

On the Recovery of Korean Null Objects

Some Challenges from Experimental Evidence*

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ABSTRACT There are two major approaches to Korean null objects: one is the argument ellipsis analysis, and the other is the null pronoun analysis. These two approaches make different predictions regarding the reading preference among two possible interpretations (strict reading vs. sloppy reading). However, there has been limited quantitative research conducted to test the predictions of each approach. This paper focuses on four unresolved questions on the issue and provides quantitative data to advance ongoing theoretical debates regarding Korean null objects. In the experiment conducted, participants read sentences and indicated their interpretation of null objects. The experiment reveals four new observations: 1. A consistent preference for the strict reading in null object constructions. 2. An interpretation discrepancy between overt pronouns and null objects. 3. General acceptance of a sloppy reading for null arguments by Korean native speakers. 4. The absence of priming effects from a full-fledged nominal phrase or a pronoun on the processing of null objects. These four observations

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challenge both approaches to Korean null objects and suggest that further quantitative research is needed to better understand the syntactic nature of null objects.

Keywords Null Object, Argument Ellipsis, Null Pronoun, Priming, Reading Preference

1. Introduction

Human languages employ silence as a means for efficient conversation. In many languages, a grammatical mechanism exists that allows speakers to omit the overt linguistic form of expected messages. The use of null arguments is one such option, particularly prevalent in East Asian languages (Otani and Whitman 1991; Hoji 1998; Oku 1998; Kim 1999; Saito 2007; Takahashi 2008a, b; Şener and Takahashi, 2010; Ahn and Cho 2011, 2020; Simpson et al. 2013; Li 2014; Sato 2015; Sakamoto 2016; Landau 2018; Han et al. 2020, among others). An illustrative example of null arguments in Korean is provided in (1). When the sentence (1b) follows the sentence (1a), the transitive predicate *ilk-ta* ‘read’ can be interpreted perfectly even without an explicit object. This interpretation is possible because the argument can be recoverable due to the corresponding object in the antecedent clause (*mwusewun chayk-ul* ‘a horror book’ in this context).

- (1) a. Jina-ka mwusewun chayk-ul ilk-ess-ta.
 Jina-NOM horrific book-ACC read-PAST-DECL
 Jina read a horror book.
- b. Minki-to <e> ilk-ess-ta.
 Minki-also read-PAST-DECL.
 Minki read <e>, too. Lit. Minki read a (horror) book, too.

The question of why and how the semantic representation of the silent expression can be recovered gives rise to the development of syntactic and semantic theories of null arguments. In particular, the syntactic nature of silent linguistic entities has been extensively discussed in the field. Parallel to the other domain of ellipsis, theories on null arguments are roughly divided into two approaches. One assumes that null arguments have an internal structure, as a full-fledged nominal phrase—which will be referred to here as the argument ellipsis approach (Oku 1998; Kim 1999; Saito 2007; Takahashi 2008a, b; Şener and Takahashi 2010). Under this analysis, the null argument in (1b) has a full nominal structure at LF that corresponds to the object in the antecedent sentence. Thus, the LF representation of (1b) is assumed to be the one in (2). Even though there is some debate on whether ellipsis takes place at PF or is reconstructed at LF (Shinohara 2006; Sakamoto 2016), the argument ellipsis analysis argues that the meaning of the silent argument can be read off from a corresponding nominal phrase in the LF representation of the sentence.

- (2) The LF representation of (1b) assumed by the argument ellipsis analysis

Minki-to <mwusewun chayk-ul> ilk-ess-ta.

Minki-also <horror book-ACC> read-PAST-DECL.

Minki read <a horror book>, too. Lit. Minki read a horror book, too.

The other type of approach is a null pronoun approach, which assumes that there is no internal structure in the LF representation of null arguments. The null pronoun approaches (Ahn and Cho 2011, 2020, cf. Hoji 1998) share the idea that null arguments are simply pronouns without a phonetic

form, as demonstrated in (3). Under the analysis, a null argument refers to a contextually salient entity through the same mechanism by which an overt pronoun finds its proper referent. Since the object in the antecedent is *mwusewun chayk* ‘a horror book’, the silent pronoun refers to a horror book which is the salient referent yielding the interpretation that *Minki read a horror book, too*. Hoji (1998) argues that *pro* in the silent argument can be either indefinite or definite, so the horror book Minki read can be the same book that Jina read or a different one.

(3) The LF representation of (1b) assumed by the null pronoun analysis

Minki-to <kukes-ul > ilk-ess-ta,
 Minki-also <it-ACC> read-PAST-DECL.
 Minki read <it>, too. Lit. Minki read it, too.¹

The two theoretical approaches have been discussed in depth with respect to the sloppy/strict readings of null arguments. The sloppy/strict reading distinction was first introduced into ellipsis theories due to considerations regarding how the meaning of elided arguments in many elliptical sentences is obtained (Heim 1982). Zooming into the case of null arguments more specifically, in example (1b), the null object may be interpreted in two ways. First, it can be interpreted as referring to the same horror book Jina read. In such a case, when a null argument refers to the same referent that the corresponding argument in the antecedent clause refers to, such an interpretation is called a *strict reading*. On the other

1 The Korean pronoun *kukes* is glossed as “it” here for explanatory purposes. However, we acknowledge that *kukes* may have indefinite interpretation under certain contexts, which is a characteristic not shared by the English counterpart, *it*.

hand, the null object can be interpreted as referring to a horror book, but not the same horror book that Jina read. In cases like this, when the null argument refers to a referent that is not the same as the corresponding argument in the antecedent clause, such an interpretation is called a *sloppy reading*.

Although both approaches claim that such a strict/sloppy ambiguity can be accounted for, each theory has different predictions as to which reading is more preferred. If the null argument in (4b) has full-fledged nominal phrases, assumed by the argument ellipsis analysis, the LF structure of (4b) would be like the one in (4c). Under the LF structure in (4c), the sloppy reading can be easily obtained while the strict reading needs an additional mechanism to be obtained (e.g. Vehicle Change (Kitagawa 1991; Fiengo and May 1994; Hestvik 1995)). On the other hand, if the null argument in (4b) is silent pronouns, argued by the null pronoun analysis, the LF structure of (4b) would be like the one in (4d). The strict reading is readily obtained from (4d), while the sloppy reading is hard to obtain although it is not impossible (Ahn and Cho 2011, 2020). Thus, each theory has different predictions regarding which reading would be preferred for a given sentence.

- (4) a. Jina-ka caki chayk-ul ilk-ess-ta.
 Jina-NOM self book-ACC read-PAST-DECL.
 Jina read a horror book.
- b. Minki-to <e> ilk-ess-ta.
 Minki-also read-PAST-DECL.
 Minki read <e>, too.
- ✓Strict reading: Minki read Jina's book,
 ✓Sloppy reading: Minki read Minki's book.

- c. Minki-to <caki chayk-ul> ilk-ess-ta.
 Minki-also <self book-ACC> read-PAST-DECL.
 Minki read <self's book>, too.
^{??}Strict reading: Minki read Jina's book.
 ✓Sloppy reading: Minki read Minki's book.
- d. Minki-to <kukes-ul> ilk-ess-ta.
 Minki-also <it-ACC> read-PAST-DECL.
 Minki read <it>, too.
 ✓Strict reading: Minki read Jina's book.
^{??}Sloppy reading: Minki read Minki's book.

Despite the ongoing debate on the nature of null arguments in Korean, now more than twenty years old, there has been little quantitative investigation of this issue. Consequently, a satisfactory and accurate generalization of the phenomenon remains elusive, yet. The goal of the current paper is to contribute to uncovering the nature of null arguments in Korean using a quantitative experimental method. We note in particular that Han et al. (2020) and Kang (2022) have recently reported interesting experimental results on null arguments in Korean, but nevertheless, there remain important issues left unanswered. In section 2, we will revisit the recent findings concerning null arguments and address questions that are left unexplored in the previous experimental studies. In Section 3, we present our experimental study, which aims at deepening our understanding of the phenomenon. In Section 4, we summarize the results of the experiment and discuss its implications. Ultimately, this paper provides quantitative data that fill the gaps in the literature on null objects in Korean, and its results call for a revision of the current theories on null

arguments, particularly as observed in East Asian languages, or at least in Korean.

2. Background and research questions

Han et al. (2020) present experimental studies on Korean null objects, and these constitute the first extensive quantitative investigation of null arguments in Korean as far as we are aware. They used a truth-value judgment task to investigate whether there is a correlation between the availability of the sloppy reading from null objects and the acceptability of quantificational binding of *ku* 'he'. In their experiment, participants read sentences exemplified in (5) (the indices are ours) and they were asked to judge whether a given sentence is true for a given context. Interestingly, they find a tendency that participants who judged sentences with a null object in the sloppy reading context (5a) acceptable also accepted the quantificational binding use of *ku*, as shown in (5b). On the other hand, participants who did not accept the former also rejected the latter.

(5) Experimental sentences used in Han et al. (2020:325–326, (12), (14))

a. [Context: Minswu, Kiswu, and Cinswu were moving to a new dorm.

Minswu moved Minswu's stuff, Kiswu also moved Kiswu's stuff].

Minswu-ka **ku-uy** **cim-ul** nalu-ess-ko, Kiswu-to
[e] nalu-ess-ta.

Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ Kiswu-also
move-PAST-DECL

'Minswu moved his stuff, and Kiswu moved, too.'

- b. [Context: Minswu, Kiswu, and Cinswu were moving to a new dorm. Minswu moved Minswu's stuff. Kiswu also moved Kiswu's stuff. Cinswu also moved Cinswu's stuff.]
- Motwu-ka **ku-uy cim-ul** nalu-ess-ta.
 everyone-NOM he-GEN stuff-ACC move-PAST-DECL
 'Everyone_i moved his_i stuff.'

Han et al. interpret these results as supporting evidence for the argument ellipsis analysis of null arguments. Han et al. postulate that the aforementioned correlation can be well accounted for under the assumption that the null object in (5a) contains a silent pronominal possessor, *ku-uy cim* 'his stuff' in its LF representation. Under this premise, it is expected that those participants who accepted the quantificational binding with the pronominal possessor in (5b) would accept the sloppy reading with the (elided) silent possessor in (5a).

Another noteworthy finding from their experiment is that the results reveal a substantial preference for a strict reading over a sloppy reading for null objects—a rather surprising result under the ellipsis approach. The authors, however, argue that this outcome is still compatible with the argument ellipsis analysis. According to their analysis, since the object in the antecedent clause contains a pronominal possessor *ku-uy* 'his', as in (5a), the elided object is also expected to include a (silent) pronominal possessor, exemplified in (6); the sentence in (6), according to Han et al., is presumably more likely to be interpreted with the strict interpretation that 'Kiswu moved Minswu's (=his) stuff' than the sloppy interpretation 'Kiswu moved his own (i.e., Kiswu's) stuff'. Because the overt *ku-uy* is biased towards the strict reading, an elided phrase containing *ku-uy*

would presumably show the same effect, explaining the strict bias of null arguments under the ellipsis analysis.

- (6) Minswu-ka ku-uy cim-ul nalu-ess-ko,
 Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ
 Kiswu-to <ku-uy cim-ul> nalu-ess-ta.
 Kiswu-also <he-GEN stuff-ACC> move-PAST-DECL
 'Minswu moved his stuff, and Kiswu moved his stuff, too.'

Han et al.'s observations are very interesting and provide valuable quantitative data based on which we can test the prediction of the two approaches to the interpretation of null arguments. As mentioned above, however, both the argument ellipsis and the null pronoun analysis argue that they can account for the ambiguity between the strict reading and the sloppy reading of null objects. Thus, simply considering whether a certain reading is available or not cannot provide us with conclusive evidence to support one analysis over the other. In such a context, speakers' preference for one reading over the other, instead of categorical judgments, would further our understanding of the phenomenon because even if both theories can account for both readings, the relative ease of achieving each reading is different under each theory, as outlined above, resulting in differing patterns of preference, and shed an important light on which approach between the two would make a better prediction on our interpretation of null arguments.

We, in particular, note that there are certain issues that must be carefully reconsidered to evaluate Han et al.'s claims. First, it has not been experimentally established yet whether the strict reading is preferred over

the sloppy reading when an overt pronominal possessor is employed in place of a null object. As noted, Han et al. assumed that a strict reading preference follows from the claim that the null object in (5a) shares the properties of an overt pronoun under ellipsis, as described in (6). Crucially, however, they did not investigate what happens when an overt pronominal possessor is employed in place of a null object in contexts like (6). Interpretation of Han et al.'s results remains inconclusive until we verify the preference for the strict reading in sentences like (6) can be systematically tested and confirmed. Unfortunately, we did not investigate the judgment of Korean native speakers regarding this type of sentence in the current study. Instead, we tested another prediction: If the preference for the strict reading is a consequence of the identical LF representation of (5a) and (6), we predict that the sloppy reading will be favored when the object in the antecedent clause contains a reflexive possessor, as discussed in example (4).

However, Kang (2022) reports that the opposite is true. Kang finds that a strict reading is preferred even when the object of the antecedent clause contains a reflexive possessor. This is not consistent with the assumption taken for granted by Han et al. Kang's results suggest that the strict reading is preferred regardless of the type of possessor within the object in the antecedent clause, contra Han et al.'s assumptions. In fact, Kang's result is not expected under the argument ellipsis analysis in general since the analysis assumes that null objects would have different preferences depending on the elided elements. Highlighting that the sloppy reading is significantly more acceptable for null objects than for null subjects, Kang argues that null objects, but not null subjects, can be generated by argument ellipsis. However, Kang does not provide an explanation for

why the strict reading is preferred even for null objects.² On the other hand, the null pronoun analysis accounts well for the across-the-board preference for the strict reading since null arguments are simply silent pronouns regardless of the antecedent context.

The first research question we want to investigate in this paper is whether we can replicate the tendency of Korean speakers' judgments observed in Kang (2022) with different experimental stimuli and designs, so that we can establish and make sense of the discrepancy between Han et al.'s prediction and Kang's findings. In Kang's experiment, the strict reading and the sloppy reading were presented with pictures. In addition, null arguments appeared in the target sentences as not only objects but also as subjects. The results show that null subjects are dispreferred with a sloppy reading. There is a possibility, however, that the strict reading preference is a consequence of response biases that affect null subjects only, which constitute a majority of items in the experiment. To control such possible confounding effects in Kang's stimuli, it is necessary to employ a different methodology, one which tests null objects consistently. If we find a strict reading preference in the new experiment as well, we can be confident that the preference for the strict reading holds for null objects in general regardless of the anaphoric form in the antecedent. Such an overall preference for the strict reading would support the null pronoun analysis over the ellipsis approach.

2 The experimental results reported in Kang (2022) demonstrate a subject-object asymmetry in the acceptability of the sloppy reading: Korean native speakers allow the sloppy reading for null objects significantly more than for null subjects. However, the acceptability of the strict reading is significantly higher than that of the sloppy reading for both null subjects and null objects.

Another issue that needs to be addressed is individual variation. In the experiment conducted by Han et al., participants were presented with 16 target sentences, grouped into four different conditions. Consequently, each participant had only four opportunities to respond regarding the availability of the sloppy reading. Based on the four presented items, the research concluded that there exists individual variation among participants. The classification was carried out using the following criteria: those who accepted the sloppy reading in three or four out of the four trials were categorized into the “accept” group; participants who accepted the sloppy reading in two out of the four trials fell into the “ambivalent” group; and finally, participants who accepted the sloppy reading in only one or none of the four trials were classified in the “reject” group. Note, however, that it may, however, be premature to categorize participants based on four test sentences. There is thus a reasonable concern that the data points may be too few in number to make a conclusion concerning individual variation.

To investigate the issues, we have pointed out above, we have designed a new experimental study. In conducting our experiment, we have four major research questions, summarized as follows:

- **Research question 1:** Is the preference for a strict reading over a sloppy reading sensitive to the anaphoric form of possessor in the antecedent clause?

If the preference for a strict reading is not observed with a reflexive antecedent, it would support the argument ellipsis analysis, as argued by Han et al. (2020). However, if the preference for the strict reading is observed with a reflexive antecedent as well, it would serve as supporting

evidence for the null pronoun analysis, contra Han et al. (2020).

The second question concerns whether the individual variation that Han et al. argued for can be reduplicated when participants were given more trials to indicate the availability of the sloppy reading. If the results show that the individual variation is robust, independent of the number of relevant stimuli items, this would strongly support Han et al.'s claim that the acceptability of the sloppy reading needs to be discussed at the individual level, rather than as a property shared across Korean speakers. If not, theoretical re-evaluation of Han et al.'s claim is necessary.

- **Research question 2:** How robust is the individual variation that Han et al. argued for?

As stated in the preceding section, the theoretical debate on null arguments has primarily centered around the syntactic nature of unpronounced arguments. Languages other than Korean permit the existence of null arguments, and these null arguments in different languages have been assumed to have distinct syntactic natures given their potential interpretations (e.g., Turkish (Şener and Takahashi 2010); Hindi, Bangla (Simpson et al. 2013); Chinese (Li 2014); Spanish (Deguine 2014); Javanese (Sato 2015), Persian (Sato and Karimi 2016), and Hebrew (Landau 2018)). Of particular importance is the acceptability of the sloppy reading, which serves as a significant criterion for determining the syntactic mechanism generating null arguments. A rule of thumb in the field has been as follows: if a null argument permits the sloppy reading, it must be generated by ellipsis, whereas if it does not allow the sloppy reading, it must not be produced by ellipsis but rather by the insertion of a silent pronoun.

This dichotomy follows from the reasoning that silent pronouns share the same syntactic and semantic properties as overt pronouns, and overt pronouns in many languages do not permit the sloppy reading. This widely used heuristic has also been applied to the study of Korean null arguments. However, Ahn and Cho (2011, 2020) present an argument that overt pronouns in Korean do indeed allow a sloppy reading. Consequently, they propose that the acceptability of a sloppy reading is insufficient to conclusively determine the syntactic nature of null arguments, at least in Korean. Interestingly, however, it has not been examined with quantifiable data whether an overt pronoun is compatible with a sloppy reading. In the current study, we will test Korean speakers' judgment on the sloppy reading for overt pronouns. If we find that overt pronouns in Korean allow the sloppy reading as much as null objects, that would support the null pronoun analysis that Ahn and Cho argued for. Thus, we have the third research question as follows:

- **Research question 3:** Do overt pronouns in Korean allow the sloppy reading to the same extent as null objects?

In our experiment, we utilize a new methodology, departing from Kang's (2022) pictorial description of the stimuli. In particular, we opt for a priming method to investigate whether a pronoun or a full nominal phrase evokes priming effects in the interpretation of null objects. Priming studies have found that when two consecutive sentences share the same syntactic structure, the processing of the second sentence is affected by the way in which the first sentence is processed. Though priming effects in sentence comprehension have been discussed in terms of processing

facilitation in literature (Arai, van Gompel, and Scheepers 2007; Traxler 2008; Thothathiri and Snedeker 2008), they can also be viewed in the sense that a particular reading of an ambiguous sentence can be preferred when the priming sentence was forced to be interpreted with that specific reading, and the priming sentence shares the same verb (Branigan, Pickering, and McLean 2005).

In Branigan, Pickering, and McLean's experiment, English native speakers were given a target sentence with a PP attachment (e.g., *The waitress is prodding the clown with the umbrella*) and asked to indicate how they interpret the sentence by selecting a picture between two options: one corresponding to a high-attachment interpretation (*The umbrella was used in the prodding event*) and the other corresponding to a low-attachment interpretation (*The clown who was prodded is holding the umbrella*). Interestingly, participants were more likely to choose the high-attachment interpretation when they were given a prime with the high-attachment reading, whereas they were more likely to choose the low-attachment interpretation when the prime was interpreted in the low-attachment reading.

This study shows that the way the prime sentence is interpreted affects the interpretation of the target sentence when they share a relevant structure. As discussed, Korean null objects can be interpreted with a strict reading or sloppy reading. If a pronoun is indeed in the LF representation of a null object (as argued by the null pronoun approach), the way the pronoun is interpreted in the prime sentence would affect the target sentence. Since pronouns are more likely to be interpreted with a strict reading (as will be shown), we expect a target sentence with a null object to be more likely to be interpreted in the strict reading. On the other hand, if a full-fledged nominal phrase is in the LF representation of a null object (as

assumed by the argument ellipsis analysis), the way the full-fledged nominal phrase is interpreted in the prime sentence would affect the interpretation of the target sentence. Thus, the sloppy reading may be preferred if the corresponding nominal phrase is more likely to be interpreted in the sloppy reading. Our last question can thus be summarized as follows:

- **Research question 4:** Does a pronoun or a nominal phrase prime a certain reading of null arguments in the target sentence?

3. Experiment

3.1. Participants

Twenty-one adult Korean native speakers (ages 20–36) participated in the experiment. Among them, one participant reported that he is a Korean–Japanese bilingual and the others were all Korean monolinguals, who had been born and raised in Korean.

3.2. Design and materials

The experiment utilized a priming technique in which a prime item and a target item were paired together within a single item. Both prime items and target items consisted of two sentences. In both the prime and target sentences, the first sentence was a transitive sentence containing an anaphoric possessor in the object. To investigate whether there was a preference for the strict reading even when the antecedent of the null

object contained a reflexive possessor, we chose the anaphoric possessor for the antecedent. The second sentence was manipulated according to two conditions. In the Self-Self condition, the prime sentences contained a full-nominal phrase in the object of the second sentence that included *caki-uy NP* ‘self’s NP’, as shown in (7a). In the Self-Pronoun condition, the second prime sentence instead contained *nukes* ‘it’ in place of *caki-uy NP* ‘self’s NP’, as shown in (7b). Each pair of prime sentences was followed by a question to probe how participants interpreted the sentences. The question and response options for a single item were the same in both conditions, as shown in (8). The first option indicated the strict reading, and the second option indicated the sloppy reading. We also included a third option “both” as obtaining one reading did not necessarily exclude the other. Additionally, we added “*I do not know*” as an option to filter out any non-interpretation-based, random choices.

(7) Sample experimental item: Prime sentences

a. Self-Self condition

Mina-ka **caki-uy** **peykay-lul** nwul-ess-ta.

Mina-NOM self-POSS pillow-ACC press-PAST-DECL.

(lit.) Mina pressed self’s pillow.

Arin-ito **caki-uy** **peykay-ul** nwulessta.

Arin-also self-POSS pillow-ACC press-PAST-DECL.

(lit.) Arin pressed **self’s pillow**, too.

b. Self-Pronoun condition

Mina-ka **caki-uy** **peykay-lul** nwul-ess-ta.

Mina-NOM self-POSS pillow-ACC press-PAST-DECL.

(lit.) Mina pressed self’s pillow.

Arin-ito **kukes-ul** nwulessta.
 Arin-also **it-ACC** press-PAST-DECL.
 (lit.) Arin pressed **it**, too.

(8) Sample experimental item: question for the prime sentence

Questions: What did Arin press? [given in Korean]

1. Mina's pillow
2. Arin's pillow
3. Both³
4. I do not know.

In the target items, the first sentence contained an object with a reflexive possessor, *caki-uy khwusyen* 'self's cushion' as the first sentence of a prime item. However, the second sentence contained a null object, as shown in (9). A single target item was presented in both conditions, and using a factorial design, each list contained a target item in one condition. Each target sentence was also followed by a question. As with the prime questions, the target questions had four response options as illustrated in (10): the strict reading, the sloppy reading, both, and "*I do not know*".⁴

(9) Sample experimental item: Target sentence

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- 3 A reviewer pointed out that the option "both" can also indicate the interpretation that Arin pressed both pillows at the same time. We agree that investigating across-speaker variation in the interpretation of the option may shed some light on the issue regarding how lexical ambiguity affects event constructions.
 - 4 In the experiment, we used only singular nouns in the object position since plurality has not been an issue in the relevant literature. However, as pointed out by a reviewer, the effect of plurality on the interpretation of null objects needs to be considered to further explore the syntactic and semantic nature of null objects.

Wuyeng-ika **caki-uy** **khwusyen-ul** nwul-ess-ta.
 Wuyeng-NOM self-POSS cushion-ACC press-PAST-DECL.
 (lit). Wuyeng pressed self's cushion.

Sangmin-ito <e> nwul-ess-tal.
 Sangmin-also press-PAST-DECL.
 (lit.) Sangmin pressed <e>, too.

(10) Sample experimental item: question for the target sentence

Questions: What did Sangmin press? [given in Korean]

1. Wuyeng's cushion
2. Sangmin's cushion
3. Both
4. I do not know.

Sixteen pairs of a prime item and a target item were used in each condition, resulting in a total of 32 prime items (16 items x 2 conditions) and 16 target items. Following a factorial design, two lists were constructed, each containing all 16 target items (eight items presented after the prime sentence in the Self-Self condition, and the other eight target items presented after the prime sentence in the Self-Pronoun condition). Each prime item in both conditions was followed by the same question and response options, resulting in 16 prime questions and 16 target questions used in the experiment. Sixteen items (i.e., 6 pairs of prime and target) were pseudo-randomized with the constraint that at least two filler trials intervene between one experimental item and the next experimental item. Different verbs were used in each of the 16 experimental pairs. Since previous studies have shown that the repetition of verbs is crucial in evoking priming effects in comprehension

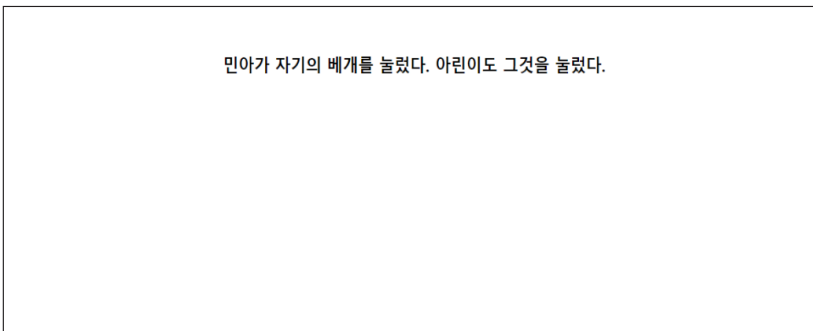
(Branigan, Pickering, and McLean 2005; Arai, van Gompel, and Scheepers 2007; LeDoux, Traxler, and Swaab 2007; Pickering and Ferreira 2008), we maximized the chance of observing the priming effect by including the same verb across the prime and the target. For the subjects in the prime sentences and target sentences, we used four boy names and four girl names in random order. The gender of the subject differed between the prime and the target. Importantly, the names used in the prime trial differed from those in the target trial within a single experimental item. Similarly, the object was not repeated between the prime and the target trial within a single experimental item. Thus, within a single experimental item, only the verb was repeated between the prime and the target.

In addition to the experimental items, we included 64 filler items. Like the experimental items, a filler item consisted of two sentences. To prevent participants from guessing the purpose of the experiment and responding strategically to the target items, we included a certain type of VP ellipsis structure ('*do-so*' construction in Korean) and introduced a new name in the object position. In some filler sentences, comprehension questions were asked about the subject instead of the object, guiding participants to not solely focus on the object. However, none of the filler items included null objects or were relevant to the strict or sloppy interpretation.

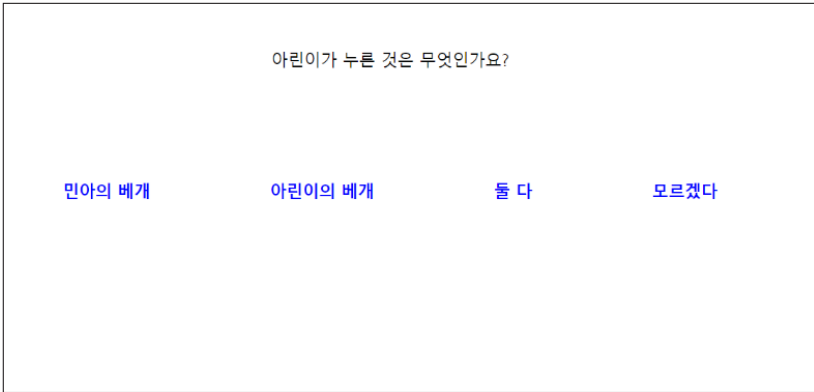
3.3. Procedure

The experiment was implemented using the web-based survey platform, PCIBex Farm (Zehr and Schwarz 2018), and participants took the experiment online. The experiment started with an informed consent form. Once they agreed on the consent, they were asked to answer to six demographic

questions: age, gender, vision, native language, whether they are simultaneous bilinguals or not, and whether they are left-handed or right-handed). On the next page, participants read an instruction page and they were instructed that they would be asked to read Korean sentences and decide an answer to the following question by clicking on one of the options presented below the question. The methodology employed in our present experiment is well suited for the qualitative comparison of two or more interpretations, making it more conducive to investigating preference in interpretations. Given that the primary aim of the experiment is to investigate preference, we adopted this specific methodology. Before they started the main experiment, four practice trials were conducted. The sentence stimuli and the comprehension question within a single trial were separated deliberately. The purpose behind this deliberate separation was to prevent participants from merely engaging in a word-by-word detection between the sentence and the question. To ensure that participants' decisions were based on the syntactic and semantic processing of the sentences, the sentence stimuli were displayed for a duration of 6000 milliseconds before disappearing (Figure 1), (cf.



[Figure 1] Screenshot of a Sentence Stimulus



[Figure 2] Screenshot of a Comprehension Question Stimulus

Branigan et al. 2005; Pickering et al. 2012) following which the corresponding comprehension question was promptly presented (Figure 2). There was no time constraint imposed on participants during their decision-making process, and once they clicked on an answer option, the subsequent trial started.

3.4. Predictions

In section 2, we summarized four research questions. Our predictions with regard to these questions are summarized below:

Research question 1: Is the preference for the strict reading over the sloppy reading sensitive to the anaphoric form of the possessor in the antecedent clause?

The argument ellipsis analysis predicts that when the antecedent object contains a reflexive possessor, the elided nominal will also contain a

reflexive possessor at LF. Since a sloppy reading can be derived from an LF representation with a reflexive possessor, processing of sloppy readings is simpler and thus expected to be preferred. On the other hand, the null pronoun analysis predicts that the strict reading will be preferred as overt pronouns prefer the strict reading (as will be shown).

Research question 2: How robust is the individual variation that Han et al. argued for?

If the individual variation observed in Han et al.'s experiment reflects grammatical variation among Korean native speakers, such variation would still be present even with an increase in the number of stimuli.

Research question 3: Do overt pronouns in Korean allow the sloppy reading to the same extent as null objects?

The null pronoun analysis assumes that null objects are essentially silent pronouns. Thus, the analysis predicts that the acceptance rates for the sloppy/strict reading of null arguments should be correlated with the acceptance rates for the sloppy/strict reading of overt pronouns.

Research question 4: Does a pronoun or a nominal phrase prime a certain reading of null arguments?

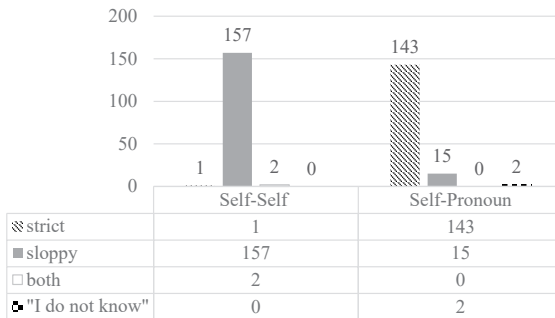
If syntactic priming affects the interpretation of null arguments, we predict that participants will be more inclined to choose the interpretation compatible with the prime sentence. Accordingly, the acceptance rate for

a sloppy reading with the prime sentence will be expected to be correlated with the acceptance rate for a sloppy reading in the target sentence.

3.5. Results

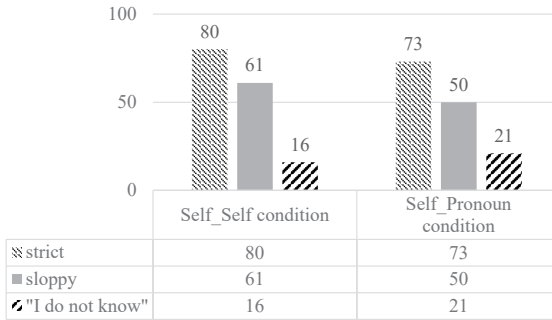
The overall results for the prime trials and the target trials are summarized in Figure 3 and Figure 4, respectively. The responses from one Korean-Japanese bilingual speaker were excluded from the further analysis to restrict the domain of study to monolingual Koreans. The results of the prime trials indicate that the sloppy reading appears to be the only available reading in the Self-Self condition. Only one response chose the strict reading, and two responses selected both readings, making up a very small proportion (1.88% of the total responses in this condition). Therefore, it is reasonable to conclude that the sloppy reading is the sole acceptable reading for the prime sentences with overt nominal phrases with ‘self’ in the object position. On the other hand, in the Self-Pronoun condition, participants were more inclined to choose the strict reading over the sloppy reading. There were only 15 responses that opted for the sloppy reading in this condition, accounting for 9.38% of the total responses. This finding aligns with the previous claim that overt pronouns in Korean may have both the strict and sloppy readings (Ahn and Cho 2011, 2020). However, the proportion of preference for the two readings is highly uneven, with nearly 90% of the responses favoring a strict reading for overt pronouns, which requires further explanation (cf. Han et al. 2020, Ahn and Cho 2011, 2020’s studies).

To see whether null objects in the target sentences share the same syntactic and semantic properties with their primes, we analyzed the



[Figure 3] Interpretation of Overt Objects in Prime Trials

responses for the target trials. To our surprise, however, there appeared to be little difference between the two conditions, as shown in Figure 4. Irrespective of what type of prime participants responded to, they were more likely to choose the strict reading than the sloppy reading, although both readings seem to be available. This preference for the strict reading is in line with the results of the experiment conducted by Kang (2022) using an acceptability judgment task with picture stimuli. Thus, all the three studies on Korean null objects discussed here (Han et al. 2020; Kang 2022 and the current experiment) point to the same conclusion: a preference for the strict reading for null objects. Interestingly, there was no single response that chose the “both” option in either condition, but there were 40 responses that chose the “I do not know” option in total. This number is probably too large to be coincidental. We suspect that participants might have invoked a third (unintended) reading (e.g., the sentence in (9) can have the reading “Wuyeng pressed Sangmin, too” since the subject of the second sentence is not nominative–case marked). It is possible that this type of unintended reading might have led to the high proportion of “I do not know” in the target trials.



[Figure 4] Interpretation of Null Objects in Target Trials

We calculated the priming effect for sloppy readings as the proportion of sloppy reading responses in the Self-Self condition minus the proportion of the same type of response in the Self-Pronoun condition, adopting the idea from Branigan et al. (2005) and Ivanova et al. (2012). First, we eliminated the responses to the target trials that follow prime trials that were not responded to as expected, (e.g., where Self_Self was responded to with the strict option) calculating the proportion based on properly primed targets only. The proportion of the sloppy reading was 38.86% in the Self-Self condition, and the proportion of the sloppy reading was 34.72% in the Self-Pronoun condition. This means that the priming effect was only 4.14%. Likewise, we also calculated the priming effect for strict readings as the proportion of the strict reading responses in the Self-Pronoun condition minus the proportion of the same type of response in the Self-Self condition. The proportion of the strict reading was 50.7% in the Self-Pronoun condition, and the proportion of the strict reading in the Self-Self condition was 50.96%, resulting in a negative priming effect. Therefore, our results suggest that there is no noticeable priming effect in the interpretation of null objects in either of the

conditions.

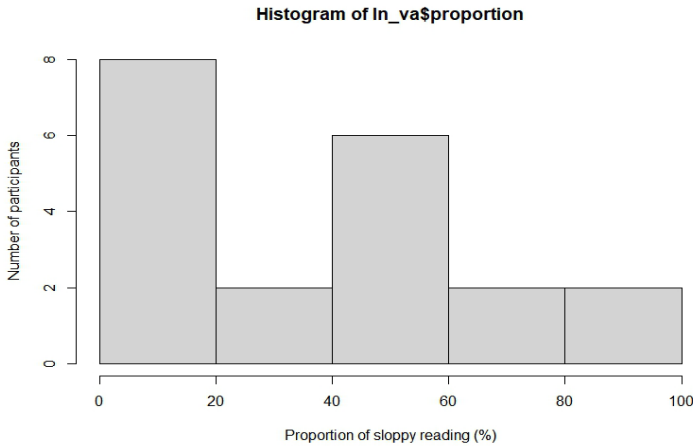
To statistically test whether there is any statistically robust priming effect at all, we constructed two generalized logistic mixed-effect models in R (R Core Team, 2020, version 4.0.2) using the *lme4* package (Bates, Mächler, and Bolker 2015) and *lmerTest* (Kuznetsova, Brockhoff, and Christensen 2017). The first model was constructed to see whether there is a significant difference in responses between the conditions. The conditions were entered into the model as fixed effects after being sum-coded and centered. Random intercepts over subjects and items were included in the model, and random slope was not included, according to the maximum likelihood test (Bates et al., 2015). For the purpose of the present study, which aimed to investigate participants' preferences for strict and sloppy reading, our analysis focused on the two responses corresponding to strict and sloppy reading.⁵ The model shows that participants' responses were not significantly different between the two conditions ($\beta = -0.032$, $SE = 0.32$, $p = .921$). A second model was constructed to investigate priming effects within each condition. The logic of the analysis is that if there is a priming effect, the way participants interpreted prime trials and target trials would

5 Unfortunately, there is no consensus view on how to construct a mixed-effect model for an experiment having categorical dependent variables with more than two response options. Therefore, we excluded 24 "I do not know" responses from the target responses and constructed a model based on the assumption that the choice was made in a binary fashion. This way of coding seems reasonable to us given that the purpose of giving the option "I do not know" is to prevent participants from choosing either the strict reading option or the sloppy reading option simply by guessing. In other words, the experiment was not designed to have more than two options for the availability of each reading. Rather, participants were asked to choose one between the strict reading and the sloppy reading, or both (although there was no single response that chose both among the target responses), and they could choose the option "I do not know" when they did not know what to choose.

be correlated with each other. The total 320 target responses (160 responses in the Self-Self condition and 160 responses in the pronoun condition) from 20 participants were categorized by condition. Since almost every prime sentence in the Self-Self condition was responded to with the sloppy reading, the responses to the prime sentences in the Self-Self condition cannot properly serve as predictors. Thus, we constructed a model for the pronoun condition only. To see whether the responses to the target (with null objects) are correlated with the responses to the prime (with a pronoun), the prime responses (strict reading chosen vs. sloppy reading chosen for prime sentences) were entered into the model as fixed effects. These fixed effects were sum-coded and centered for further analysis. Random intercepts over subjects and items were included in the model, and random slope was not included, according to the maximum likelihood test.

The generalized logistic mixed-effect model shows that the target responses were not significantly affected by the prime responses ($\beta = 1.09$, $SE = 0.75$, $p = .149$). This indicates that participants' responses to the prime sentences do not prime the way of interpreting the target sentences. Participants made their choice for target sentences independently of the interpretation they had for the primes.

Lastly, an individual analysis was conducted to assess potential individual variations. Given the absence of a noticeable priming effect, all responses to the target trials were pooled without considering the prime condition. Han et al. (2020) categorized participants in their study based on their mean acceptance rates in the "sloppy reading" condition. The task employed by Han et al. was a truth value judgment task, making a direct comparison of the current experimental results to Han et al.'s results virtually impractical. However, the proportion of selecting the "sloppy



[Figure 5] Number of Participants by Proportion of Sloppy Reading Responses for Null Objects

reading” can be calculated individually in the current experiment: For each participant, this is achieved by dividing the number of responses choosing the “sloppy reading” option by the total number of target trials (16).

Figure 5 illustrates the number of participants based on the proportion of selected “sloppy reading.” Due to the preference for the “strict reading”, the proportion of selecting the “sloppy reading” is generally not high. However, crucially, the distribution of participants across the proportion groups is not bimodal. Out of twenty participants, eight either did not choose the “sloppy reading” at all (2 participants) or selected it in less than 20% of trials (3 or fewer trials). However, the remaining participants’ distribution is relatively even. Notably, six participants fell within the 40–60% range of choosing the “sloppy reading”, which represents the second-highest proportion category. Interestingly, in the current experiment, in which participants were provided with more opportunities to indicate the acceptability of the “sloppy reading”, the bimodal pattern disappeared. We

agree that there is individual variation in the preference for the sloppy reading of null objects. Nevertheless, this variation is distributed along a spectrum rather than following an all-or-nothing pattern, contra Han et al.'s (2020) suggestion.

4. Discussion

Both the ellipsis and pronoun approaches contend that the availability of the strict and sloppy reading can be accounted for. However, as we have discussed extensively, the two approaches make different predictions regarding the preferred reading of null arguments. This section discusses what our experimental results imply for the four inquiries introduced in section 2 in relation to the two approaches to the syntax and semantics of null arguments.

- **Research question 1:** Is the preference for the strict reading over the sloppy reading sensitive to the anaphoric form of possessor in the antecedent clause?

Our results reveal a preference for the strict interpretation even in cases where the anaphoric form in the antecedent is reflexive (recall Figure 4). This observation is not expected under the assumption posited by Han et al. (2020). Han et al. posit that the preference for a specific interpretation hinges upon the anaphoric form of the possessor within the antecedent. However, our results show that the strict reading preference remains consistent, even when the antecedent is not in a pronominal form. We suggest that a more proper generalization regarding the current state of

affairs is that there is an overall preference for the strict reading in null object constructions. This receives a rather straightforward explanation under the null pronoun analysis. According to this approach, null objects are silent pronouns, and in Korean, overt pronouns tend to favor the strict reading over the sloppy reading, as evidenced by the results from the prime sentences (recall Figure 3). The strict reading preference of null objects can be attributed to their syntactic and semantic properties shared with overt pronouns at LF.

To accommodate the current observation under the ellipsis approach, a much more complex theory would have to be proposed. Since the overt form of the reflexive possessor permits the sloppy reading only (Figure 3, Self-Self condition), it is not clear how speakers override this obvious bias towards the sloppy reading to end up with the strict reading with null objects. To accommodate this result, one might assume that the strict reading is not attained via ellipsis of a nominal phrase that is identical to the corresponding object in the antecedent clause. Rather, the elided object possesses an LF representation similar to (11). In this view, the elided object may not be syntactically identical to the object in the antecedent sentence. However, both objects in (11) hold the same referential value, thereby allowing ellipsis to be licensed through Referential Parallelism (Fox 2000). If this is indeed the case, the existence of the strict reading might be accommodated under ellipsis. Nevertheless, the crucial question remains as to why the strict reading licensed by “Referential Parallelism” is preferred over the sloppy reading, which corresponds to the antecedent’s interpretation more transparently.⁶

⁶ The availability of strict or sloppy readings can vary depending on the verbs used. Null

- (11) Wuyeng-ika caki-uy khwusyen-ul nwul-ess-ta.
 Wuyeng-NOM self-POSS cushion-ACC press-PAST-DECL.
 (lit.) Wuyeng pressed self's cushion.
 Sangmin-ito <Wuyeng's cushion> nwul-ess-tal.
 Sangmin-also press-PAST-DECL.
 (lit.) Sangmin pressed <Wuyeng's cushion>, too.

- **Research question 2:** How robust is the individual variation that Han et al. argued for?

With an increased number of trials allowing participants to express their judgments on the sloppy reading, we observe that the distribution of participants across the proportion groups is not bimodal, contrary to the findings of Han et al. (2020). Although the proportion of the sloppy reading preference is not generally high, individual preferences for this reading vary along a spectrum. We categorized participants into five groups based on the proportion of their selection of the sloppy reading: less than 20%, 20–40%, 40–60%, 60–80%, and more than 80%. It is not the case that the majority of participants were placed in either the first group (less than 20%) or the last group (more than 80%). Half of the participants (10 participants) were categorized into one of the middle groups (20–40%, 40–60%, 60–80%). This result raises a serious challenge to Han et al.'s claim that

objects with certain verbs only allow for either a sloppy or strict reading. This occurs because the event described by the verb is either incompatible with a particular reading or is biased towards a particular reading based on common real-world sense. However, in this experiment, we used verbs that are compatible with both readings, allowing us to investigate the preference without being significantly affected by such an influence.

variation in the interpretation of null arguments should be analyzed at the individual level. Our results suggest that the opposite might be true and that the interpretation of null arguments should be analyzed at the level of Korean grammar in general.

- **Research question 3:** Do overt pronouns in Korean allow the sloppy reading to the same extent as null objects?

We observe that participants' responses to overt pronouns are not the same as those to the null objects. The null pronoun approach would assume that the experimental sentences in (7b) and (9) (we repeated below) share the same syntactic and semantic structures. However, we found a clear discrepancy between the pronoun (prime) condition and null object (target) conditions in the selection of the sloppy vs. strict reading. In our experiment, for null objects, participants selected the sloppy reading 38.7% of the time, whereas participants only selected the sloppy reading in the overt pronoun condition 9.37% of the time such as (7b). This much difference would remain a mystery under the null pronoun approach. It appears that null objects are more likely to be interpreted with an indefinite (\approx sloppy-like) reading than overt pronouns are. This result partially supports Ahn and Cho's (2011, 2020) claim that pronouns can be interpreted with a sloppy reading in Korean. At the same time, however, our results are not consistent with their claim in the sense that the discrepancy between the overt pronoun and null argument would not be straightforwardly expected under the null pronoun approach.⁷

⁷ A reviewer suggests that the discrepancy between the overt pronoun and null argument

(7) b. Pronoun condition

Mina-ka caki-uy peykay-lul nwul-ess-ta.

Mina-NOM self-POSS pillow-ACC press-PAST-DECL.

(lit.) Mina pressed self's pillow.

Arin-ito kukes-ul nwul-ess-ta.

Arin-also it-ACC press-PAST-DECL.

(lit.) Arin pressed it, too.

(9) Sample experimental item: Target sentence

Wuyeng-ika caki-uy khwusyen-ul nwul-ess-ta.

Wuyeng-NOM self-POSS cushion-ACC press-PAST-DECL.

(lit.) Wuyeng pressed self's cushion.

Sangmin-ito <e> nwul-ess-tal.

Sangmin-also press-PAST-DECL.

(lit.) Sangmin pressed <e>, too.

- **Research question 4:** Does a pronoun or a nominal phrase prime a certain reading of null arguments?

We suggest that the answer to this last research question is negative. Priming effects were not observed in our experiment. Put differently, the processing of prime sentences did not affect the interpretation of the target sentence with a null object. We conjecture that the absence of priming effects

is not surprising, given that languages avoid redundancy. In other words, Korean would not utilize two different anaphoric expressions if they serve the exact same functions. We believe that this idea may provide a good theoretical explanation against the null pronoun approach, where null objects are simply assumed to be silent pronouns.

attested here can be ascribed to various factors. One possibility is that the syntax and semantics of an overt noun phrase in the prime diverge from that of a null object so that the occurrence of priming effects is precluded. Alternatively, it is conceivable that the methodology employed in our experiment lacks the sensitivity to unveil such cross-sentential priming effects. A full answer to this question awaits further experimentation using different priming paradigms. We leave open the issue here with a note that further research is called for to investigate why we did not obtain priming effects for the interpretation of null arguments.

5. Conclusion

In this paper, we have investigated the syntax and semantics of null arguments in Korean, focusing on the empirical consequences of two theoretical approaches – the argument ellipsis vs. null pronoun approach. Using a priming paradigm, we have examined how null objects in Korean are interpreted and processed when their antecedents contain a reflexive phrase. The two theoretical approaches make different predictions regarding the preferred reading for null arguments. The persistent preference for a strict reading supports the null pronoun approach. At the same time, however, the clear difference between overt pronouns and null objects attested in our experiment would pose a new challenge to the null pronoun approach. It is not entirely impossible that our data might be accommodated under the ellipsis approach, but given the prevalent preference for a strict reading, it remains to be seen whether the ellipsis approach would provide a better account over the null pronoun approach.

The jury is still out.

Our study also shows that the argument ellipsis analysis, as postulated by Han et al. (2020), faces a non-trivial challenge given the preference for a strict reading in the presence of a reflexive antecedent. Furthermore, our data reveal that a sloppy reading for null arguments is generally acceptable among native speakers of Korean, and thus suggest that the interpretation of null arguments could be analyzed at the level of Korean grammar in general, contra Han et al.'s claim. Our results also suggest the need for a further experimental study on the syntactic priming of null arguments. Though we did not find a significant priming effect for the interpretation of null arguments, it yet remains open whether this observation can be generalizable to other types of antecedents in Korean other than reflexives and can be replicated with other priming paradigms. We believe that a more sophisticated experimental study is required to answer the remaining questions about null arguments (see Kang et al. (this volume) for an attempt to achieve this). We hope that the current study will provide useful quantitative data upon which new and fruitful theoretical discussions regarding null arguments can be based.

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초록

한국어 영논항 복원에 관한 실험연구

고희정*

김현우**

강초롱***

한국어에서 흔하게 사용되는 영목적어의 통사적 본질이 무엇인가를 설명하는 대표적인 두 이론으로 논항생략 가설과 영대명사 가설이 있다. 두 갈래의 설명은 영목적어의 해석에 대하여 서로 다른 예측을 한다. 한국어의 영목적어는 엄격해석과 완화지시해석을 모두 허용하는데 논항생략 가설은 완화지시해석이, 영대명사 가설은 엄격해석이 선호될 것이라는 예측을 한다. 하지만 이를 검증할 양적연구가 미비하였고, 본 연구는 영목적어의 해석상의 선호도를 알아보는 실험연구를 통하여 한국어의 영목적어에 대한 네 가지 아직 깊이 논의되지 않은 문제들을 논의하였다. 실험결과, 한국어 모국어 화자들은 영목적어를 해석할 때 엄격해석의 의미를 선호하였다. 이는 영대명사 가설을 지지해 주는 듯 하지만, 실험결과 일반 대명사는 영논항과 달리 완화지시해석을 거의 허용하지 않았다. 더불어 실험 참가자 대부분 고르게 영논항을 완화해석으로도 이해되는 경향을 보여 해석상의 개인차가 크지 않다는 점과 마지막으로 영논항이 아닌 구문이 영논항 구문에 점화효과를 보이지는 않는다는 점도 관찰하였다. 이러한 관찰들을 바탕으로 본 연구는 한국어의 영논항 구문의 통사, 의미적 특성을 더 잘 이해하기 위해서는 더 많은 양적 연구가 필요하며 이러한

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양적 연구를 통해 얻은 섬세한 언어자료와 현상을 설명하기 위해서는 대표적인 두 가설 또한 수정이 필요하다는 제안을 한다.

주제어 영목적어, 논항 생략, 영대명사, 접화, 해석상의 선호도