* gives the exhaustive reading. We expect the correct response rate of the control sentences to be near 100% for both adults and children and the results of the control sentence will be used as baseline that can be compared with *–deul* alone.

3.3.4 Results

Descriptive statistics for the participants' exhaustive reading of testing sentences and control sentences are presented in Table 6.

Table 6.
Descriptive statistics for subject's exhaustive reading of *–deul* and *–deul+all*

	Age Group			
Exhaustive interpretation	**Adult**	4 year-olds	5 year-olds	**Children**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
DEUL (Test)	0.61 (0.46)	0.40 (0.45)	0.53 (0.46)	0.47 (0.45)
DEUL + ALL (Control)	1.00 (0.00)	0.79 (0.37)	0.60 (0.44)	0.74 (0.40)
N	60	31	27	58

First, a between-subjects one way ANOVA analysis[4] was conducted to see if there are any significant differences between the age groups. The result indicated that the pattern of responses of 4 year-olds and 5 year-olds did not show significant main effect on both testing sentences ($F(1, 56) = 0.671$, $p = .416$) and control sentences ($F(1, 56) =$

[4] In the analysis of this experiment, before the within-subjects analysis, we conducted a one sample t-test of the very first *–deul* responses of the two different adult groups, A and B, to see if there was a significant difference between the groups. Adults in group A got the control sentence (*–deul* + *all* condition) prior to receiving the test sentence (*–deul* alone condition) and this group's mean value was significantly higher than group B's responses who got the test sentence (*–deul* alone condition) prior to have control condition (*–deul* + *all* condition). However, since the t-test results of the other responses were not significantly different, we collapsed the two groups' data for the further analysis. There were no differences for children.

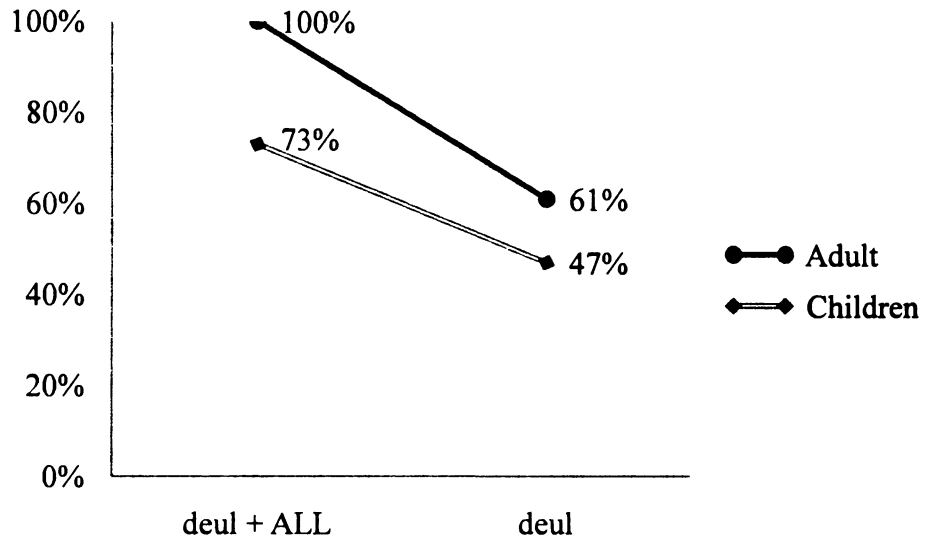
0.206, p = .652). So we combined the two different age groups and compared them with adults.

The results indicate that adults' response to '*–deul* alone' had a mean of (0.61) and *–deul* with universal quantifier had a mean of (1.00). The children's response to '*–deul* alone' was (0.47). When there was a universal quantifier in the sentence, children's response's mean was (0.74).

Next, for the analysis of participants' exhaustive interpretation a 2 x 2 mixed-design ANOVA was conducted. Age group is the between subjects variable with two levels (adults and children); The existence of universal quantifier with the morpheme *–deul* or not is the within subjects variable with two levels ('*–deul* alone' and '*–deul* + *all*').

Figure 2 shows the percentage of adults and children's exhaustive interpretation of both '*–deul* alone' and *–deul* with *all*. For within subject factors, adults' results showed a significant effect of the existence of universal quantifier with the morpheme *–deul* ($F(1, 59) = 41.013, p < .001$). For within subject factors, the children's results also showed a significant effect of the existence of universal quantifier with the morpheme *–deul* ($F(1, 57) = 8.285, p = .006$). A between-subjects one way ANOVA indicated that there was no significant difference ($F(1, 116) = 2.849, p = .094$) between adults and children on the '*–deul* alone' interpretation. On the control sentence, however, there was significant difference between the two groups, ($F(1, 116) = 24.491, p < .001$).

Figure 2.
Percentage of *–deul* and *–deul + all* exhaustive reading for adults and children.



3.3.4 Discussion

The results of Experiment 2 from both children and adults show that the argument that Korean *–deul* is associated to universal quantification (Park 2008) cannot be supported. At least from this experimental result, we can say that adults do not require an exhaustive interpretation of the morpheme *–deul*. Adults gave 100% exhaustive reading when the universal quantifier *all* was present. Without *all*, only 50% of the time did they gave an exhaustive reading.

We did not find any significant difference between 4 year-olds and 5 year-olds. All the children showed an exhaustive reading when the universal quantifier *all* was present and they did not show an exhaustive reading without *all*. The children significantly differentiated the sentences based on the existence of universal quantifier *all*. We therefore conclude that children clearly do not interpret *–deul* as requiring

exhaustivity.

In sum, from the second experiment, we conclude that the Korean morpheme *–deul* does not require an exhaustive interpretation and the exhaustive interpretation also does not exist in children's language.

3.4 Experiment 3

The third experiment was designed to determine if children have the associative reading of the morpheme *–ne*. Hypothesis 3, repeated below, allows us to predict that children will have difficulties interpreting *–ne* than *–deul.* If children make a distinction between one and more-than-one of the same kind prior to learning the rule that transform nouns to plural, the acquisition of the pluralizer *–deul* will be faster than the acquisition of *–ne*.

3.4.1 Materials and Methods

In this experiment, there are four stories and two pictures in each story. The first picture introduces five animals: two animals are of species A and the other three are of species B. In the second picture, four animals are performing the same activity and only one animal of species A is performing a different activity from the other animals' activity. Example (37) is one example story that was used in the third experiment. See Appendix III for all the stories.

(37)

Gom	du-mali-wa	mal	se-mali-ga	nonggang-e	iss-oss-da.
Bear	two-CL-and	horse	three-CL-NOM	farm-LOC	EX-PST-DEC

'2 bears and 3 ponies were in the farm.'

Gom	han-mali-wa	mal	se-mali-neun	sule-leul	dang-geoss-da.
Bear	one-CL-and	horse	three-CL-NOM	cart-ACC	drag-PST-DEC

'1 bear and 3 ponies dragged a cart.

Nameun	gom	han-mali-neun	sule-leul	mil-eoss-da.
Left	bear	one-CL-NOM	cart-ACC	push-PST-DEC

'The other bear pushed a cart.'

There was one test sentence and one control sentence for each story: (i) and (ii). Table 7 shows one example of the testing materials.

Table 7.
An example of associative reading task.

Condition	Stimulus	Study sentence
(i) using *–ne* with a chance of associative reading		Gom-ne-ga sule-leul dang-geoss-da. Bear-PL-NOM cart-ACC drag-PST-DEC 'Bear-*ney* dragged a cart'
(ii) Cardinal number and classifier without *-ne*		Gom du-mali-ga sule-leul dang-geoss-da. Bear two-CL-NOM cart-ACC drag-PST-DEC '2 bear (bare noun) dragged a cart.'

To the child participants, experimental and control sentences were given by a puppet and children were told to answer if the puppet was correct or not. Adults were told to mark true or false of the given sentences on the answer sheet based on what they have heard and seen. No participants heard both test sentences and control sentences with the same story. Group A heard the test sentence and group B heard the control sentence of story A so that all the materials were counterbalanced.

The adult participants heard one additional filler sentence after or before they heard a testing sentence (i) or a control sentence (ii). For each story, there were two filler sentences, true and false, and their distribution was counterbalanced. The filler sentences were not given to the child participants. See Appendix VI for all the filler sentences.

3.4.2 Predictions

In this experiment, the participants heard two stories at the same time as above. Before each story started, the background and the animals in the two stories were contrasted so that the participants could make a tight association between the animals in the story. After the story ended, the participants were asked to judge a test sentence (i) 'Bear–*ne* are dragging the carts.' or a control sentence (ii) 'Two bears are dragging the carts'. If the participants did not have the associative reading, they would accept sentence (i) 'Bear–*ne* are dragging the carts.' since 'bear-*ne*' can refer to 'the bear that is dragging the cart and his/her associates that is not bear dragging the cart.' But if the participants do had the associative reading, they would reject it. For the control sentence (ii) 'Two bears are dragging the carts', the participants should reject it since there is only one bear that is dragging the cart and no way to create the associative reading present in the sentence.

Therefore, we expect all the participants to reject the control sentences. For the test sentences, we expect adults to show significantly higher mean value than the mean value of the control sentences, and 4-year-old children to show no significant difference between the test sentences and the control sentences.

3.4.3 Results

Descriptive statistics for the participants' associative reading of the test sentences and control sentences are presented in Table 8.

Table 8.
Descriptive statistics for subject's associative reading of *–ne* and cardinal number

Associative reading	**Adult**	Age Group 4 year-olds	5 year-olds	**Children**
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
NE (Testing)	0.15(0.23)	0.30 (0.35)	0.37 (0.32)	0.32 (0.34)
Cardinal Number (Control)	0.05 (0.16)	0.14 (0.23)	0.22 (0.32)	0.18 (0.27)
N	60	31	27	58

The results indicate that adults' mean response to *–ne* was (0.15) and to the cardinal number was (0.05). The children's mean response to *–ne* was (0.32) and with the cardinal number, the children's mean response was (0.18).

First, a between-subjects one way ANOVA analysis was conducted to see if there were any significant differences between the children's age groups. The results indicated that the pattern of responses of 4 year-olds and 5 year-olds did not show a significant main effect in both testing ($F(1, 56) = 0.498, p = .483$) and control sentences ($F(1, 56) = 2.419, p < .126$). We therefore combined the two different age groups and compared them with adults for further analysis.

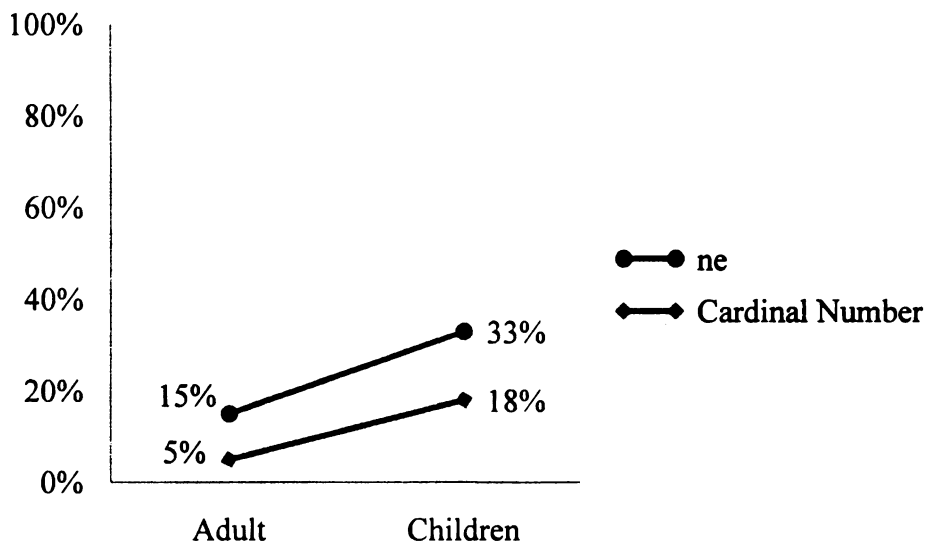
For the analysis of associative interpretation, a 2 x 2 mixed design was conducted. Age group is the between subjects variable with two levels (adults and children); The existence of the morpheme *–ne* is the within subjects variable with two levels (*–ne* and cardinal number).

The analysis of within subject factors, adults' results showed a significantly difference between *–ne* and the cardinal number ($F(1, 59) = 6.268, p = .015$). For children, the responses to *–ne* and the cardinal number were also significantly different ($F(1, 57) = 7.471, p = .008$).

For the between subjects factors, children's associative interpretation of *–ne* is

significantly higher overall than adult's associative interpretation of *–ne* ($F(1, 116) = 10.869$, $p < .001$). But children's associative interpretation of the cardinal number is also significantly higher overall than adult's ($F(1, 116) = 8.737$, $p < .004$). Figure 3 shows adults and children's percentage of associative interpretations of *–ne* and the cardinal number.

Figure 3.
Percentage of *–ne* and cardinal number associative interpretation for adults and children.



3.4.4 Discussion

In the third experiment, the overall participants' acceptance of the associative reading was not as high as we expected. For adults, it seems that many adults chose an alternative interpretation of the associative pluralizer. As has been discussed in chapter 2, the construction with an associative plural is used to talk about a group already in the discourse, a group that is understood to be contextually or inherently associated with its

named protagonist (Vassilieva, 2008). In this experiment, the intention of contrasting the two different stories was to stimulate the participants to recognize the animals in the same story as associates to the named animal of the story. However, contrasting the two stories might not have been strong enough to make them to recognize the animals in the same story as associates. Vassilieva (2008) says that in the associative interpretation, the identity of the group represented by the protagonist can be determined from the context, or, in the absence of contextual evidence, the group will be interpreted as 'inherently associated' with the protagonist (i.e. *x* and *x*'s family). Concerning this characteristic of the associative pluralizers, it is possible for the adults to interpret *–ne* as 'inherently associated' and make the association of the animals of the same species and not make the association with the animals in the same story. We assume that the participants might have chosen the alternative interpretation when the contextual evidence was weaker than the "species-group" interpretation. The results show that many of the adult participants failed to make an association of the group in the same story. Although we did not expect their contextual associative interpretation to be 100%, the results of this experiment were unexpectedly low. Since forcing them to create only an associative reading was not realistic, this problem is left as a limitation of testing associativity with the TVJT.

We cannot, therefore, make a strong argument about the children's interpretation of associative interpretation from this experiment, since adults' associative interpretation cannot work as a baseline. In this experiment, therefore, Hypothesis 3 could not be confirmed.

Furthermore since 4-year-olds and 5-year-olds did not show any differences, Hypothesis 2 was not confirmed.

In sum, this experiment showed that *–ne* does have an associative meaning, but that the inherent interpretation of the associative pluralizer is stronger when the contextual evidence is weaker.

CHAPTER 4

CONCLUSION

We have presented three experiments to investigate how children acquire optional plural morphemes which have semantically complex properties. We looked at the two morphemes *–deul* and *–ne*. *–deul* is the morpheme that is associated to a more-than-one interpretation and has been claimed as giving definite or universal quantification interpretation, (which would require an exhaustive interpretation) or a specific interpretation (which does not need to be interpreted as exhausting the set in the discourse). *–ne* is an associative pluralizer.

First of all, our experimental results provide empirical evidence to say that the Korean pluralizer *–deul* does not force an exhaustive reading. This indicates that the interpretation of *–deul* does not meet the requirement to have definite interpretation or universal quantification. Therefore, this finding goes against Park's (2008) argument which says Korean *–deul* involves universal quantification in the course of interpretation. The existence of a specificity interpretation associated to *–deul* as claimed by Kim (2008) was not disproved from our study but we cannot conclude that *–deul* is necessarily specific. Further experiments will help to determine this.

Next, we conclude that variable and unreliable input delays the acquisition of the plural morpheme when we compare with the acquisition of plurality in a language where invariable and reliable input exists. In English, the morpheme *–s* which appears consistently and reliably in the input is comprehended as indicating more than one by most three-year-olds (Kouider, Halberda, Wood and Careyet, 2006). Chilean Spanish, which has variability in the input showed incomplete mastery of plural morphology even

at around age five and it confirmed a delay of children's plural acquisition in comparison with consistent and reliable plurals (Miller and Schmitt 2009, Miller 2007). In Chinese, plural *–men* behaves as definite and gives plurality although bare NPs can also have plural interpretation. In the study of Chinese pluralizer acquisition (Munn, Zhang and Schmitt, 2009), 5-6-year-old children did not show adult-like interpretation of the plural morpheme but they showed a plural and singular distinction at that age. In our study of pluralizers in Korean, first we expected to see children's development in understanding the pluralizers through the different behavior between the age groups. But this was not found since both 4 and 5-year-olds' interpretations of the pluralizers were at the same level. Thus Hypothesis 2, whether age difference impacts the ability to use the pluralizers, could not be confirmed. However, this study showed that Korean children's understanding of pluralizers is not yet mastered by 5-year-olds which is later in comparison with English plural acquisition. This might indicate that the developmental process for Korean pluralizers is slower than for Chinese but we need further studies in both languages using the same methodology in order to determine the exact differences. We also need to confirm if *–deul* has further properties than a more-than-one interpretation such as specificity but the children's results of our study still supports the hypothesis 1 that the optionality of the morpheme hindered the mastery of the plural morpheme in comparison with English speaking children.

The last experiment did not go as we expected and could not confirm Hypothesis 3 creating a group of associates which are not identical is harder than pluralzing identical items. This result was probably due to the two possible interpretations of the associative group but from the experiment, we can begin to observe how adults identify the

associates of the group with associative pluralizers *–ne* when the two sources of evidence, contextual and inherent, exist. The results showed that the 'inherently associated' interpretation of an associative pluralizer *–ne* can be more easily realized when there is no explicit contextual evidence that can force the listeners to make a contextual association of the individuals.

In sum, the results of this study suggest that 4-to-6-year old children may not know that the Korean pluralizers are associated to a more-than-one interpretation. Still much work needs to be done to understand how children arrive at adult-like interpretation on such semantically complex morphemes.

APPENDIX I
Stories used in Experiment 1

1. Story 1 (*–deul*)

Bada-e	gore du-mari-ga	suyeong-eul	hago-iss-oss-da.
Ocean-LOC	whale two-CL-NOM	swim-ACC	do-PRE-PST-DEC

'In the ocean, two whales swam.'

Gore	han-mari-nun	nasgam-eul-garo	tto-nass-da.
Whale	one-CL-TOP	nap-ACC-for	leave-PST-DEC

'One of them went away to take a nap.'

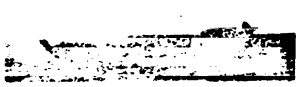
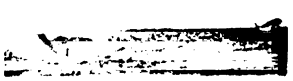
Nameun	gore-nun	mul-eul	ppum-ess-da.
Left	whale-TOP	water-ACC	blow-PST-DEC

'The other one blew water.'

Given sentences

(i)	Gore-deul-i	mul-eul	ppum-ess-da.
	Whale-PL-NOM	water-ACC	blow-PST-DEC
	'The whales blew water.'		
(ii)	Gore-deul-i	suyeong-eul	ha-ess-da.
	Whale-PL-NOM	swim-ACC	do-PST-DEC
	'The whales swam.'		

Pic 1. Pic 2. Pic 3.


2. Story 2 (*–deul*)

Apeulika-e	kokkili	du-mali-ga	banana-leul	mok-eoss-da.
Africa-LOC	elephant	two-CL-NOM	banana-ACC	eat-PST-DEC

'In Africa, two elephants ate bananas.'

Geulonde	kokkili	han-mari-ga	bae-ga
But	elephant	one-CL-NOM	Stomach-NOM

bullo-so	gib-e	ga-ass-da.
full-because	home-LOC	go-PST-DEC

'But one of them was full , so he went home.'

Nameun	kokkili-neun	mok-i	malla-so
Left	elephant-TOP	throt-NOM	thrist-because

mul-eul mass-ess-da.
water-ACC drink-PST-DEC
'The other one was thirty, so he drank water.'

Given sentences

(i) Kokkili-deul-i banana-leul mok-eoss-da.
Elephant-PL-NOM banana-ACC eat-PST-DEC
'The elephants ate banana.'

(ii) Kokkili-deul-i mul-eul mass-ess-da.
Elephant-PL-NOM water-ACC drink-PST-DEC
'The elephants drank water.'

Pic 1.

Pic 2.

Pic 3.

3. Story 3 (*–deul*)

Sup-e	tokki	du-mari-ga	pul-eul	mok-eoss-da.
Woods-LOC	rabbit	two-CL-NOM	grass-ACC	eat-PST-DEC

'In the woods, there were two rabbits ate grass.'

Gurigo	tokki	han-mari-ga	gib-e	ga-ass-da.
And	rabbit	one-CL-NOM	home-LOC	go-PST-DEC

'And one of them went home.'

Nameun	tokki-neun	keun	kkoch-eul	chaga
Left	rabbit-TOP	big	flower-ACC	found

naemse-leul mat-ass-da.
smell-ACC smell-PST-DEC
'The other one found big flower and smelled the flower.'

Given sentences

(i) Tokki-deul-i pul-eul mok-eoss-da.
Rabbit-PL-NOM grass-ACC eat-PST-DEC
'The rabbits ate grass.'

(ii) Tokki-deul-i kkoch naemse-leul mat-ass-da.
Rabbit-PL-NOM flower smell-ACC smell-PST-DEC
'The rabbits smelled flower.'

Pic 1.

Pic 2.

Pic 3.

4. Story 4 (*–deul*)

Madang-e gae du-mari-ga ppyeo-leul gagigo nol-ass-da.
Backyard-LOC dog two-CL-NOM bone-ACC have play-PST-DEC
'In the backyard, two dogs played with bones.'

Eolmahu gae han-mari-neun bae-ga gopaso
After awhile dog one-CL-TOP stomach-NOM felt hungry

gib-e ga-ass-da.
home-LOC go-PST-DEC
'After awhile, one got hungry, so he went away to eat.'

Nameun gae-neun ppyeo-leul ttang-e mud-ess-da.
Left dog-TOP bone-ACC ground-LOC bury-PST-DEC
'The other one buried his bone in the ground.'

Given sentences

(i) Gae-deul-i ppyeo-leul gagigo nol-ass-da.
Dog-PL-NOM bone-ACC have play-PST-DEC
'The dogs played with bones.'

(ii) Gae-deul-i ppyeo-leul ttang-e mud-ess-da.
Dog-PL-NOM bone-ACC ground-LOC bury-PST-DEC
'The dogs buried the bone.'

Pic 1.

Pic 2.

Pic 3.

5. Story 5 (*–ne*)

Yeomso	du-mari-ga	gib-e	sal-ass-da.
Goat	two-CL-NOM	home-LOC	live-PST-DEC

'Two goats are living in the house.'

Eoneunal	yeonso-neun	dengsan-eul	ga-ass-da.
One day	goat-TOP	mountain climbing-ACC	go-PST-DEC

'One day they went out to climb the mountain.'

Yeomso	han-mari-neun	pigonhae-so	gib-e	ga-ass-da.
Goat	one-CL-TOP	tired-because	home-LOC	go-PST-DEC

'One goat came back home because he is tired.'

Given sentences

(i)

Yeomso-ne-neun	dengsan-eul	ga-ass-da.
Goat-PL-TOP	mountain climbing-ACC	go-PST-DEC

'The Goats went out to climb the mountain.'

(ii)

Yeomso-ne-neun	gib-e	ga-ass-da.
Goat-PL-TOP	home-LOC	go-PST-DEC

'The goats came back home.'

Pic 1.

Pic 2.

Pic 3.

6. Story 6 (*–ne*)

Paendo	du-mari-ga	mudae-eso	norae-leul	ha-ess-da.
Panda	two-CL-NOM	stage-LOC	sing-ACC	do-PST-DEC

'Two pandas were singing in a band.'

Keun	paendo-neun	gita-ga	burogyeo-so
Big	panda-TOP	guitar-NOM	broken-because

sae	gita-leul	sa-ro	naga-ass-da.
new	guitar-ACC	buy-to	go out-PST-DEC

'Big panda broke his guitar so he went out to buy a new one.'

Gageun	paendo-neun	honga	gita-leul	chye-oss-da.
Little	panda-TOP	alone	guitar-ACC	play-PST-DEC

'Little panda played guitar alone.'

Given sentences

(i)	Paendo-ne-neun	norae-leul	ha-ess-da.
	Panda-TOP	sing-ACC	do-PST-DEC
	'The pandas sang a song.'		
(ii)	Paendo-ne-neun	gita-leul	chye-oss-da.
	Panda-TOP	guitar-ACC	play-PST-DEC
	'The pandas played the guitar.'		

Pic 1.

Pic 2.

Pic 3.

7. Story 7 (*–ne*)

Gamgali	du-mari-ga	haneul-eul	ppaleugae	nalgo-iss-oss-da.
Dragonfly	two-CL-NOM	sky-ACC	fast	fly-PRE-PST-DEC

'Two dragonflies are flying fast in the sky.'

Agi	gamgali-neun	shuil-yeogo	gureum-e	ang-ass-da.
Baby	dragonfly-TOP	take a rest-to	cloud-LOC	sit-PST-DEC

'Baby dragonfly sat on the cloud to take a rest.'

Namneun	gamgali-neun	namugagi-e	ang-ass-da.
Left	dragonfly-TOP	tree-LOC	sit-PST-DEC

'The other dragonfly hanging on the branch.'

Given sentences

(i)	Gamgali-ne-neun	ppaleugae	nalgo-iss-oss-da.
	Dragonfly-PL-TOP	fast	fly-PRE-PST-DEC
	'The dragonflies flew fast.'		
(ii)	Gamgali-ne-neun	gureum-e	ang-ass-da.
	Dragonfly-PL-TOP	cloud-LOC	sit-PST-DEC
	'The dragonflies set on the cloud.'		

Pic 1.

Pic 2.

Pic 3.

8. Story 8 (*–ne*)

Mulgogi	du-mari-ga	hon	gib-e	sal-ass-da.
Fish	two-CL-NOM	old	house-LOC	live-PST-DEC

'Two fishes live in an old house.'

Mulgogi	han-mari-neun	mun-eul	gochi-lyeogo
Fish	one-CL-NOM	door-ACC	fix-to

miyeok-eul	gagyeowa-ass-da.
seaweed-ACC	bring-PST-DEC

'One fish brought seaweed to fix the door.

Nameun	mulgogi-neun	byeok-eul	gochi-lyeogo

dol-eul	gagyeowa-ass-da.
Stone-ACC	bring-PST-DEC

'The other fish brought a stone to fix a wall.

Given sentences

(i)	Mulgogi-ne-neun	hon	gib-e	sal-ass-da.
	Fish-PL-TOP	old	house-LOC	live-PST-DEC
	'The fishes were living in the old house.'			

(ii)	Mulgogi-ne-neun	miyeok-eul	gagyeowa-ass-da.
	Fish-PL-TOP	seaweed-ACC	bring-PST-DEC
	'The fishes brought seaweed.'		

Pic 1.

Pic 2.

Pic 3.

APPENDIX II
Stories used in Experiment 2

1. Story 1

Ako	dasos-mari-ga	gang-eso	suyeong-eul	ha-ess-da.
Alligator	five-CL-NOM	river-LOC	swim-ACC	do-PST-DEC

'5 alligators were swimming together in a river.'

Gamsihu	ako	ne-mari-ga	tongnamu-eso	swi-oss-da.
After a while	alligator	four-CL-NOM	log-LOC	rest-PST-DEC

'After a while, four alligators rested on a log.'

Ako	han-mari-neun	gyesok	suyeong-eul	ha-ess-da.
Alligator	one-CL-NOM	keep	swim-ACC	do-PST-DEC

'One alligator kept swimming.'

Given sentences

(i)

Ako-deul-i	tongnamu-eso	swi-oss-da.
Alligator	log-LOC	rest-PST-DEC

'The alligators rested on a log'

(ii)

Ako-deul-i	modu	tongnamu-eso	swi-oss-da.
Alligator	all	log-LOC	rest-PST-DEC

'The alligator all rested on a log'

Pic 1.

Pic 2.

2. Story 2

Yeonmos-e	oli	dasos-mali-ga	suyeong-eul	ha-ess-da.
Pond-LOC	duck	five-CL-NOM	swim-ACC	do-PST-DEC

'In the pond, there were five ducks swimming.'

Onenal	bi-ga	wa-seo	oli	ne-mali-neun
One day	rain-NOM	come-because	duck	four-CL-TOP

usan-eul	ss-oss-da.
umbrella-ACC	put-PST-DEC

'One afternoon, it started raining. 4 ducks used an umbrella.'

Georonde	oli	han-mali-neun	bi-ga	goa-seo
But	duck	one-CL-TOP	rain-NOM	come-because

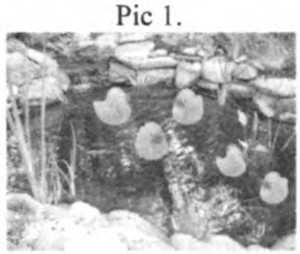
usan-eul sseu-jian-ass-da.
umbrella-ACC put-NEG-PST-DEC
'But 1 duck likes rains, so he didn't use an umbrella.'

Given sentences

(i) Oli-deul-i usan-eul ss-oss-da.
Duck-PL-NOM umbrella-ACC put-PST-DEC
'The Ducks used umbrellas.'

(ii) Oli-deul-i modu usan-eul ss-oss-da.
Duck-PL-NOM all umbrella-ACC put-PST-DEC
'The ducks all used umbrellas.'

Pic 1.



Pic 2.

3. Story 3

Gongwon-e	nabi	dasos-mali-ga	nalgo	iss-oss-da.
Garden-LOC	butterfly	five-CL-NOM	fly	exist-PST-DEC

'In the garden, there were 5 butterflies were flying.'

Geomsim-e	bae-ga	gopa-seo	nabi	ne-mari-neun
Noon-At	stomach-NOM	hungry-because	butterfly	four-CL-TOP

kkoch-eso kkul-eul mog-oss-da.
flower-LOC honey-ACC eat-PST-DEC
'At noon, they got hungry so 4 butterflies were on flowers to suck nectars.'

Georonde	nabi	han-mali-neun	kkoch-i
But	butterfly	one-CL-TOP	flower-NOM

obso-seo aiseukeulim-eul mog-oss-da.
not exist-because ice cream-ACC eat-PST-DEC
'But 1 butterfly couldn't find a flower so she ate ice cream.'

Given sentences

(i) Nabi-deul-i kkoch-eso kkul-eul mog-oss-da.
Butterfly-PL-NOM flower-LOC honey-ACC eat-PST-DEC
'The butterflies suck nectar from flowers.'

(ii) Nabi-deul-i modu kkoch-eso kkul-eul mog-oss-da.
Butterfly-PL-NOM all flower-LOC honey-ACC eat-PST-DEC
'The butterflies all suck nectar from flowers.'

Pic 1.

Pic 2.

4. Story 4

Namgeuk-e paengguin dasos-mali-ga iss-oss-da.
Antarctica-LOC penguin five-CL-NOM EX-PST-DEC
'In Antarctica, there were 5 penguins.'

Oneu gyeoul paengguin ne-mali-ga al-eul pum-oss-da.
One winter penguin four-CL-NOM egg-ACC warm-PST-DEC
'In one winter, 4 penguins kept their eggs warm.'

Geuronde paengguin han-mali-nun sagwa-leul pum-oss-da.
But penguin one-CL-TOP apple-ACC warm-PST-DEC
'But 1 penguin didn't have an egg, so she warmed an apple.'

Given sentences

(i) Paengguin-deul-i al-eul pum-oss-da.
Penguin-PL-NOM egg-ACC warm-PST-DEC
'The penguins warmed the eggs.'

(ii) Panguin-deul-I modu al-eul pum-oss-da.
Penguin-PL-NOM all egg-ACC warm-PST-DEC
'The penguins all warmed the eggs.'

Pic 1.

Pic 2

APPENDIX III
Stories used in Experiment 3

1. Story 1

Gom	du-mali-wa	mal	se-mali-ga	nonggang-e	iss-oss-da.
Bear	two-CL-and	horse	three-CL-NOM	farm-LOC	EX-PST-DEC

'2 bears and 3 ponies were in the farm.'

Modu	chinhan	chingu-da.
All	close	friend-DEC

'They all are close friends.'

Gom	han-mali-wa	mal	se-mali-neun	sule-leul	dang-geoss-da.
Bear	one-CL-and	horse	three-CL-NOM	cart-ACC	drag-PST-DEC

'1 bear and 3 ponies dragged a cart.

Nameun	gom	han-mali-neun	sule-leul	mil-eoss-da.
Left	bear	one-CL-NOM	cart-ACC	push-PST-DEC

'The other bear pushed a cart.'

Given sentences

(i)

Gom-ne-ga	sule-leul	dang-geoss-da.
Bear-PL-NOM	cart-ACC	drag-PST-DEC

'Bear-*ney* dragged a cart'

(ii)

Gom	du-mali-ga	sule-leul	dang-geoss-da.
Bear	two-CL-NOM	cart-ACC	drag-PST-DEC

'2 bear (bare noun) dragged a cart.'

Pic 1.

Pic 2.

2. Story 2

Yang	du-mali-wa	doaegi	se-mali-ga	nonggang-e	iss-oss-da.
Sheep	two-CL-and	pig	three-CL-NOM	farm-LOC	EX-PST-DEC

'Two sheep and three pigs were in the farm.'

Modu chinhan chingu-da.
All close friend-DEC
'They all are close friends.'

Yang han-mali-wa doaegi se-mali-neun pungson-eul gap-ass-da.
Sheep one-CL-and pig three-CL-NOM ballon-ACC held-PST-DEC
'One day, one sheep and three pigs held a balloon to play.'

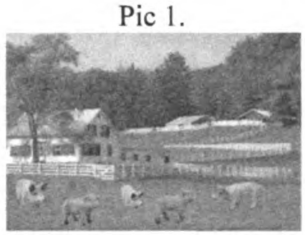
Nameun yang han-mali-neun kkoch-eul gap-ass-da.
Left sheep one-CL-NOM flower-ACC held-PST-DEC
'The other sheep held a flower.'

Given sentences

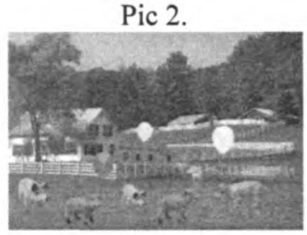
(i) Yang-ne-ga pungson-eul gap-ass-da.
Sheep-PL-NOM ballon-ACC held-PST-DEC
'The sheeps held a ballon.'

(ii) Yang du-mali-ga pungson-eul gap-ass-da.
Sheep two-CL-NOM ballon-ACC held-PST-DEC
'2 sheep held a ballon.'

Pic 1.



Pic 2.



3. Story 3

Se du-mali-wa dolgole se-mali-ga bada-eso
Bird two-CL-and dolphin three-CL-NOM ocean-LOC

gompeu-leul ha-ess-da.
jump-ACC do-PST-DEC
'Two birds and three dolphins were jumping in the ocean.'

Modu chinhan chingu-da.
All close friend-DEC
'They all are close friends.'

Geuronde se han-mali-wa dolgole se-mali-neun
But bird one-CL-and dolphin three-CL-TOP

gompeu-leul momchu-go suyeong-eul ha-ess-da.
jump-ACC stop-COMP swim-ACC do-PST-DEC
'But one bird and three dolphins stopped jumping and they swam.'

Namneun	se	han-mali-neun	namu-eso	swi-oss-da.
Left	bird	one-CL-TOP	tree-LOC	rest-PST-DEC

'The other bird rested on a tree.'

Given sentences

(i)

Se-ne-ga	suyeong-eul	ha-ess-da.
Bird-PL-NOM	swim-ACC	do-PST-DEC

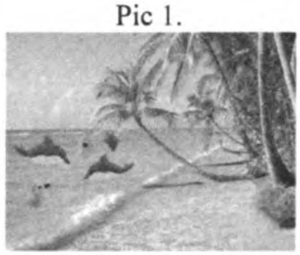
'The birds were swimming.'

(ii)

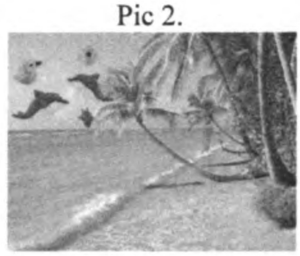
Se	du-mali-ga	suyeong-eul	ha-ess-da.
Bird	two-CL-NOM	swim-ACC	do-PST-DEC

'2 bird were swimming.'

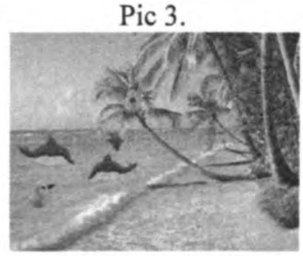
Pic 1.



Pic 2.



Pic 3.



4. Story 4

Ttokki	du-mali-wa	dalamgwi	se-mali-ga	sup-e	iss-oss-da.
Rabbit	two-CL-and	squirrel	three-CL-NOM	wood-LOC	EX-PST-DEC

'Two rabbits and three squirrels were in the words.

Modu	chinhan	chingu-da.
All	close	friend-DEC

'They all are close friends.'

Oneunal	Ttokki	han-mali-wa	dalamgwi	se-mali-ga
One day	rabbit	one-CL-and	squirrel	three-CL-NOM

ttangkong-eul	mog-oss-da.
acorn-ACC	eat-PST-DEC

'One day, one rabbit and three squirrels ate an acorn.

Ttokki	han-mali-neun	danggeun-eul	mog-oss-da.
Rabbit	one-CL-TOP	carrot-ACC	eat-PST-DEC

'The other rabbit ate a carrot.

Given sentences

(i)

Ttokki-ne-ga	ttangkong-eul	mog-oss-da.
Rabbit-PL-NOM	acorn-ACC	eat-PST-DEC

'The rabbits ate acorn.'

(ii) Ttokki du-mali-ga ttangkong-eul mog-oss-da.
Rabbit two-CL-NOM acorn-ACC eat-PST-DEC
'2 rabbits ate acorn.'

Pic 1.

Pic 2.

APPENDIX IV
Filler sentences used in Experiment 1

1. Story 1

(i) Gore-ga bada-e iss-ess-da.
Whale-NOM ocean-LOC EX-PST-DEC
'The whales were in the ocean.'

(ii) Gore du-mari-ga naggam-eul ga-ro ga-ass-da.
Whale two-CL-NOM nap-ACC sleep-to go-PST-DEC
'The two whales went to take a nap.'

2. Story 2

(i) Kokkili-ga apeulika-e iss-eoss-da.
Elephant-NOM africa-LOC EX-PST-DEC
'The elephants were in Africa.'

(ii) Kokkili du-mari-ga sala-gess-da.
Elephant two-CL-NOM disappear-PST-DEC
'The two elephants disappeared.'

3. Story 3

(i) Tokki han-mali-ga gib-e ga-ass-da.
Rabbit one-CL-NOM home-LOC go-PST-DEC
'One rabbit went home.'

(ii) Tokki-ga bada-e iss-eoss-da.
Rabbit-NOM ocean-LOC EX-PST-DEC
'The rabbits were in the ocean.'

4. Story 4

(i) Gae han-mali-ga gib-e ga-ass-da.
Dog one-CL-NOM home-LOC go-PST-DEC
'One dog went home.'

(ii) Gae-ga gib-an-e iss-ess-da.
DogNOM house-inside-LOC EX-PST-DEC
'The dogs were in the house.'

5. Story 5

(i) Yeomso-ga gib-e sal-ass-da.
Goat-NOM house-LOC live-PST-DEC
'The Goats were living in a house.'

(ii) Yeomso du-mari-neun pigon-haess-da.
Goat two-CL-NOM tired-PST-DEC
'The goats were tired.'

6. Story 6

(i) Paendo-ga mudae-e iss-oss-da.
Panda-NOM Stage-LOC EX-PST-DEC
'The pandas were on the stage.'

(ii) Paendo du-mali-ga gita-leul sa-ro ga-ass-da.
Panda two-CL-NOM guitar-ACC buy-to go-PST-DEC
'The two pandas went out to buy a guitar.'

7. Story 7

(i) Agi gamgali-neun gureum-e ang-ass-da.
Baby dragonfly-TOP cloud-LOC sit-PST-DEC
'The baby dragonfly sat on the clouds.'

(ii) Gamgali du-mali-neun gureum-eul goa-haess-da.
Dragonfly two-CL-TOP cloud-ACC like-PST-DEC
'The two dragonflies liked the clouds.'

8. Story 8

(i) Mulgogi-neun hon gib-e sal-ass-da.
Fish-PL-TOP old house-LOC live-PST-DEC
'The fishes were living in the old house.'

(ii) Mulgogi du-mali-neun byeok-eul goch-yess-da.
Fish two-CL-TOP wall-ACC fix-PST-DEC
'The two fishes fixed the wall.'

APPENDIX V
Filler sentences used in Experiment 2

1. Story 1

(i) Ako-neun gang-e iss-oss-da.
Alligator-TOP river-LOC EX-PST-DEC
'The alligators were in the river.'

(ii) Ako-neun pigon-heass-da.
Alligator-TOP tired-PST-DEC
'The alligator were tired.'

2. Story 2

(a) Oli-ga yeonmos-e iss-oss-da.
Duck-PL-NOM pond-LOC EX-PST-DEC
'The ducks were in the pond.'

(b) Oli yeososs-mali-ga iss-oss-da.
Duck six-CL-NOM EX-PST-DEC
'The ducks were total of six.'

3. Story 3

(i) Nabi-neun bae-ga gopa-ass-da.
Butterfly-TOP stomach-NOM houngry-PST-DEC
'The butterflies were hungry.'

(ii) Nabi-neun bang-e iss-oss-da.
Butterfly-TOP house-LOC EX-PST-DEC
'The butterflies were inside of the house.'

4. Story 4

(i) Paengguin-eun Namgeuk-e sal-ass-da.
Penguin-TOP antarctica-LOC live-PST-DEC
'The penguins were living in Antarctica.'

(ii) Panguin yeososs-mali-ga iss-oss-da.
Penguin six-CL-NOM EX-PST-DEC
'The penguins were total of six.'

APPENDIX VI
Filler sentences used in Experiment 3

1. Story 1

(i) Gom-gwa mal-eun nonggang-e iss-oss-da.
Bear-and horse-TOP farm-LOC EX-PST-DEC
'The bears and horses were in the farm.'

(ii) Mal-eun chingu-ga ob-oss-da
Horse-TOP friend-NOM NonEX--PST-DEC
'The horse did not have friends.'

2. Story 2

(i) Yang-gwa doaegi-neun chingu-yeoss-da.
Sheep-and pig-TOP friend-PST-DEC
'The sheep and pigs were friends.'

(ii) Yang-gwa doaegi-neun uli-e iss-oss-da.
Sheep-and pig-TOP hut-LOC EX-PST-DEC
'The sheep and pigs were inside of the hut.'

3. Story 3

(i) Se-wa dolgole-ga gompeu-leul ha-ess-da.
Bird-and dolphin-NOM jump-ACC do-PST-DEC
'The birds and the dolphins jumped.'

(ii) Se-wa dolgole-ga san-e iss-oss-da.
Bird-and dolphin-NOM mountain-LOC EX-PST-DEC
'The birds and the dolphins were in the mountain.'

4. Story 4

(i) Ttokki-wa dalamgwi-neun sup-e iss-oss-da.
Rabbit-and squirrel-TOP mountain-LOC EX-PST-DEC
'The rabbits and the squirrels were in the mountain.'

(ii) Ttokki-neun chingu-ga ob-oss-da
Rabbit-TOP friend-NOM NonEX--PST-DEC
'Rabbit did not have friends.'

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