

# Subject Preference in Korean

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## 1. Introduction<sup>1</sup>

Long-distance dependencies have long been at the center of linguists' attention, and have played an important role in the ongoing dialogue between theoreticians and experimentalists, who share an interest in the motivation for empty categories and in the nature of filler-gap relationships. In this paper, we address certain issues that arise with regard to Korean relative clauses from both a theoretical and an experimental perspective. Theoretically, the data that we present shed additional light on—but do not entirely resolve—long-standing controversies pertaining to the appropriate analysis of Korean relative clauses. Experimentally, we present robust evidence that even in head-final languages like Korean, subject gaps of all types enjoy a processing advantage.

Long-distance dependencies between two clausal positions have two crucial characteristics. First, a more articulated expression in one of these positions determines the referential identity of the linguistic expression in the other position. This latter expression typically has less descriptive content and may even be null. For example, a lexically specified noun phrase can serve as the antecedent of a pronoun (including a null pronoun) (1a), an epithet (1b), or a hypothetical null element (1c). Second, the relationship between the lexically specified antecedent (filler) and the less elaborated expression or null element (gap) is established at a distance, across other linguistic expressions that separate them. This distance between the two positions imposes a burden on working memory: the first linguistic position has to be held in (or retrieved from) working memory so that it can be associated with the second.

- (1) a. A reporter asked the senator<sub>*i*</sub> what he<sub>*i*</sub> hoped to accomplish with the new bill.
- b. A reporter asked the senator<sub>*i*</sub> about the new bill, but the politician<sub>*i*</sub> avoided the answer.
- c. A reporter asked the senator<sub>*i*</sub> at the press conference \_\_\_<sub>*i*</sub> to elaborate on the new bill.

Relative clauses (2) have played a particularly prominent role in the study of long-distance dependencies. Numerous experimental studies show that in English, subject relative (SR) clauses (2a) are easier to process than object relative (OR) clauses (2b), and this result has been replicated across various methodologies (reading time: King and Just 1991; ERP: King and Kutas 1995; fMRI: Just et al 1996, Caplan et al 2001, Cooke et al. 2002; PET: Stromswold et al. 1996, Caplan et al 1998, 1999, 2000; eye-tracking: Traxler et al. 2002). Furthermore, subject relative preference has been confirmed for other languages (Dutch: Frazier 1987; German: Schriefers et al. 1995, Mecklinger et al. 1995, Romance: Frauenfelder et al. 1980, Holmes and O'Regan 1981, Cohen and Mehler 1996, Gouvea et al 2002; Hebrew: Arnon 2005, 2006).

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<sup>1</sup> Different versions of this project were presented at the Workshop on Relative Clauses at the Max-Planck Institute in Leipzig (June 2005), AMLaP 2006 in Ghent, CUNY 19<sup>th</sup> (New York, 2006), and WCCFL-25. We have benefited from suggestions and remarks made by the audience at these conferences and also by Joan Bresnan, Ivano Caponigro, Annabel Cormack, Shin Fukuda, Gaby Hermon, Shin-Sook Kim, Phil Monahan, Colin Phillips, Eric Potsdam, Peter Sells, Tim Stowell, Satoshi Tomioka, Mieko Ueno, and Amy Weinberg. All errors are our responsibility.

The following abbreviations are used throughout the paper: ACC—accusative, ADN—adnominal, DECL—declarative, GEN—genitive, INTERR—interrogative, NOM—nominative, PRS—present.

- (2) a. The reporter<sub>*i*</sub> who<sub>*i*</sub> \_\_\_\_<sub>*i*</sub> harshly attacked the senator admitted the error.  
 b. The reporter<sub>*i*</sub> who<sub>*i*</sub> the senator harshly attacked \_\_\_\_<sub>*i*</sub> admitted the error.  
 (King and Just 1991: 581)

To explain the processing advantage of SR over OR in English, and possibly other languages, researchers have advanced hypotheses stated either in terms of structural differences (MacDonald and Christiansen 2002; Piñango 1999; O’Grady 1997; Keenan and Hawkins 1987; Hawkins 1999 and 2004), or non-structural differences including memory load differences (Gordon et al. 2001; MacWhinney 1982; MacWhinney and Pleh 1988), in particular differences couched in terms of the linear distance between the filler and the gap (Gibson 1998, 2000).

However, it is difficult to decide among these competing processing hypotheses without looking at configurations in which these hypotheses make different predictions. Languages with pre-nominal relative clauses (Chinese, Japanese, Korean) are particularly important in this regard. From an experimental standpoint, they are of interest because the gap precedes the filler. From a theoretical standpoint, they are challenging because the structural analysis of relative clauses in these languages has been controversial, ranging from a movement analysis to an analysis based on unselective binding of null pronominals (with possible hybrids in between; see Huang 1989) to an analysis in terms of pragmatically motivated adposition (Kuno 1973).

Processing studies of relative clauses in Japanese and Chinese have produced somewhat equivocal results. In general these studies have confirmed the familiar SR advantage (Japanese: Miyamoto and Nakamura 2003, Ishizuka et al. 2003; Chinese: Lin and Bever 2006; Lin 2006), although Hsiao and Gibson (2003) reported an OR advantage in Chinese,<sup>2</sup> and contextual manipulation has been shown to remove the SR advantage in Japanese (Ishizuka et al. 2006).

Korean relative clauses have received less attention than their counterparts in Japanese and Chinese. A notable exception is the study by O’Grady et al. (2003) which shows that second-language learners of Korean exhibit a preference for subject relatives, thus supporting the familiar SR advantage. The performance of native speakers of Korean on relative clauses, however, has not been investigated; in this paper, we attempt to fill this gap by examining the processing of Korean relative and adjunct clauses. It is often assumed without much discussion that Korean clause structure is extremely close to that of Japanese. While we do not deny significant grammatical parallels between the two languages, we would like to underscore that the view of Korean as relexified Japanese is overly simplistic and misses important generalizations, some of which will become apparent in the discussion below.

To anticipate some of the results presented below, Korean also shows a strong subject advantage, evident in the processing of both relative and adjunct clauses. In trying to account for this advantage, we will examine and reject several possible explanations. This will leave us with a general structurally based explanation that in turn raises a number of larger questions, and it is these questions that we will conclude with. Overall, we will be mainly concerned with processing aspects of Korean relative and adjunct clauses, but in setting the stage for the experimental work reported in section 3, we will also address some of the more general issues of Korean grammatical structure (section 2).

## 2. Basics of Korean structure

### 2.1 General properties

Korean is a rigid head-final language with SOV word order. Structural cases include nominative (marked with *-i/-ka*) and accusative (marked with *-(l)ul*), as shown in (3).

- (3) a. hyengsa-ka      kica-lul      sinloyha-n-ta      (SOV)  
          detective-NOM   reporter-ACC trust-PRS-DECL

<sup>2</sup> See Lin and Bever 2006 for an analysis of Hsiao and Gibson’s experimental design. We will not discuss the Chinese data here.

- b. kica-lul hyengsa-ka sinloyha-n-ta (OSV)  
 reporter-ACC detective-NOM trust-PRS-DECL  
 ‘The detective trusts the reporter.’

Scrambling is possible (3b) but very infrequent: according to our text counts, only 1.2% of sentences in the Seyjong corpus (2002) have OSV word order.

Korean is a subject and object pro-drop language, as illustrated in (4) and (5) respectively. The null pronoun can be interpreted indefinitely, as in these examples, but there is a strong preference for a referential interpretation (Sohn 2001: 404-5; Choe 2006). According to Y.-J. Kim (2000), the subject *pro*-drop rate is about 69% and the object drop rate about 46% in spoken language. In written language, only subject pro-drop statistics are available (about 49%).

- (4) *pro* kica-lul sinloyha-n-ta  
 reporter-ACC trust-PRS-DECL  
 ‘Someone trusts the reporter.’
- (5) kica-ka *pro* sinloyha-n-ta  
 detective-NOM trust-PRS-DECL  
 ‘The detective trusts someone.’

## 2.2 Relative clauses

Korean has pre-nominal relative clauses without an overt complementizer. Two aspects of Korean relative clauses require comment: the nature of the adnominal marker and the nature of the gap in the relative clause. Unlike Japanese, where the relative clause is not marked at all, the predicate of a Korean relative clause bears the adnominal marker *-(nu)n* (Sohn 2001: 309):<sup>3</sup>

- (6) [hyengsa-ka \_\_\_\_\_ sinloyha-n] kica<sub>i</sub>  
 detective-NOM trust-ADN reporter  
 ‘the reporter whom the detective trusted’

The same adnominal marker also marks the predicates of complement clauses headed by the nouns ‘fact’, ‘news’, ‘rumor’, etc. (“fact-clauses”):

- (7) [ku sinmwunsa-uy pheyncipchang-i \_\_\_\_\_ hyeppakha-n] sasil-i  
 that newspaper-GEN editor-NOM threaten-ADN fact-NOM  
 palhyeciessta  
 was\_revealed  
 ‘The fact that the newspaper editor threatened someone was brought to light.’

If the adnominal clause is a relative clause, the gap inside that clause has to be co-indexed with the head noun (for instance, the object gap and head noun ‘reporter’ in (6)). If, on the other hand, a missing argument occurs in a fact-clause, it naturally cannot be co-indexed with the head noun. Because the adnominal marker can appear in relative and complement clauses alike, its presence does not unambiguously signal the right edge of a relative clause, and therefore it does not automatically trigger the search for a coindexed filler, as is the case in languages with overt relative clause complementizers. The identification of the gap with the head noun therefore has to be delayed until the head noun is reached. Until then, the gap inside the adnominal clause may be interpreted as a null pronominal independent of any potential upcoming filler, and the parser will thus delay postulating a filler-gap dependency while in the meantime filling the argument structure slots of the embedded predicate.

The nature of the gap in the relative clause has been a controversial issue for Korean as well as for Chinese and Japanese. Some researchers propose an English-style operator movement analysis of

<sup>3</sup> Here and below we represent the missing element atheoretically as a gap, shown by means of underlining.

relative clauses (Yang 1989; Han 1992; Yang 1990; Han and Kim 2004, among others). In this analysis, the null relative operator binds the deleted DP (trace), and the coindexed head noun originates in a position external to the relative clause:<sup>4</sup>

- (8) [ $Op_i$             ~~NP<sub>i</sub>~~ Predicate]    head noun<sub>i</sub>

However, other researchers have posited a null pronominal analysis, which derives its support from the weakness of island effects in relative clauses (Sohn 1980; Kang 1986; cf. also Reinhart 1998 for *wh*-in-situ in general). On this analysis, the gap in the relative clause is a null pronominal, unselectively bound by a relative operator and also coindexed with the head noun:

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<sup>4</sup> In a different version of the movement analysis, which has been quite popular lately, the head noun originates inside the relative clause and undergoes raising to the head position (Kayne 1994, Bianchi 2000, Fukui and Takano 2000 for Japanese), thus:

- (i) [DP [<sub>RC</sub>    hyengsa-ka    ~~kica-lul<sub>i</sub>~~    enceyna    sinloyha-n]    kica<sub>i</sub>]  
       detective-NOM                    always    trust-AND    reporter  
       ‘the reporter that the detective has always trusted’

Two pieces of evidence indicate that the raising analysis of Korean relative clauses is untenable. First, idiom chunks, which are expected to relativize under the raising analysis (cf. the English (ii-a, b)), fail to do so (iv).

- (ii)     a. the headway that/\*which they made on the project was impressive  
        b. the crow that/\*which he ate was substantial

In (iii), observe the Korean idiom with the meaning ‘to fail’. As (iv) shows, the nominal part of the idiom cannot relativize (the idiomatic chunk can have only the literal reading):

- (iii)    Mira-ka    ipen        sihem-eyse    miyekkwuk-ul        masi-ess-ta  
           M-NOM    this\_time exam-at        seaweed\_soup-ACC    drink-PAST-DECL  
           ‘Mira failed the exam this time.’  
           (lit.: ‘Mira drank seaweed soup at the exam this time’)
- (iv)    #[Mira-ka    ipen        sihem-eyse    \_\_\_<sub>i</sub>        masi-n]        miyekkwuk<sub>i</sub>  
           M-NOM    this\_time exam-at        drink-ADN    seaweed\_soup  
           #‘the seaweed soup which Mira ate at the exam’

The second argument against the raising analysis of Korean relatives comes from the interpretation of expressions ‘first’ and ‘last’ modifying the head noun of a relative clause headed by a propositional attitude verb. In English, such modifiers are ambiguous between the high and low reading (Bhatt 2002; Heycock 2005):

- (v)     the last movie that Kim mentioned ~~the last movie~~ that Goddard shot ~~the last movie~~  
       i.        *High reading*: the order of saying is relevant  
       ii.      *Low reading*: the order of film-making is relevant

The Korean counterpart of (v) is unambiguous:

- (vi)    [Chelswu-ka    [Minswu-ka    \_\_\_<sub>i</sub>        ceycakhay-ss-ta-ko]    sayngkakha-n]  
           Chelswu-NOM    Minswu-NOM                    produce-PAST-DECL-that think-ADN  
           ches        yenghwa<sub>i</sub>  
           first        movie  
           ‘the first movie that Chelswu thought that Minswu produced’

‘First’ is interpreted only with respect to the time of thinking, and the low reading is impossible. (Satoshi Tomioka informs us that the Japanese counterpart of (vi) works the same way.) This is unexpected under the raising analysis, which we will not pursue any further.

- (9) [Op *pro<sub>i</sub>* Predicate] head noun<sub>*i*</sub>

Both approaches posit a null operator; the difference is in the nature of the empty category—does it arise due to deletion under movement or is it a null pronominal? In a language like Korean, with rampant *pro*-drop, these two different types of empty categories are harder to distinguish than in English. The primary linguistic facts used to distinguish the two approaches are rather subtle and rely on three main phenomena: alternation with an overt pronoun, island effects, and weak crossover. We will examine these effects later in the paper, when we can compare them with the processing results.

### 2.3 Adjunct clauses

As a head-final language, Korean has a large number of so-called medial verb forms or converbs, which can be marked for tense but cannot be marked for polarity or force (Sohn 2001: 302-309). These forms can head various adjunct clauses. For the purposes of this study we chose an adjunct clause that can be shown to be unambiguously embedded under the finite predication. This clause is headed by the causal marker *-se* (Polinsky 1992; Sohn 2001: 307), which is a medial verb marker but not a complementizer.

- (10) a. [Minswu-ka \_\_\_<sub>*i*</sub> silhehay-se] sonye-ka<sub>*i*</sub> phati-lul ttenassta  
M-NOM hate-BECAUSE girl-NOM party-ACC left  
‘Because Minswu hates (her), the girl left the party.’  
b. [\_\_\_<sub>*i*</sub> Minswu-lul silhehay-se] sonye-ka<sub>*i*</sub> phati-lul ttenassta  
M-ACC hate-BECAUSE girl-NOM party-ACC left  
‘Because she hates Minswu, the girl left the party.’

If the subject or object of the embedded clause is a null pronominal, as in (10), it can be co-indexed with a DP in the matrix clause under pragmatic co-reference.<sup>5</sup> The dependency between the null pronominal in the adjunct clause and a DP in the matrix clause allows us to compare adjunct and relative clauses: both clauses linearly precede the matrix clause and are signaled by morphological markers on the embedded verb (the nature of the gap in the two types of embedded clauses may be different, but we will return to this issue later). This surface parallelism between the relative and adjunct clauses motivates the experiment presented in the next section.

## 3. The processing of relative and adjunct clauses

### 3.1 Background

The goal of the experiment presented here was to compare relative clauses and adjunct clauses containing null subjects or objects. The main question addressed by the experiment was whether or not subject gaps are easier to process than object gaps. If accounts of filler-gap dependencies based on considerations of working memory load are correct, object gaps should be easier to process because the linear distance between the gap and its filler is shorter:

- (11) a. [GAP Object Verb-nun/se] FILLER  
b. [Subject GAP Verb-nun/se] FILLER

If, however, the preference for subject gaps is due to some universal, arguably structural, principle, then subject relative clauses should show a processing advantage.

### 3.2 Materials

The English equivalents of the target structures are shown in (12) through (15), and their word-by-

<sup>5</sup> Cataphoric coreference where the null pronominal occurs in the matrix clause is also possible, but we will not discuss it here because it does not have a parallel under relativization.

word order is given in Tables 1 and 2.

(12) Subject trace (relative clause):

‘The actor<sub>*i*</sub> who \_\_\_<sub>*i*</sub> hit the writer of the soap opera appeared on the front page of the newspaper.’

(13) Subject *pro* (“because” clause):

‘Because (he)<sub>*i*</sub> hit the writer of the soap opera, the actor<sub>*i*</sub> appeared on the front page of the newspaper.’

(14) Object trace (relative clause):

‘The actor<sub>*i*</sub> who the writer of the soap opera hit \_\_\_<sub>*i*</sub> appeared on the front page of the newspaper.’

(15) Object *pro* (“because” clause) :

‘Because the writer of the soap opera hit (him)<sub>*i*</sub>, the actor<sub>*i*</sub> appeared on the front page of the newspaper.’

**Table 1. Embedded clause region and filler: Subject and object relative and adjunct clauses**

ku	tulama -uy	kukcakka -lul/i	pangsongk wuk	inkun	swulcip -eyse	phokhayngha -n/se	paywu -ka
that	soap opera -GEN	writer -ACC/NOM	broadcast station	vicinity	bar -at	hit -ADN/-because	actor -NOM
W1	W2	W3	W4	W5	W6	W7	W8
‘The actor <sub><i>i</i></sub> [who ___ <sub><i>i</i></sub> hit the writer of the soap opera]...’ ‘The actor <sub><i>i</i></sub> [who the writer of the soap opera hit ___ <sub><i>i</i></sub> ]...’ ‘Because [( <u>he</u> ) <sub><i>i</i></sub> hit the writer of the soap opera], the actor <sub><i>i</i></sub> ...’ ‘Because [the writer of the soap opera hit ( <u>him</u> ) <sub><i>i</i></sub> ], the actor <sub><i>i</i></sub> ...’							

**Table 2. Main clause region (identical in all conditions)**

sinmwun-uy	ilmyen-ul	cangsikhayssta
newspaper-GEN	front page-ACC	decorated
W9	W10	W11
‘...decorated the front page of the newspaper.’		

There were 24 sets of sentences containing four conditions: a subject gap in a relative clause, an object gap in a relative clause, a subject *pro* in an adjunct clause, and an object *pro* in an adjunct clause. In addition, 60 filler sentences were used. The experimental sentences were normed for event plausibility and for plausibility of coindexation with the matrix clause subject (thirty one Korean high school students in Korea, all males).

### 3.3 Procedure and analysis

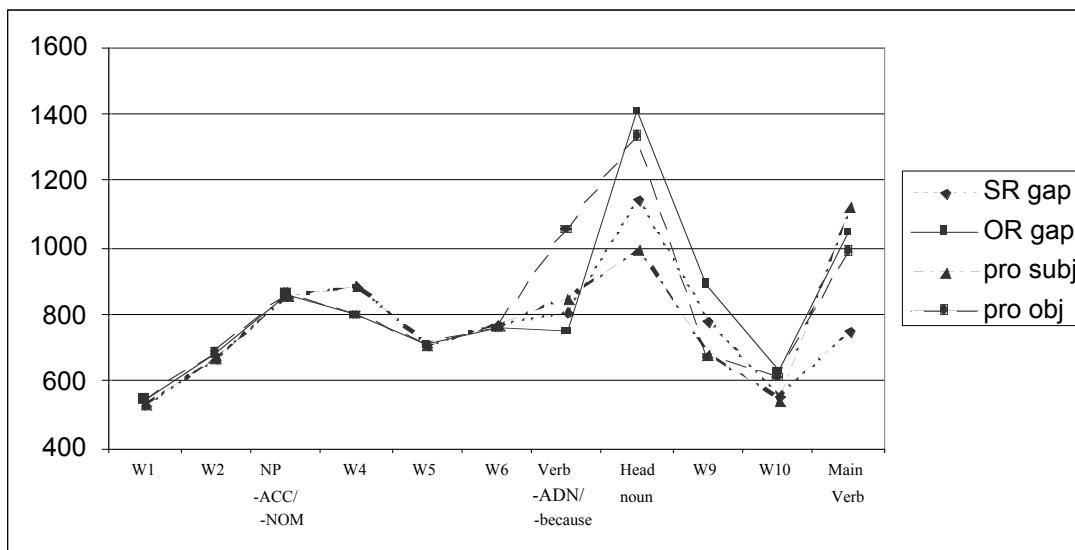
The experiment was a self-paced reading time study run with PsyScope on Macintosh. 23 native speakers of Korean participated in the study. Each trial began with a crosshair in the center of the screen. When participants were ready for the next trial, they pressed a button, and the crosshair was replaced by the first word of the sentence. To see the following word, participants pressed a button, and the preceding word was replaced by the next one in the center of the screen. The stimulus onset asynchrony from the appearance of one word to the next was recorded as the reading time of that word. After the final word of each sentence, a yes/no comprehension question about the preceding sentence appeared on the screen. After the participants indicated a yes or no answer to the question via a button press, the crosshair reappeared in the center of the screen to begin the next trial. Each sentence was followed by a comprehension question about the content of the relative clause (‘who did what to whom?’).

JMP IN was used for analyzing the data. Data from two participants were excluded from the RT analysis due to low comprehension scores (52% in comparison to 83% in other participants). In addition, the RT analysis was conducted only on correctly answered items.

### 3.4 Results

Results for the comprehension questions showed that there was a main effect of grammatical function [ $F(1, 20) = 5.03, p < 0.036$ ]: subject gap sentences were answered more correctly than object gap sentences (86% vs. 81%). There was no comprehension difference between relative and adjunct clauses [ $F(1,20) = 0.42, p < 0.52$ ].

The reading time results for the experiment are given below.



**Figure 1. Reading time results**

Because the relative and adjunct clauses were exactly the same up to the clause-final embedded predicate, only the grammatical function of the gap (subject vs. object) was used as an independent variable prior to the embedded verb. At W4, subject gap sentences were read more slowly than object gap sentences (919 vs. 839 ms). The effect, however, was only marginally significant [ $F(1,20) = 3.28, p < 0.08$ ].

From the embedded predicate position on, both grammatical function (subject vs. object) and embedded clause type (relative vs. adjunct) were used as independent variables, with reading times used as the dependent variable. At W7 (the embedded predicate), where the number of syllables differed between adjunct and relative clauses, statistical analysis was based on residual reading times. There was no main effect of clause type and/or grammatical function. However there was a significant interaction of clause type and grammatical function [ $F(1,20) = 5.92, p < 0.0225$ ]. Pairwise comparisons showed that subject and object *pro* were significantly different from each other [ $F(1,20) = 5.2, p < 0.03$ ], with subject *pro* in adjunct clauses read faster than object *pro* (850 vs. 1130 ms). In contrast, subject and object gaps in relative clauses did not differ from each other [ $F(1,20) = 0.52, p < 0.48$ ] at this point in the sentence.

At W8 (matrix subject), there was a main effect of grammatical function of the gap [ $F(1,20) = 10.8, p < 0.0034$ ]. Subject gap sentences were read faster than object gap sentences regardless of embedded clause type (1105 vs. 1423 ms). There was no main effect of embedded clause type and there was no interaction of grammatical function with clause type. At W9 (the word following the matrix subject), there was a main effect of embedded clause type [ $F(1,20) = 8.54, p < 0.0079$ ], with the adjunct clause condition read faster than the relative clause condition (681 vs. 882 ms). At W10 (sentence-penultimate word), there was a marginal main effect of grammatical function [ $F(1,20) = 3.92, p < 0.061$ ]. The subject condition was read faster than the object condition (558 vs. 643 ms). At W11 (sentence-final word), there was a main effect of embedded clause type [ $F(1, 19) = 7.15, p < 0.014$ ]: adjunct clauses were read more slowly than relative clauses (671 vs. 630 ms).

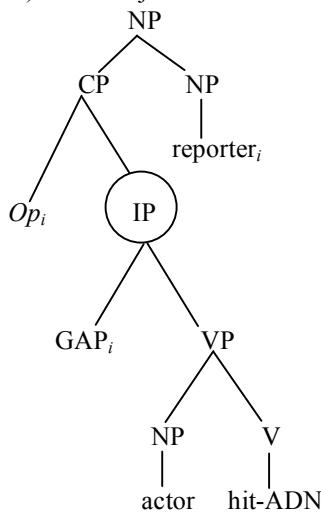
## 4. Discussion

### 4.1 Subject advantage

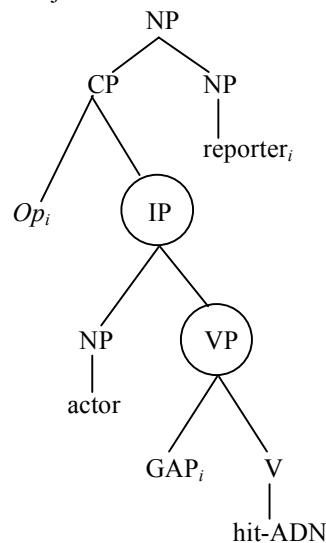
In all four conditions, there was a significant slowdown at the matrix subject position, which is where the co-indexation of the gap inside the embedded clause with the matrix subject filler takes place. Specifically, at the matrix subject position, object gap sentences took longer to read than subject gap sentences, regardless of whether these occurred in relative or adjunct clauses. These results confirm the subject-object asymmetry seen in the processing of relative clauses in other languages, and show that Korean patterns with these languages with respect to exhibiting a subject advantage. The results also show that the subject advantage is present not only for relative clauses, but also in the processing of adjunct clauses whose gap is co-indexed with a filler following the embedded clause. Thus regardless of the status of embedded clauses (relative or adjunct), subject gaps have a processing advantage over object gaps.

The overall subject advantage observed in Korean does not support processing accounts based on linear distance between gap and filler, which predict that for Korean and other head-final languages, object relatives and object gaps should be easier. The subject advantage in Korean is however consistent with more structurally based accounts, namely the structural distance hypothesis (O'Grady 1997) and the accessibility hierarchy (Keenan and Comrie 1977). Under the structural distance hypothesis, processing difficulty is calculated based on the distance of syntactic operations: "the distance traversed by a syntactic operation, calculated in terms of number of nodes crossed, determines a structure's relative complexity" (O'Grady 1997: 179). In Korean subject relatives, the gap and the operator are separated by one node, whereas in object relative clauses they are separated by two nodes. Hence the object relative clause is predicted to be more difficult, as confirmed by our experimental results:

(16) a. subject relative: one XP



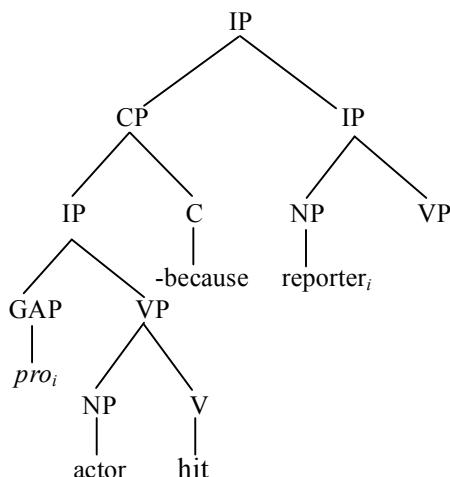
b. object relative: two XPs



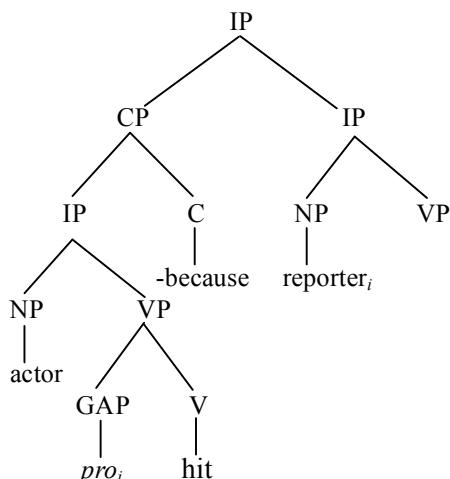
The application of the structural distance hypothesis to adjunct clauses is more problematic, however. First, the identification of the gap in an adjunct clause does not involve any syntactic operations; it is rather a semantic/pragmatic co-indexation process. It is therefore unclear what role structural distance would play in determining the complexity of the relationship of an anaphor to its antecedent in this particular case. The only way to apply the structural distance hypothesis would be to count the nodes between the gap and the predicate that subcategorizes for the missing argument, which could then explain the subject advantage for adjunct clauses. But applying such a process to subcategorization stretches the notion of a syntactic operation and seems to undermine the strength of the hypothesis. If the structural distance hypothesis were to be maintained for an overarching subject

advantage, it would require additional modifications and refinements.

(17) a. adjunct clause: subject *pro*



b. adjunct clause: object *pro*



The accessibility hierarchy (Keenan and Comrie 1977) was initially proposed as a generalization on relative clause formation, capturing the notion that all languages should be able to relativize subjects, and that positions below subject on the hierarchy may be more difficult or impossible to relativize:

(18) Accessibility Hierarchy

Subject > Direct Object > Indirect Object > Oblique > Genitive > Object of Comparison

Since its introduction, the accessibility hierarchy has been applied to environments other than relative clauses (control, binding, possessor raising, and coreference across clauses, all of which show subject advantage). Given this more general nature, the hierarchy makes correct predictions for our experimental results regarding both relative and adjunct clauses.

However, the hierarchy itself is not really explanatory—it is a strong descriptive generalization, but it is unclear what it operates over: thematic roles? grammatical functions? semantic/pragmatic relations? Because of this, the accessibility hierarchy is in danger of overgeneralizing. It is also unclear what exactly motivates the hierarchy. Keenan and Comrie proposed that it reflects ease of processing and the psychological salience of subjects. If we thus attempt to explain the processing advantage of subjects by appealing to the ease of processing and psychological salience of subjects, we end up with complete circularity. Nonetheless, the fact remains that the accessibility hierarchy accounts for all of our results, regardless of its status as a psychologically real phenomenon. The ultimate explanation of the accessibility hierarchy thus remains an open question.

#### 4.2 Trace or *pro*?

As we mentioned above, the nature of the gap inside Korean relative clauses is controversial, with some proposals identifying it as the result of deletion (trace) and others maintaining that it is a null pronominal. Primary linguistic data on this issue are equivocal at best. They include alternation with an overt pronoun, island effects, and weak crossover. All these effects are rather ambiguous.

Alternation with an overt pronoun seems somewhat restricted (Han and Kim 2004). This may be due to the preponderance of *pro*-drop, which makes the presence of an overt pronoun a pragmatically marked option. If this is the case, then the availability of an overt pronoun may be determined by non-syntactic factors that are hard to formalize. In any case, the unreliability of alternation with an overt pronoun casts doubt on the null pronominal analysis, but does not necessarily provide any argument against the movement analysis, since overt pronominals in relative clauses could also be resumptive.

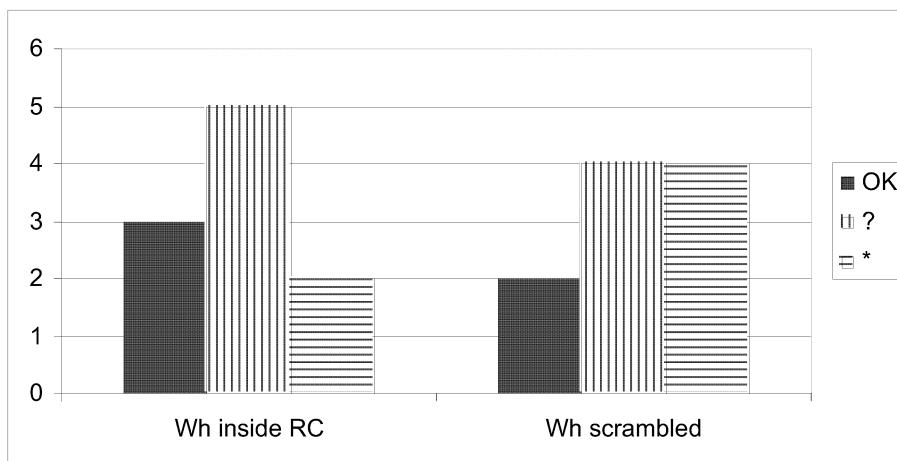
On the other hand, the existence of island effects is critical to the movement analysis. However, the weakness of island effects in Korean (and Japanese) has long been a matter of concern. Several confounds make the issue of islandhood difficult in these languages. First, given that *wh*-words in these languages are actually indefinite expressions, island effects for *wh-in-situ* can only be identified via interpretation, and not on the basis of syntactic well-formedness, as in English. Interpretation must therefore carefully distinguish between the *wh*-reading (i) and the available indefinite reading (ii) in (19), which is possible on the basis of prosody (Jun and Oh 1996).

- (19) ?/\*Minswu-ka [<sub>i</sub> nwukwu-lul cal a-nun] kica<sub>i</sub>-lul manness-nayo?  
 Minswu-NOM who-ACC well know-ADN reporter-ACC met-INTERR  
 (i) ‘For which *x*, *x* a person, did Minswu meet the reporter who knew *x* well?’  
 (ii) ‘Did Minswu meet the reporter who knew someone well?’

Second, even when the offending *wh*-word is scrambled out of the relative clause (20), mimicking overt movement in languages like English and thereby circumventing questions about the relevance of *wh-in-situ* for issues of islandhood (Reinhart 1998), speaker judgments continue to vary. Long-distance scrambling of argument *wh*-words does not uniformly result in island violations either (cf. Saito 1992 for Japanese), casting further doubt on the viability of a strictly syntactic movement analysis.

- (20) ?/\* nwukwu-lul Minswu-ka [<sub>i</sub> cal a-nun] kica<sub>i</sub>-lul manness-nayo?  
 who-ACC Minswu-NOM well know-ADN reporter-ACC met-INTERR  
 ‘For which *x*, *x* a person, did Minswu meet the reporter who knew *x* well?’

For (19) and (20) as well, judgments vary significantly across speakers. Figure 2 shows raw numbers for the acceptability of sentences such as (19) and (20) across ten native speakers. The results are equivocal at best.



**Figure 2. Variation in judgments: argument *wh*-word inside the relative clause and long-scrambled**

Weak crossover data in Korean relative clauses are even more complex and subtle. First, they elicit strong disagreements among native speakers. Second, they exhibit subject/object asymmetries in acceptability (with subject weak crossover yielding more robust violations; Frank et al. 1996). Third, what appear to be bound variables in Korean can under certain circumstances be indefinite expressions, free choice pronouns, or even negative polarity items (e.g., *nwukwu* ‘anyone’ used in WCO examples in Bresnan 1998, but generally rejected by other speakers). In other words, weak crossover data cannot be used unequivocally to argue for a movement analysis of Korean relative clauses.

Given that the primary linguistic evidence is ambiguous, one would hope that processing results

might resolve the controversy concerning the nature of the empty category in the relative clause. We have shown that the gap in the relative clause and the null pronominal in the adjunct clause cause slightly different reading time bottlenecks across the course of our experimental sentences. The differences are summarized in Table 3.

**Table 3. Reading time slowdown in relative vs. adjunct clauses**

	Embedded predicate (W8)	Matrix subject (W9)	Word following matrix subject (W10)
Relative clause	No	Yes	Yes
Adjunct clause	Yes	Yes	No

Note that the reading time slowdown in the adjunct clause condition begins already at the embedded clause predicate, whose ending unambiguously signals that this clause is an adjunct, and that the missing argument is therefore a null pronominal. This reading time slowdown continues at the matrix subject, presumably related to its coindexation with *pro* in the embedded clause. In contrast, the reading time slowdown in the relative clause condition does not begin until the matrix subject (head noun) position, spilling over onto the following word. Before this point, the embedded clause remains ambiguous between a relative clause and a complement clause reading (see (7) above).

The overall time course for the processing of the gap in relative clauses and the *pro* in adjunct clauses is thus distinct, and at first blush one could interpret these experimental findings as an argument against the null pronominal status of the gap in a relative clause. On the basis of this evidence, the gap should therefore be identified as a trace derived via movement. However, under closer scrutiny this conclusion turns out to be premature. The processing differences may instead be due to the difference in the functions served by the relative clause, whose role is to modify the head noun, and the adjunct clause, which enters into a semantic relation with the matrix predicate. Moreover, the processing differences could also be explained under an analysis on which both embedded clauses have a null pronominal, but only the relative clause involves an operator that unselectively binds *pro*. In other words, the slowdown at the head noun of the relative clause could simultaneously reflect operator binding and coindexation with the gap—although at the same time, it should be noted that object gaps in both conditions elicited substantial reading time slowdowns at the matrix subject position (over 200 ms). While this does not distinguish between the two competing analyses of Korean relative clauses, it underscores the most robust result of this study, namely that subject gaps show a strong processing advantage over object gaps, regardless of empty category type.

## 5. Conclusions

The main result of this work is that Korean subject gaps have a processing advantage over object gaps in both relative and adjunct clauses. Korean thus adds new evidence to the growing body of work suggesting that subjects enjoy a processing advantage cross-linguistically, regardless of headedness. In terms of its subject advantage in relative clauses, Korean patterns with Japanese among the head-final languages, and with Chinese with respect to pre-nominal relative clauses. Moreover, these Korean data show that subject gaps of different types are easier to process than corresponding object gaps—the subject advantage holds equally of relative and adjunct clauses.

The processing advantage enjoyed by subjects in a head-final language like Korean casts doubt on accounts of filler-gap dependencies that rely on the linear distance between the antecedent and the gap. According to such accounts, object gaps in Korean should be easier to process because they are closer to the postposed filler. In contrast, structurally-based accounts of filler-gap relationships have a better chance of capturing the Korean subject advantage in relative clauses. However, the same subject advantage was observed in adjunct clauses as well, where a null argument in the embedded clause is co-indexed with the matrix subject antecedent. This result poses new challenges to accounts based purely on syntactically-determined structural distance (for example, O'Grady 1997). We have suggested that the overall subject advantage is best captured by the accessibility hierarchy (Keenan and Comrie 1977), but while this hierarchy constitutes an empirically robust generalization, it still defies

explanation. It remains to be seen if the overall subject advantage can be motivated by some newly conceived interaction of structural, conceptual, and performance factors.

Another question that the data presented here leave open concerns the nature of the empty category in Korean relative clauses, namely whether the gap in relative clauses is due to operator movement, as in English, or can be accounted for as a null pronominal unselectively bound by a null operator. Both primary linguistic data and experimental data are somewhat equivocal in this regard, and seem compatible with both analyses. It is possible that other sources of experimental data could provide additional dissociating information that would allow us to differentiate between these two competing analyses.

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