Null objects in Korean: experimental evidence for the argument ellipsis analysis

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Abstract

Null object (NO) constructions in Korean and Japanese have received several different accounts: (i) as argument ellipsis (Oku 1998, Kim 1999, Saito 2007, Sakamoto 2015), (ii) as VP ellipsis after verb raising (Otani and Whitman 1991, Funakoshi 2016), or (iii) as instances of base-generated *pro* (Park 1997, Hoji 1998, 2003). In this article, we report results from two experiments supporting the argument ellipsis analysis for Korean. The first experiment builds on the finding in Kim and Han 2016 of inter-speaker variation among Korean speakers in whether the pronoun *ku* can be bound by a quantifier. In Experiment 1, we found that a speaker's acceptance of quantifier-bound *ku* positively correlates with their acceptance of sloppy readings in NO sentences. We argue that an ellipsis account, in which the NO site contains internal structure hosting the pronoun, accounts for this correlation. In Experiment 2, we tested the recovery of adverbials in NO sentences, and found that only the object, but not the adverb, can be recovered in the NO site, excluding the possibility of VP ellipsis. Our findings taken together thus suggest that NOs result from argument ellipsis in Korean.

KEYWORDS: null object, argument ellipsis, null pronominal, sloppy reading, Korean

Null objects in Korean: experimental evidence for the argument ellipsis analysis [0]

1 Introduction

One of the defining grammatical properties of East Asian languages, such as Korean and Japanese, is the possibility to drop object arguments in addition to subject arguments. This object drop phenomenon is attested in the so-called null object construction in Korean, as exemplified in (1), where a transitive verb with no overtly expressed object (marked with **[e]** as a theory-neutral notation) appears in the second conjunct of the coordinate structure.

(1) Appa-nun sayenni-lul coaha-yss-ciman, emma-nun **[e]** sileha-yess-ta.
dad-TOP new.sister-ACC like-PAST-CONJ mom-TOP dislike-PAST-DECL
(lit.) 'Dad liked new sister, but mom disliked.' [Google]

The object of *sileha* 'dislike' is missing, but it is readily understood as corresponding to the phonologically overt object in the first conjunct, *sayenni* 'new sister'. This is in contrast with English, which does not allow null objects; the literal translation of (1) is not acceptable. The existing analyses for null object constructions in the East Asian languages can be grouped into at least three camps: (i) the null pronominal analysis; (ii) the argument ellipsis analysis; and (iii) the verb-stranding VP ellipsis analysis.

The first of these analyses, the null pronominal analysis, postulates a phonologically null pronoun (*pro*) base-generated in the object position **[e]** (Yoon 2004, Cole 1987, Park 1994, 1997, Hoji 1998, 2003, Li 1998, Kim 2010, Moon 2010, Ahn and Cho 2010, 2011a,b, Bae and Kim 2012). The null *pro* refers to a contextually salient entity, e.g., new sister in (1), introduced into the discourse by the overt object in the first clause, similar to the behaviour of an overt pronoun such as *kunye* 'she'.

The second analysis of null objects is that they are the result of an ellipsis operation called argument ellipsis (Oku 1998, Kim 1999, Saito 2003, 2007, Saito and An 2014, Takahashi 2007, 2008, Takita 2011, Um 2011, Cheng 2011, 2013, Kim 2012, Park 2013, Ohtaki 2011, 2014, Sakamoto 2015, 2016, 2017). That is, a full-fledged DP constituent is constructed in the object position in (1), but is subsequently elided under identity with an overt DP in the corresponding object position in a preceding clause.[1]

The third analytic option for null objects involves VP ellipsis preceded by overt movement of the main verb out of the VP to Tense (Huang 1987, 1988, 1991, Otani and Whitman 1991, Lee 2005, Funakoshi 2014, 2016, Fujiwara 2017; cf. Pan 2002, Lee 2016). In (1), for instance, all the elements within the VP in the second conjunct, including the DP object, undergo ellipsis, while the verb, *sileha* 'dislike', which has been raised to Tense, is "stranded" and is thus overtly realized. Under the verb-stranding VP ellipsis analysis, then, the null object site **[e]** is equivalent to an articulated VP constituent, although it does not appear to be so on the surface.[2]

The three competing approaches can be distinguished from one another in their assumptions regarding the following two parameters: (i) whether null objects contain unpronounced internal structure; and (ii) whether null objects correspond to DPs or 'null VPs in disguise' (a term coined by Huang 1988), as summarized in Table 1.

<INSERT TABLE 1 ABOUT HERE>

The primary purpose of this article is to present novel empirical data obtained from two experimental studies which demonstrates that some instances of Korean null objects should be analyzed as argument ellipsis. In Experiment 1, the availability of sloppy identity readings for null objects was examined in conjunction with inter-speaker variability in the interpretation of the pronoun *ku*, which offers a novel probe for diagnosing the presence of internal syntactic structure at the null object site. We

demonstrate that the results from Experiment 1 could only be obtained if the null object constructions tested are attributed to the ellipsis of a constituent with full-fledged structure, thus undermining the view that Korean null objects are pronominal. Experiment 2 tested the recoverability of adjuncts to diagnose the size of ellipsis, whether a DP object (argument ellipsis) or a VP containing the DP object (verb-stranding VP ellipsis). We present findings that show that adjuncts cannot be recovered, which supports the claim that the null object in Korean is a result of argument ellipsis, not verb-stranding VP ellipsis.

2 Experiment 1

2.1 Research question and predictions

The first and most frequently cited argument in defence of the ellipsis strategy for null objects in East Asian languages is that sloppy identity readings are available in some null object constructions, as illustrated in the Korean example in (2) below. Note that the antecedent sentence in (2A) has a DP object containing the long-distance anaphor *caki* 'self' as a possessor.

(2) A: Minswu$_1$-ka caki$_1$-uy emeni-lul piphanha-yess-ta.
Minswu-NOM self-GEN mother-ACC criticize-PAST-DECL
'Minswu$_1$ criticized his$_1$ mother.'

B: Cinswu-to **[e]** piphanha-yess-ta.
Cinswu-also criticize-PAST-DECL
(lit.) 'Cinswu criticized, too.'

a. 'Cinswu criticized his own mother, too.' [sloppy identity]

b. 'Cinswu criticized Minswu's mother, too.' [strict identity]

(adapted from Ahn and Cho 2011a: 473, ex.(3))

The possibility of both a strict and sloppy reading poses a non-trivial challenge to the

"uniform *pro*-theory" (Sato 2014: 2). If the null object argument in (2B) were simply an empty pronominal, the sentence, contrary to fact, should not be able to yield the sloppy identity reading, on a par with the sentence in (3) below in the same context, which contains *kunye* 'she' in the object position. Here, the overt pronoun can only be interpreted referentially and, thus, only allows the strict identity reading, preceded by (2A).

(3) Cinswu-to **kunye-lul** piphanha-yess-ta.
Cinswu-also her-ACC criticize-PAST-DECL
'Cinswu criticized her, too.' [*sloppy identity, ^{ok}strict identity]

In order to accommodate the availability of sloppy interpretation in null object constructions, a number of syntacticians have argued that the relevant null objects should be analyzed as resulting from some kind of ellipsis operation, which might be either argument ellipsis (Oku 1998, Kim 1999, Saito 2003, 2007, Takahashi 2007, 2008, 2013, Sakamoto 2015, 2016) or verb-stranding VP ellipsis (Huang 1987, Otani and Whitman 1991, Lee 2005, Funakoshi 2014, 2016). On either ellipsis approach, the null object sentence in (2B) would involve a DP with internal syntactic structure that includes the possessive anaphor *caki-uy* 'self-GEN', elided under identity with its overt antecedent. The sloppy identity reading would then be attributed to standard mechanisms, in which the elided anaphor is bound by its clause-mate subject, *Cinswu*.

Another representative argument made to substantiate the ellipsis analysis is based on the observation that some null objects yield 'quantificational readings' (a term coined by Takahashi 2008). Consider the following Korean null object construction, in which the antecedent sentence in (4A) contains a nominal object modified by the numeral quantifier *sey myeng*(*-uy*) 'three CL(-GEN)'.

(4) A: Minswu-ka sey myeng-uy kaswu-lul coaha-n-ta.
Minswu-NOM three CL-GEN singer-ACC like-PRES-DECL
'Minswu likes three singers.'

B: Cinswu-to **[e]** coaha-n-ta.
Cinswu-also like-PRES-DECL
(lit.) 'Cinswu likes, too.'

a. 'Cinswu likes three singers, too.' [quantificational]

b. 'Cinswu also likes the same three singers who Minswu likes.' [E-type]

As indicated above, the null object sentence in (4B) may be interpreted in two different ways. One reading is the quantificational reading, in which the set of singers that Cinswu likes does not need to be identical to the set that Minswu likes. The other reading is the so-called 'E-type reading' (e.g., Evans 1980), in which the singers who Cinswu likes must be the same as the ones that Minswu likes. Now compare (4B) with (5) below, where the object argument site is filled with an overt pronominal.

(5) Cinswu-to **kutul**-ul coaha-n-ta.
Cinswu-also they-ACC like-PRES-DECL
'Cinswu likes them, too.' [*quantificational, ^{ok}E-type]

When preceded by (4A), the pronoun *kutul* 'they' in (5) can only be anaphorically linked to the singers that Minswu likes. Thus, the sentence only yields the E-type reading. Given this, the fact that (4B) *does* allow the quantificational reading (as well as the E-type reading) would be mysterious if a null pronoun occupied the object argument position. On the other hand, the ellipsis analysis can easily capture the availability of the quantificational reading of the null object. Under either the argument ellipsis analysis or the verb-stranding VP ellipsis analysis, (4B) involves an (indefinite) object DP containing *sey myeng*(*-uy*) 'three CL(-GEN)', which undergoes ellipsis under identity with its overt antecedent. The quantificational reading arises quite simply because there is an elided quantifier in the null object sentence.

The ellipsis analyses discussed so far, however, have been rejected by Hoji (1998, 2003) and subsequent researchers (Li 1998, Kurafuji 1999, Ahn and Cho 2010, 2011a,b,

Moon 2010, Bae and Kim 2012, Tomioka 1998, 2003, 2014, Kasai 2014), who have argued that the examples can be all accounted for by a null pronominal analysis. Hoji (1998) argues that null pronominals in East Asian languages, including Korean, can be construed as indefinite as well as definite (cf. Jaeggli 1986, Rizzi 1986). According to Hoji, the null object position **[e]** in (2B) is occupied by a *pro* that can be anaphorically linked to an indefinite argument, *emeni* 'mother', which corresponds to the noun head of the full DP object in the antecedent sentence in (2A). Under this 'indefinite *pro* analysis', then, the null object sentence in (2B) is taken to be semantically equivalent to the sentence in (6) containing the lexically overt object, *emeni* 'mother'.

(6) Cinswu-to emeni-lul piphanha-yess-ta.
Cinswu-also mother-ACC criticize-PAST-DECL
(lit.) 'Cinswu criticized a mother, too.'

As noted by Saito (2007: 206), the interpretation of the sentence in (6) is not exactly identical to the sloppy identity reading given in (2), 'Cinswu criticized his own mother, too'. Nevertheless, this sentence is (pragmatically) consistent with a sloppy identity reading and can thus be truthfully uttered in such a situation or discourse context. Hoji (1998) concludes that the availability of the sloppy identity reading (in his terms, the 'sloppy-like reading') for the null object sentence in (2B) can be analyzed in terms of *pro*, without recourse to an elided structure embedding the bound variable element *caki-uy* 'self-GEN'.

As for the quantificational readings for null objects introduced in (4), Ahn and Cho (2011a,b) suggest that (4B) involves an indefinite *pro*, and thus is equivalent to the sentence in (7), where the object position is filled with the indefinite nominal, *kaswu* 'singer', and the quantificational reading in (4B) is generated via pragmatic inference.

(7) Cinswu-to kaswu-lul coaha-n-ta.
Cinswu-also singer-ACC like-PRES-DECL

(lit.) ‘Cinswu likes a singer, too.’

As it stands, then, both the ellipsis and the null pronominal approaches can account for the availability of the sloppy reading in the null object construction. In what follows, we present novel empirical data from Experiment 1 that supports the ellipsis analysis for Korean. We use the availability of sloppy readings to identify the syntactic nature of Korean null objects, with the aid of the overt third-person pronoun *ku* ‘he’. The fundamental logic of Experiment 1 is based on the discoveries about *ku* in Kim et al. 2015 and Kim and Han 2016 that there exists substantial inter-speaker variation in the bindability of *ku*. That is, with regard to the interpretation of quantificational sentences such as (8), an individual Korean speaker will either consistently allow a bound variable reading for *ku* or consistently not allow such a reading.

(8) Motwu-ka **ku**-uy cim-ul nalu-ess-ta.
everyone-NOM he-GEN stuff-ACC move-PAST-DECL
‘Everyone moved his stuff.’

a. ‘Each person moved his own stuff.’

b. ‘Everyone moved one particular person’s stuff.’

For a referential interpretation of *ku*, there is no inter-speaker variation: the pronoun *ku* can readily take as its antecedent a referential matrix subject (e.g., *Minswu* in (9)) as long as a relevant context is provided, although it often prefers to have a discourse antecedent.

(9) Minswu-ka **ku**-uy cim-ul nalu-ess-ta.
Minswu-NOM he-GEN stuff-ACC move-PAST-DECL
‘Minswu moved his stuff.’

a. ‘Minswu moved his own stuff.’

b. ‘Minswu moved one particular person’s stuff.’

In Experiment 1, we use this inter-speaker variation for bound *ku* as a probe into the correct representation of null objects. If null objects involve the ellipsis of syntactic

structure which matches an antecedent, we would expect that when the pronoun *ku* is elided, it will have the same interpretative options as unelided *ku* for any given speaker. It is standardly assumed that sloppy pronouns in ellipsis contexts and bound variable pronouns in quantificational contexts are subject to the same λ-binding mechanism (Heim and Kratzer 1998, Büring 2005). We expect, therefore, to find inter-speaker variation in the acceptance of sloppy reading just as in the acceptance of bound variable reading in quantificational sentences. More crucially, we should be able to observe a correlation between the distribution of the two readings: an individual speaker's acceptance of the sloppy reading in null object sentences should be predictable from her acceptance of the bound variable reading in quantificational sentences (and vice versa). That is, speakers who allow the bound variable reading of *ku* in quantificational sentences would be expected to accept the sloppy reading in null object sentences, while speakers who do not allow the bound variable reading would be expected to reject the sloppy reading. Alternatively, if null objects are simply null elements without internal, elided structure, we do not expect such a correlation. In the latter case, sloppy readings might arise for all speakers via a mechanism unrelated to the bindability of *ku*, Hoji's 'sloppy-like' interpretations for instance. The central research question is summarized in (10).

(10) RESEARCH QUESTION:

Does the distribution of sloppy readings of null objects follow from the distribution of quantified bound-variable pronouns in Korean?

To answer this research question, the availability of sloppy identity readings in null object constructions such as (11) was examined in comparison with the availability of bound variable readings in quantificational sentences such as (8).

(11) Minswu-ka **ku**-uy cim-ul nalu-ess-ko, Kiswu-to **[e]**
Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ Kiswu-also

nalu-ess-ta.
move-PAST-DECL
(lit.) 'Minswu moved his stuff, and Kiswu moved, too.'

a. 'Minswu moved Minswu's stuff, and Kiswu moved Kiswu's stuff, too.'

[sloppy identity]

b. 'Minswu moved Minswu's stuff, and Kiswu moved Minswu's stuff, too.'

[strict identity]

Given the context where the first conjunct in (11) is understood as 'Minswu moved Minswu's stuff', the ellipsis and null pronominal analyses make different predictions regarding the relation between the distribution of the sloppy identity readings for the null object constructions and the quantificational binding of *ku*. This is so since the ellipsis analysis assumes the null object to have syntactically represented internal structure while the null pronominal analysis does not.[3]

2.2 Methodology

2.2.1 Participants

Forty native Korean adult speakers participated in the experiment. Most were university students in Korea. They were paid $10 each as compensation for participation.

2.2.2 Task

A truth-value judgment task (Crain and Thornton 1998) was employed. Participants were presented with sentences on a computer screen describing a context, followed by a target sentence. They were then asked to judge whether the target sentence truthfully described the given context by clicking 1 for 'True' and 0 for 'False' (see Figure 1).

<INSERT FIGURE 1 ABOUT HERE>

2.2.3 Design and Materials

Each target sentence was either a null object construction such as (11) or a quantificational sentence such as (8), and each context was biased toward a bound or referential reading in the quantificational sentences, and a sloppy (i.e. bound) or strict reading in the null object sentences. Thus, two factors were crossed to create four experimental conditions: SENTENCE TYPE (NullObject vs. Quantificational) × CONTEXT TYPE (Bound vs. Referential). A sample set of test items is given in (12)-(15) below. The context sentences are given here in English to save space.

(12) NULLOBJECT-BOUND (sloppy identity reading) condition:

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]**
Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ Kiswu-also
nalu-ess-ta.
move-PAST-DECL

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

(13) NULLOBJECT-REFERENTIAL (strict identity reading) condition:

Minswu, Kiswu, and Cinswu were moving to a new dorm. Minswu moved Minswu's stuff. Kiswu also moved Minswu's stuff.

Minswu-ka ku-uy cim-ul nalu-ess-ko, Kiswu-to **[e]**
Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ Kiswu-also
nalu-ess-ta.
move-PAST-DECL

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

(14) QUANTIFICATIONAL-BOUND condition:

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 moved his stuff.'

(15) QUANTIFICATIONAL-REFERENTIAL condition:

Minswu, Kiswu, and Cinswu were moving to a new dorm, waiting for Thayswu to come. Minswu moved Thayswu's stuff. Kiswu also moved Thayswu's stuff. Cinswu also moved Thayswu's stuff.

Motwu-ka ku-uy cim-ul nalu-ess-ta.
everyone-NOM he-GEN stuff-ACC move-PAST-DECL

'Everyone moved his stuff.'

In (12), the context is consistent with the sloppy identity reading for the target null object construction, which would arise, according to the ellipsis analysis, from elided *ku* being a bound pronoun, while in (13), the context is consistent with the strict identity reading for the target null object construction, which would be attributed to *ku* serving as a referential pronoun. In (14), the context is consistent with the bound variable reading for *ku* in the target quantificational sentence, while in (15), the context is consistent with the referential reading for *ku* in the target quantificational sentence.

Based on the sample set illustrated in (12)–(15), 16 sets of test items were constructed, thus resulting in 64 test items (16 items for each of the four experimental conditions). These items were then assigned to four presentation lists according to a Latin Square design, such that each list contained four items in each condition. The same 40 filler items were then added to each list, some of which are given in (16)–(18) below.

(16) REFERENTIAL filler:

Minswu, Kiswu, and Cinswu were taking a rest after exercise. Minswu drank Minswu's beverage.

Minswu-ka ku-uy umlyoswu-lul masi-ess-ta.
Minswu-NOM he-GEN beverage-ACC drink-PAST-DECL
'Minswu drank his beverage.'

(17) NULLOBJECT-'OBJECT-MISMATCH' filler:

Minswu, Kiswu, and Cinswu were taking a rest after exercise. Minswu drank a beverage. Kiswu drank water.

Minswu-ka umlyoswu-lul masi-ess-ko, Kiswu-to **[e]** masi-ess-ta.
Minswu-NOM beverage-ACC drink-PAST-CONJ Kiswu-also drink-PAST-DECL
'Minswu drank a beverage, and Kiswu drank, too.'

(constructed on the basis of J. S. Kim's (2012) examples)

(18) NULLOBJECT-'MODIFIER-MISMATCH' filler:

Minswu, Kiswu, and Cinswu were taking a rest after exercise. Minswu drank a cold beverage. Kiswu drank a warm beverage.

Minswu-ka chaka-wun umlyoswu-lul masi-ess-ko, Kiswu-to **[e]**
Minswu-NOM cold-ADN beverage-ACC drink-PAST-CONJ Kiswu-also
masi-ess-ta.
drink-PAST-DECL
'Minswu drank a cold beverage, and Kiswu drank, too.'

(constructed on the basis of J. S. Kim's (2012) examples)

2.2.4 Procedure

The experiment was administered using PsychoPy (Peirce 2007). Sixteen test trials (four trials per condition) and 40 filler trials were presented to the participants in a uniquely generated random order.

2.2.5 Findings

Figure 2 summarizes mean acceptance rates (assignment of 1 'True') by condition: 33% in the Quantificational-Bound condition, 31% in the NullObject-Bound (sloppy identity reading) condition, 82% in the Quantificational-Referential condition, and 79% in the NullObject-Referential (strict identity reading) condition. A generalized linear mixed-effects model (logistic/binomial regression model) was fit to the data using the 'glmer' function of the 'lme4' package (Bates et al. 2012) in R (R Development Core Team 2012), to analyze participants' responses as a function of SENTENCE TYPE and CONTEXT TYPE, with PARTICIPANT and ITEM included as random effects. The random effects structure specified only random intercepts. The analysis revealed a main effect of CONTEXT TYPE (coefficient estimate = 2.46, *s.e.* = .29, $z = 8.44$, $p < .001$): regardless of SENTENCE TYPE, speakers were significantly more likely to accept the referential reading than the bound reading. However, the analysis revealed no main effect of SENTENCE TYPE, and no interaction between CONTEXT TYPE and SENTENCE TYPE: speakers were equally likely to accept bound readings for the quantificational sentences and the null object constructions; speakers were also equally likely to accept referential readings for both sentence types.

<INSERT FIGURE 2 ABOUT HERE>

In order to understand the distribution of responses in the Bound conditions, all participants ($n = 40$) were assigned into three different groups on the basis of their mean individual acceptance rates in the Quantificational-Bound condition and the NullObject-Bound (sloppy identity reading) condition: ACCEPT ($\geq$75% acceptance: assignment of 1 to three or four target sentences), AMBIVALENT ($=$ 50% acceptance: assignment of 1 to two target sentences), and REJECT ($\leq$25% acceptance: assignment of 1 to none or one target sentence). A bimodal distribution of the participants' responses was

observed in each Bound condition, as illustrated in Figure 3: participants tended to either always accept or always reject the quantificational binding interpretation for *ku*; participants also tended to either always accept or always reject the sloppy readings for the null object constructions.

<INSERT FIGURE 3 ABOUT HERE>

Given that inter-speaker variation was found in the Quantificational-Bound condition and the NullObject-Bound condition, a linear regression analysis was carried out to examine the correlation between the participants' mean acceptance rates in the two Bound conditions. The analysis revealed a strong correlation ($R^2 = .62$, $t = 7.93$, $p < .001$), as illustrated in Figure 4. This result indicates that an individual speaker's acceptance of the sloppy readings for the null object constructions is predictable from her acceptance of the bound variable readings for the quantificational sentences (and vice versa).[4] These results taken together suggest that participants who allowed the quantificational binding of *ku* accepted the sloppy identity readings for the null object constructions, and those who did not allow the quantificational binding of *ku* rejected the sloppy identity readings.[5]

<INSERT FIGURE 4 ABOUT HERE>

2.3 Discussion

The findings of Experiment 1 present empirical evidence that is inconsistent with the view that null objects in Korean are all instances of phonologically empty pronominals. As discussed in Subsection 2.1, if the null object in sentences such as (11) were indeed a base-generated (indefinite) *pro*—an atomic element without the internal structure to host the pronoun *ku*—then the availability of the relevant sloppy identity readings would not be

expected to correlate with the availability of the bound variable construal of *ku* in sentences such as (8). Contrary to the prediction of the null pronominal analysis, however, Experiment 1 found a strong correlation between the distribution of the sloppy identity readings and the quantificational binding of *ku*. It was demonstrated that native speakers of Korean sort into two distinct groups: a group of speakers who allow both the sloppy identity readings for null objects (as in (11a)) and the quantificational binding of *ku* (as in (8a)), and a group who do not allow either. This correlation follows from an ellipsis account, where the sloppy reading is derived by the binding of an elided *ku*; that option, however, depends on the speaker's grammar for *ku*, something which is independently verified by the speaker's ability to use *ku* as a quantifier-bound pronoun.[6]

Our claim that the correlation between the bindability of *ku* and the availability of sloppy reading can be used to diagnose ellipsis is corroborated by the results from our studies in Kim et al. (2015) of the non-elliptical VP anaphor in Korean, *kuleha* 'do so' in (19).

(19) Minswu-ka **ku**-uy cim-ul nalu-ess-ko, Kiswu-to **kuleha**-yess-ta.
Minswu-NOM he-GEN stuff-ACC move-PAST-CONJ Kiswu-also so.do-PAST-DECL
(lit.) 'Minswu moved his stuff, and Kiswu did so, too.'

a. 'Minswu moved Minswu's stuff, and Kiswu moved Kiswu's stuff, too.'
[sloppy identity]

b. 'Minswu moved Minswu's stuff, and Kiswu moved Minswu's stuff, too.'
[strict identity]

In Kim et al. (2015), we confirm that *kuleha* does not involve ellipsis but is an (overt) VP proform: we show that in contrast to what would be expected of ellipsis, these constructions do not allow extraction from within the anaphor site. Further, we showed that the availability of the sloppy reading in these VP anaphora constructions is not correlated with the availability of the quantificational binding interpretation for *ku*, unlike

the case of null objects as shown in Experiment 1. In Kim et al., we found that while there existed considerable inter-speaker variation in the acceptance of the quantificational binding of *ku*, just as in Experiment 1, (nearly) all participants unequivocally accepted the sloppy readings for the VP anaphors. Given these findings, if null objects were indeed instances of empty pronouns, then uniform and high acceptance of the sloppy readings for the null object constructions would have been expected, just as in the VP anaphora sentences in Kim et al. However, this expectation was not borne out by the results of Experiment 1, which revealed 31% acceptance rate in the NullObject-Bound (sloppy reading) condition and 33% acceptance rate in the Quantificational-Bound condition, derived from about one-third of the participants who consistently accepted the target sentences in the two conditions. This further supports the claim that the null object constructions tested in Experiment 1 involve ellipsis for the most part, not *pro*.[7]

3 Experiment 2

3.1 Research question and predictions

In Section 2, we provided novel empirical evidence that some cases of null objects in Korean should be attributed to the ellipsis of a constituent with full-fledged internal syntactic structure. However, a crucial question remains unanswered as to whether the elided element in question is a DP object (argument ellipsis) or a VP containing the DP object (verb-stranding VP ellipsis).

One of the well-known diagnostics to identify the 'size' of ellipsis is the (un)availability of the so-called 'null adjunct reading' (a term coined by Hayashi 2015) for null object constructions such as (20), where the antecedent sentence in (20A) contains an adverb and the null object sentence in (20B) is negated.

(20) A: Minho-ka ppali mwul-ul masi-ess-ta.
Minho-NOM quickly water-ACC drink-PAST-DECL
'Minho drank water quickly.'

B: Kiho-nun **[e]** masici-an-ass-ta.
Kiho-TOP drink-NEG-PAST-DECL
(lit.) 'Kiho did not drink.'

(constructed on the basis of Oku's (1998: 172) Japanese examples)

The verb-stranding VP ellipsis analysis and the argument ellipsis analysis make different predictions with respect to the 'recovery' of an adjunct in the Korean null object construction above. Under the verb-stranding VP ellipsis analysis, the null object sentence in (20B) should mean that Kiho did not drink water quickly (thus implying that Kiho drank water, but he did not do so quickly). This is so since the elided element in **[e]** would correspond to a VP structure (after the verb raises out of the VP to Tense), which contains the manner adverb *ppali* 'quickly' as well as the DP object *mwul* 'water', as represented in (21).[8]

(21) Kiho-TOP [~~VP quickly~~ [~~DP water-ACC~~] ~~t_v~~](=**[e]**) drink$_v$-NEG-PAST

According to the argument ellipsis analysis, on the other hand, such a null adjunct reading should not be available, because only the DP object *mwul* 'water', but not the adverb *ppali* 'quickly', would undergo ellipsis in **[e]**, as in (22), and thus the whole null object sentence in (20B) should receive the object only reading that Kiho did not drink water at all.

(22) Kiho-TOP [~~DP water-ACC~~](=**[e]**) drink-NEG-PAST

To the best of our knowledge, the dominant view in the literature of East Asian languages has been that null object sentences such as (20B) are acceptable only under the interpretation in which the DP object alone is semantically 'recovered' in **[e]** (e.g., Park 1997, Oku 1998; cf. Takahashi 2008, Cheng 2011, J. S. Kim 2012), thus supporting the

argument ellipsis analysis. However, the verb-stranding VP ellipsis analysis has recently been revitalized by Funakoshi (2016: 5), who argues that the null adjunct reading becomes much more available, at least for some speakers, if the antecedent clause and the null object clause are combined by a contrasting conjunction connective, as illustrated in the following Japanese example.

(23) Taroo-wa teineini kuruma-o arat-ta **kedo**, John-wa **[e]** araw-anak-atta.
Taroo-TOP carefully car-ACC wash-PAST **but**, John-TOP wash-NEG-PAST
(lit.) 'Taroo washed the car carefully, **but** John did not wash.'

(adapted from Funakoshi 2016: 5, ex.(16))

According to Funakoshi, the null object clause in (23) has the meaning, 'John washed the car, but not in a careful manner', which can be derived if the adverb *teineini* 'carefully' as well as the object *kuruma* 'car' is recovered in **[e]**. Funakoshi also observes that the null adjunct reading is available even without the conjunction connective, if a context makes the null adjunct reading appropriate. He provides the following Japanese example to illustrate this point.

(24) Context: Taroo and Hanako washed their parents' cars to get allowance. Taroo was thorough in his work while Hanako was not.

A: Taroo-wa teineini kuruma-o arat-ta.
Taroo-TOP carefully car-ACC wash-PAST
'Taroo washed the car carefully.'

B: Hanako-wa **[e]** araw-anak-atta. Hanako-ga arat-ta ato-no
Hanako-TOP wash-NEG-PAST Hanako-NOM wash-PAST after-GEN
kuruma-wa kitanak-atta.
car-TOP dirty-PAST
(lit.) 'Hanako did not wash. The car that Hanako washed was dirty.'

(Funakoshi 2016: 7, ex.(17))

Funakoshi claims that the null object sentence in (24B) can mean that Hanako did not

wash the car carefully, with the aid of the context and the follow-up sentence which promotes the null adjunct reading.

Building upon Funakoshi's insights and arguments, we conducted an experimental study to address the following research question, in order to investigate the size of ellipsis involved in Korean null object constructions.

(25) RESEARCH QUESTION:

Does the null object construction in Korean allow the null adjunct reading?

The verb-stranding VP ellipsis analysis predicts that the null object sentences will allow the null adjunct reading because the VP structure containing an adverb, created after V-raising, can be recovered. In contrast, the argument ellipsis analysis predicts the null adjunct reading to be unavailable because only the object, and nothing else, can be recovered.

3.2 Methodology

3.2.1 Participants

Thirty native Korean adult speakers, none of whom participated in Experiment 1, participated in Experiment 2. Most were university students in Korea. They were paid $10 each as compensation for participation.

3.2.2 Task

A truth-value judgment task was employed as in Experiment 1. Participants were presented with sentences describing a context, along with images matching the description, before a target sentence was presented. As in Experiment 1, participants clicked on 1 for 'True' and 0 for 'False' to indicate whether the target sentence truthfully described the given context.

3.2.3 Design and Materials

A target sentence was presented in a context in which two animal characters are in a contest with different prizes, performing the same action in different manners, as illustrated in (26). The target sentence contained a clause describing the action of one of the animals, a contrasting conjunction connective, and a second clause describing the action of the other animal. The second clause of each target sentence contained an obligatorily transitive verb in Korean, and was formed either with a null object (26a), with an object (26b), or with an object and an adverb (26c). The experiment thus tested one factor, SENTENCE TYPE, with three levels, creating three conditions in total: NO (test sentences have no object and no adverb), Obj (test sentences have an object but no adverb), and ObjAdv (test sentences have an object and an adverb).

(26) Dog and Lion were in a sweeping contest! If they swept the floor quickly, they'd win a big toy car. If they didn't sweep the floor quickly, they'd only win a small toy car. Dog started sweeping the floor very quickly. Lion decided he didn't like cleaning, and he was going to go to one of the other contests instead. Soon, Dog finished sweeping quickly and won a big toy car! When Lion saw this, he decided he wanted a big toy car too, so he started sweeping the floor. Lion really didn't like to clean, so he swept the floor very slowly. When Lion was done, he got the small toy car.

a. Kay-nun patak-ul ppalukey ssul-ess-ciman, saca-nun an
dog-TOP floor-ACC quickly sweep-PAST-but lion-TOP NEG
ssul-ess-supnita.
sweep-PAST-DECL
'Dog swept the floor quickly, but Lion didn't sweep.' [NO]

b. Kay-nun patak-ul ppalukey ssul-ess-ciman, saca-nun patak-ul an
dog-TOP floor-ACC quickly sweep-PAST-but lion-TOP floor-ACC NEG
ssul-ess-supnita.
sweep-PAST-DECL

'Dog swept the floor quickly, but Lion didn't sweep the floor.' [Obj]

c. Kay-nun patak-ul ppalukey ssul-ess-ciman, saca-nun patak-ul ppalukey
dog-TOP floor-ACC quickly sweep-PAST-but lion-TOP floor-ACC quickly
an ssul-ess-supnita.
NEG sweep-PAST-DECL
'Dog swept the floor quickly, but Lion didn't sweep the floor quickly.'

[ObjAdv]

3.2.4 Procedure

As in Experiment 1, Experiment 2 was administered using PsychoPy. Twelve test trials (four trials per condition) were presented to the participants, in accordance with a Latin Square design, in a uniquely generated random order.

3.2.5 Findings

The verb-stranding VP ellipsis analysis predicts the NO sentences as in (26a) to be as felicitous in the given context as ObjAdv sentences in (26c) because the VP structure containing *ppalukey* 'quickly', created after V-raising, can be recovered in the null object site. In contrast, the argument ellipsis analysis predicts the NO sentences to be as infelicitous as Obj sentences in (26b) because only the object *patak-ul* 'floor-ACC', and nothing else, can be recovered. These would both then be judged false, since Lion *did* do some sweeping. We found that the NO sentences predominantly patterned with Obj sentences and not ObjAdv sentences, as can be seen in Figure 5, which summarizes acceptance rates by condition: 7% in NO, 4% in Obj and 92% in ObjAdv.

<INSERT FIGURE 5 ABOUT HERE>

A generalized linear mixed-effects model (logistic/binomial regression model) fitted to the data, with SENTENCE TYPE as a fixed effect and PARTICIPANT and ITEM as random

effects (whose structure was specified with random intercepts) revealed a main effect of SENTENCE TYPE: while the acceptance rates in Obj and NO were not different, the acceptance rate in ObjAdv was significantly higher than NO (coefficient estimate = 6.67, $s.e.$ = .87, z = 7.65, $p < .001$). Pairwise comparison using Tukey also revealed that while speakers were equally unlikely to accept NO and Obj, they were significantly more likely to accept ObjAdv than NO ($p < .001$) or Obj ($p < .001$).

3.3 Discussion

In Experiment 2, we presented test sentences in contexts favouring the null adjunct reading, heeding suggestions by Funakoshi (2016). Nonetheless, the findings show that in interpreting null object sentences in Korean, while the object argument is easily recovered, an adjunct is nearly impossible to recover. These findings show that the null adjunct reading is unavailable and thus, verify the predictions for the argument ellipsis analysis, but are incompatible with the predictions made by the verb-stranding VP ellipsis analysis.

A question remains as to why the null adjunct reading becomes available to some speakers in similarly constructed null object sentences in Japanese, as reported in Funakoshi (2016), unlike Korean, as shown by the findings in Experiment 2. While we must leave this for future research, one possibility is that potential differences in the position of the verb in the clause structure in the two languages could play a major role in whether the verb-stranding VP ellipsis analysis is available. Alternatively, there might be variation in the extent to which a language elides structures with traces.

4 Conclusion

This article has presented two experiments designed to determine the correct analysis for null objects in Korean along two parameters: do they involve ellipsis or not, and if ellipsis,

is an argument elided or a VP remnant. Our findings suggest that null objects are elided arguments. As evidence that null objects in Korean involve argument ellipsis, and not VP ellipsis, we found that null object constructions cannot be construed as involving the elision of a VP adjunct.

The evidence for ellipsis came from a novel use of inter-speaker variation to probe for the existence of elided syntactic structure. We found a correlation between a speaker's acceptance of quantifier-bound *ku* and their acceptance of sloppy readings for null objects with antecedents containing *ku*. This correlation is expected if null objects contain complex internal syntactic structure with an elided *ku* that has the same grammatical properties, for any given speaker, as the overt *ku*. The correlation is not expected if null objects are atomic, un-analyzable null *pro*-forms, whose sloppy readings arise in a way that is not dependent on a given speaker's interpretation of *ku*. While explorations of 'microparamteric' variation in the domain of morpho-syntax have been fruitful for syntactic theory (see Brandner 2012 for an overiew), the present study shows how inter-speaker semantic variation can be profitably exploited to address theoretical questions.

Notes

[0]We are extremely indebted to the three anonymous reviewers for their insightful comments that were crucial in improving this article. The research reported here was partially supported by SSHRC 435-2014-0161 and AKS-2016-LAB-2250004 to Han.

[1]Argument ellipsis has also been argued to occur in South Asian languages such as Bangla, Hindi, and Malayalam (Simpson et al. 2013; cf. Takahashi 2013), and in other languages such as Colloquial Singapore English (Sato 2014, 2016), Mongolian (Takahashi 2007), Persian (Sato and Karimi 2016), Turkish (Sener and Takahashi 2010), and Hebrew (Landau 2018).

[2]The verb-stranding VP ellipsis analysis has also been proposed for Hebrew (Doron 1999, Goldberg 2005), Irish (McCloskey 1991), Persian (Shafiei 2015), and Russian (Gribanova 2013a,b).

[3]The strict identity reading in (11b) would be expected to be available to all Korean speakers under either the ellipsis or the null pronominal analysis. Under the ellipsis analysis, *ku* in the null object site [e] would readily serve as a co-referential pronoun, which has been standardly assumed to be the source of strict identity readings under ellipsis. Under the null pronominal analysis, the strict identity reading would be generated if the postulated null pronoun is co-referential with the object in the antecedent clause.

[4]A reviewer observes that the correlation between the acceptances rates in the NullObj-Bound and Quant-Bound conditions could just reflect response biases of individuals, rather than telling us anything about the grammar. To rule out this interpretation, as suggested by the same reviewer, we examined NullObject-Bound and NullObject-Ref acceptance rates, a pair of conditions where correlation is not theoretically expected. We found no correlation what so ever between the two NullObj conditions ($R^2 = .0003$, $t = 0.11$, $p = .92$). The same reviewer was concerned about the power of the correlation reported, and suggested that we use a bootstrap procedure to calculate a 95% confidence interval for the R^2 value. Using the 'boot' package (Canty and Ripley 2017), we generated the bootstrapped 95% confidence interval, [0.36, 0.78], for R^2 in the linear regression of NullObj-Bound and Quant-Bound based on 1000 replications. This confidence interval does not include 0, and the lower bound is far from 0, and so our conclusion is supported that the correlation between the acceptance rates of the NullObj-Bound and the Quant-Bound conditions is significant.

[5]The mean acceptance rates in the Quantificational-Referential and NullObject-Referential (strict identity reading) conditions are uniformly high, which were predicted by both the ellipsis and null pronominal analyses (see Subsection 2.1). These results thus confirm the accuracy and reliability of the results obtained in the Quantificational-Bound and NullObject-Bound (sloppy identity reading) conditions, which are the key test conditions of the experiment.

[6] The results obtained from the participants' responses in the NULLOBJECT-'MODIFIER-MISMATCH' fillers further support that some cases of Korean null objects should be analyzed as involving ellipsis, not *pro*. As noted by J. S. Kim (2012: 42-43), the ellipsis and null pronominal analyses yield different predictions regarding the truth-value of the target sentence in (18). Under the argument ellipsis analysis or verb-stranding VP ellipsis analysis, the null object site [e] in the second conjunct involves a full-fledged structure containing *chakawun umlyoswu* 'cold beverage', which is elided under identity with its antecedent in the first conjunct. Therefore, the whole target sentence should be judged false, since it is not compatible with the given context where Minswu drank a cold beverage, but Kiswu drank a warm beverage. According to the null pronominal analysis, on the other hand, the null object site **[e]** corresponds to the head noun of the full DP object in the first conjunct, *umlyoswu* 'beverage'. Thus, the whole target sentence should be taken to truthfully describe the given context, since it is true that both Minswu and Kiswu drank a beverage, although the beverages consumed were of different temperatures. The results revealed that the participants rejected 'modifier-mismatch' target sentences 93% of the time, indicating that they interpreted the null object site as involving the same full DP objects as in the first conjuncts, and thus supporting the ellipsis analysis.

[7] As a reviewer observes, speakers might still be using the *pro* analysis in some cases. A few participants who consistently rejected the sloppy reading accepted the quantificational bound reading at least once, and a few participants who consistently rejected the quantificational bound reading accepted the sloppy reading at least once. These participants might be resorting to the *pro*-strategy in analyzing some instances of null objects. Our main point however is that the correlational distribution of the two readings we found supports that the analysis of null objects tested in Experiment 1 involves ellipsis for the most part, and is incompatible with the view that all instances of null objects in Korean are instances of *pro*.

[8] As discussed in Oku (1998: 173), the verb-stranding VP ellipsis analysis assumes that ('low') adverbs are adjoined to VP (cf. Ko 2007, Lasnik 2003). It is possible that the ellipsis site could be just an unmodified VP, something that Moulton 2007 showed was possible for

verb phrase ellipses in English. However, Moulton 2007 also showed that this possibility only arises in subordinated clauses, and that modified antecedents for ellipses are chosen when the clause containing the ellipsis is a main clause, as in the cases we tested in Korean.

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Source of null objects	(i) Internal structure?	(ii) **[e]** is DP or VP?
NULL PRONOMINAL	Absent	DP
ARGUMENT ELLIPSIS	Present	DP
VERB-STRANDING VP ELLIPSIS	Present	VP

Table 1: Syntactic status of null objects

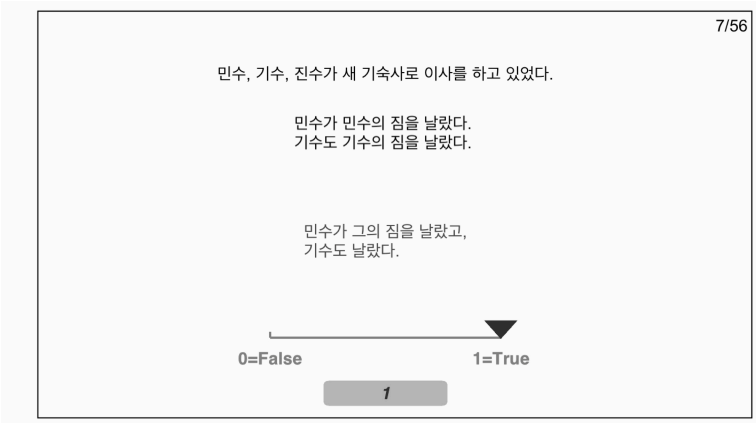

Figure 1: Screenshot of a test trial in Experiment 1

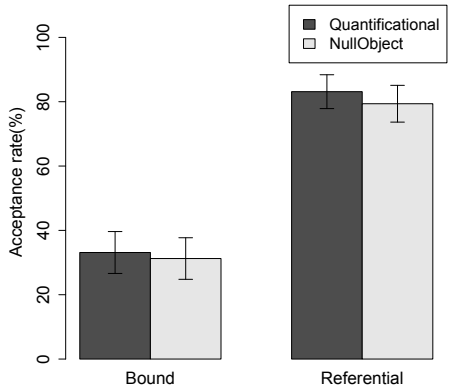

Figure 2: Mean rates of acceptance and standard errors in Experiment 1

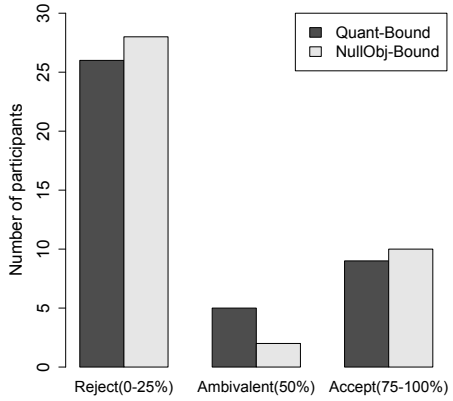

Figure 3: Distribution of responses in Quantificational-Bound and NullObject-Bound (sloppy identity reading) conditions in Experiment 1

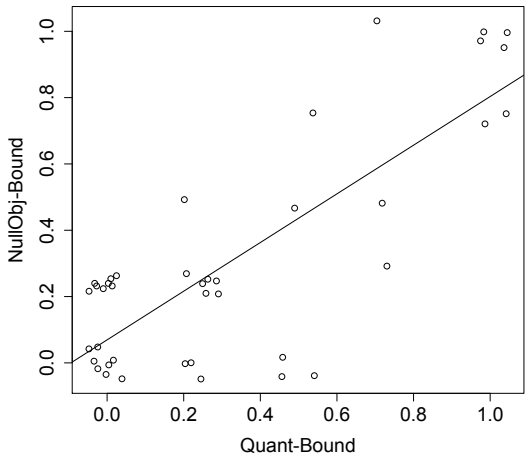

Figure 4: Correlation between mean acceptance rates in Quantificational-Bound and NullObject-Bound (sloppy identity reading) conditions in Experiment 1

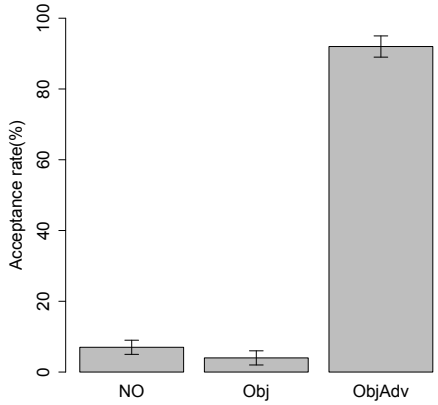

Figure 5: Mean rates of acceptance and standard errors in Experiment 2