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Honorific agreement in Korean: Retrieval processing and predictive processing*

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Lee, So Young and Myung Hye Yoo. 2023. Honorific agreement in Korean: Retrieval processing and predictive processing. *Linguistic Research* 40(3): 387-407. This study investigates the processing mechanisms of subject-verb agreement in Korean, which offers a distinctive landscape that encompasses both optional and required agreement components. We particularly focused on the attraction effect, by teasing a part of agreement relationships (optional vs. required). The findings in this study indicate that Korean honorific agreements might employ a distinct processing strategy, potentially resembling the active search strategy observed in other long-distance dependencies in Korean. Korean speakers appear to predict the presence of honorific markers for dependency resolution, even though honorific agreements are not obligatory in the language. This research provides new insights into the crosslinguistic variations in processing strategies for subject-verb agreement. **(Miami University · National University of Singapore)**

Keywords honorific agreements, attraction effect, processing strategies

1. Introduction

Long-distance dependencies are a fundamental aspect of human language, referring to morphosyntactic relationships between words or phrases that are separated by a significant distance in a sentence. One common example of long-distance dependencies

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is subject-verb agreement as in (1b). In many languages including English, in order to form a grammatically legitimate sentence, a subject and a verb need to agree with each other in one or more morphosyntactic features such as numbers, genders, and/or person features.

(1) a. The ***key was/*were*** new.
b. The ***key*** to the cabinet in the department ***was/*were*** new.

For appropriate comprehension, a speaker must correctly identify the verb *was* and its licit subject *key* to link them, even if they are separated by a considerable distance as in (1b). These long-distance dependencies require speakers to keep track of multiple elements in a sentence and to make connections between them.

The investigation of these long-distance dependencies has been a prominent topic in psycholinguistics, as it offers insights into the complex cognitive processes involved in sentence processing. Recent research on long-distance dependencies has primarily focused on the processing strategies that a parser employs during real-time processing to resolve the dependency, as well as the impact of different levels of linguistic information on the resolution process.

The prevailing consensus in in human sentence processing research (Marslen-Wilson 1975; Frazier 1979; Tanenhaus et al. 1990; Sedivy et al. 1999) suggests that the human sentence parser seamlessly integrates incoming linguistic input into the preexisting structure as it is encountered within the sentence without significant delay. During the incremental processing, the human parser is constantly generating predictions about upcoming words or structures based on the linguistic context established earlier in the sentence (Federmeier and Kutas 1999; Meyer and Federmeier 2007; Wlotko and Federmeier 2007). At the same time, the parser needs to quickly access and retrieve specific lexical items from long-term memory to form dependencies (Lewis et al. 2006; Van Dyke and McElree 2006; Jäger et al. 2017).

Long-distance dependencies such as morphosyntactic agreements involve navigating through distinct syntactic, semantic, and discourse constraints, which must be evaluated incrementally as sentences unfold. In most studies particularly on subject-verb agreements, discussions have been developed based on the assumption that when encountering a verb, a parser retrieves the structure already processed and accesses a subject, which is associated with the retrieval processing. According to previous studies

(Van Dyke and Lewis 2003; Lewis, Vasishth, and Van Dyke 2006), the cue-based retrieval model posits that specific features, known as retrieval cues, are employed to retrieve the associated item, referred to as the retrieval target, from memory.

Numerous studies on the timing and precision of dependency formation provide empirical support for a direct-access retrieval mechanism, which places notable emphasis on syntactic information when accessing linguistic representations within memory. Direct access memory retrieval involves an extensive matching procedure, where a composite retrieval probe is created by combining cues derived from both the current context and grammatical knowledge. It is then compared to all constituents previously stored in memory (Clark and Gronlund 1996). For instance, in configuration (2), where two items are dependent on each other for number agreement, when the dependent element (e.g., *was*) that appears later in the sentence is encountered, the parser begins to search for the target subject (e.g., *the key*) that has already been processed.

(2) The $\text{key}_{\text{subject}}$ … was …
[sg] [sg]

The retrieval is determined by how closely that item matches the retrieval probe. Thus, this retrieval process can be described as content-addressable, as it relies on content-related cues and features of the linguistic information in memory (McElree and Dosher 1989; McElree 2000, 2006; McElree, Foraker, and Dyer 2003). This means that words or phrases are retrieved based on the content attributes including lexical meaning, phonological characteristics, or grammatical structure. The strength and specificity of these content-based cues play a crucial role in determining the accuracy and efficiency of retrieval.

Retrieval processes can be significantly influenced by interference which is a structurally-irrelevant yet feature-relevant element. The interference effects in subject-verb agreement (known as the attraction effect) are a well-documented phenomenon in psycholinguistics (Pearlmutter et al. 1999; Wagers et al. 2009; Lago et al. 2015). They arise due to intervening noun phrases, known as attractors, that can cause errors in sentence processing. For instance, although the intervening attractor, such as *the cabinets* in sentence (3d), is grammatically irrelevant to subject-verb agreement, it reduces processing difficulty in comparison to sentence (3c). In other words, the potential items

(attractors), rather than the target item, are erroneously activated during the retrieval process.

(3) a. The key to the cabinet was rusty after many years of disuse.
b. The key to the cabinets was rusty after many years of disuse.
c. *The key to the cabinet were rusty after many years of disuse.
d. *The key to the cabinets were rusty after many years of disuse.

Consequently, English speakers tend to spend less time reading (3d) than reading (3c), despite both being ungrammatical (Pearlmutter et al. 1999). These attraction effects have been reported in various languages.

Nevertheless, previous research has predominantly focused on a limited range of typologically similar languages, mainly Indo-European ones such as English. Interestingly, Korean does not have a robust subject-verb agreement system akin to what is observed in Indo-European languages. However, even previous literatures on Korean subject-verb agreement processing, including Kwon and Sturt's (2016), primarily addressed the obligatory agreement relationship within the context of the stimuli's structural attributes, while the exploration of the optional agreement relationship remains a notable gap in the literature. Consequently, the question regarding the processing dynamics of this optional honorific relationship remains unresolved. On this view, our study examines both optional and required agreement processing.

This paper is structured as follows. In section 2, we will briefly sketch the Korean honorific agreement system, and the parsing strategies. Section 3 presents the details of the experiments. In section 4, we provide the experimental results and brief discussion based on the results. Section 5 offers concluding remarks.

2. Background

2.1 Honorific agreement

Honorifics are a unique feature of Korean language. The honorifics (e.g. *-nim* 'honorable' on the nouns and *-si* 'honorific marker' on the verb) are used to convey respect, politeness, and deference toward a referent or an addressee. These honorifics are

morphosyntactically and pragmatically productive devices indicating the social status of the sentential subject relative to the speaker in Korean.

As in (4), the honorific affix *-si-* attaches to a verbal stem and agrees with an honorable subject like *sensayng-nim* 'teacher.'

optional agreement

(4) *sensayng-**nim**-i* *hakkyo-ey* *ka-ss-ta / ka-**(si)**-ess-ta*
teacher$_{\text{-HON-NOM}}$ School$_{\text{-LOC}}$ go$_{\text{-PAST-DEC}}$ / go$_{\text{-(HON)-PAST-DEC}}$
'The teacher went to school.'

Notably, the honorific affix *-si-* on the verb can be optional as it is not required for grammaticality, and may be omitted depending on the social context. In that sense, Korean lacks a robust subject-verb agreement system as found in Indo-European languages.

Nevertheless, honorifics on a subject and a verb can form systematic dependency relations (Sohn 1999; Brown 2015). For instance, the honorific suffix cannot be compatible with a subject of low social status, such as *ai* 'kid' in (5), rendering the sentence ungrammatical. In other words, the affix *-si-* requires an honorable subject that can be associated.

required agreement

(5) *ai-ka* *hakkyo-ey* *ka-ss-ta / *ka-**si**-ess-ta*
kid$_{\text{-NOM}}$ school$_{\text{-LOC}}$ go$_{\text{-PAST-DEC}}$ / go$_{\text{-HON-PAST-DEC}}$
'The kid went to school.'

Even though the Korean honorific system is different from the subject-verb number agreement in English in that it is not grammatically motivated, it still involves a dependency relation. If the affix *-si-* appears on the verb, it should be agreed with an honorific feature on the subject.

To provide the empirical evidence for the Korean honorific system, we conducted an acceptability judgment of simple sentences, as exemplified in Table 1.

Table 1. The acceptance rate

Subject	Honorific affix *-si*	Acceptance rate (se) 1(the least acceptable)-7: (the most acceptable))
H	Yes	6.09 (0.16)
H	No	4.19 (0.22)
N	Yes	1.72 (0.11)
N	No	6.73 (0.07)

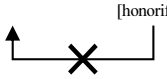
Analysis of responses from 58 Korean native speakers revealed that when the affix *-si-* was attached to the verb, the absence of an honorable subject rendered the sentences unacceptable, as demonstrated in Table 1. In contrast, when the subject was an honorable noun, Korean speakers found these sentences acceptable (above 3.5), regardless of whether the affix *-si-* was present on the verb. Although the presence of the affix *-si-* did not impact the grammaticality of the sentences, there was a noticeable preference among Korean speakers for sentences with the affix *-si-* over those without it. Investigating how these unique honorific agreements are processed can contribute to our understanding of the nature of language processing and the universality of processing mechanisms across different languages. Previous Korean honorific agreement studies have mainly investigated the required honorific agreement in the presence of the honorific affix *-si-*. The processing of this agreement has been accounted for by the retrieval mechanism, the honorific affix *-si-* being as a retrieval cue. For instance, when the parser encounters the honorific affix *-si-* on the verb as in (6), the main subject with honorific feature is retrieved.

(6) Subject-honorific ⋯ Verb-honorific

As the evidence of the retrieval processing of Korean honorific agreements, the phenomenon of attraction effects has been observed as well (Kwon and Sturt 2016). The simplified configuration for the attraction condition in Kwon and Sturt (2016) is in (7). In Korean, honorific feature matching happens within the same clause boundary (Sohn 1999). Consequently, when the embedded subject was non-honorifics (NH), the honorific affix *-si-* on the embedded verb failed to agreement. They observed that the processing difficulty of mismatching features in the subject-verb honorific agreement in the embedded clause was reduced when there was a structurally illicit, but feature matching

main subject (the attractor). Since the attractor in their stimuli was not linearly intervening, they concluded that during the process of resolving dependencies between honorific markers, any relevant item in memory would be activated if it possessed a feature that matched the retrieval cue.

(7) H (attractor) NH
[matrix Subject ... [embedded Subject ... Verb-*si*] ... Verb]
[honorific] [honorific]



Retrieval processing (Kwon and Sturt 2016)

In such instances, even when the attractor is situated between the target subject and the verb, the persistence of the attraction effect should be observable. Our study examines such cases where the attractor (i.e., embedded subject) linearly intervening the dependency between the main subject and the verb. The details on experimental design will be discussed later in section 3. In the next section, we introduce the mechanism of predictive processing as a potential processing strategy of the optional honorific agreement.

2.2 Predictive processing

Predictive processing involves generating expectations for upcoming words based on the current context. Previous studies including Brouwer et al. (2017), Dahan et al. (2000), Dussias et al. (2013), Hopp (2013), and Lew-Williams and Fernald (2010) have illustrated how our brains utilize morphosyntactic cues to anticipate upcoming lexical items. For example, in the visual world paradigm experiments testing agreements in Hopp and Lemmerth (2018), reported that as in (8), in German, gender-marked articles and adjectives were used, and the results indicated that native speakers were quicker to predict the target object when gender cues were different compared to when they were the same.

(8) a. Wo ist der/dle/das gelbe … ?
Where is the$_{\text{-MASC/FEM/NEUT}}$ yellow…?
'Where is the yellow …?

b. Wo ist ein Kleiner/kleines gelber/s …?
Where is a small$_{\text{-MASC/NEUT}}$ yellow$_{\text{-MASC/NEUT}}$
'Where is a yellow…?

This suggests that they used agreement cues to constrain their noun expectations. Similar effects have been observed in number agreement with German articles and Mandarin Chinese classifiers. In English, where articles and adjectives do not have number agreement, constructions like *There is* and *There are* still influence people's preferences for number-congruent objects. (Kouider et al. 2006; Riordan et al. 2015; Lukyanenko and Fisher 2016)

In addition, the predictive effect that morphosyntactic information can significantly shape prediction formation aligns with observations in other predictive phenomena such as filler-gap dependencies and cataphora. In reading studies, these phenomena are widely recognized as instances of predictive processing (for a detailed discussion, see Phillips et al. 2011). As in the simplified configuration of the filler-gap dependency in (9a), a parser initiates a search for a gap as soon as a filler is identified (Frazier and Clifton 1989).

(9) a. ... who ... ____ ...
filler *gap*

b. ... who ... V-Q ...?
[+Q] [+Q]

This strategy has been understood as a descriptive generalization that should ultimately be explained in terms of more general parsing mechanisms. Even in the study on Japanese *wh*-question scope (Aoshima et al. 2004) where there is no gap position, they found the evidence on the active search parsing strategy.[1] In Japanese, the *wh*-phrase should be associated with the question (Q) particle for its scope as in (9b). According

1 Even though the processing strategy is commonly called active-filler strategy, since sentences for Japanese *wh*-scope do not contain fillers and gaps, the term "active-filler" does not sound inclusive enough. Hence, we use the term "active search" instead of "active-filler."

to Aoshima et al. (2004), when a declarative marker with [-Q] feature that cannot be associated with *wh*-phrases appeared on the verb that the parser first met, the slower reading times were observed. It shows that the parser actively predicts Q particles as a sentence unfolds, rather than waiting to identify a Q particle. If these findings extend to honorific agreement relationships, we would anticipate that predictions may immediately start with morphosyntactically licensed words such as honorable nouns.

Therefore, turning to honorific agreements in Korean, if the predictive processing is involved in Korean honorific agreements, as soon as the honorific features of a noun are identified, the parser would actively predict the honorifics on the verb as in (10). It is expected that the slow reading time will be observed when no honorific affix appears on the verb, although it is optional.

(10) Subject-honorific ... Verb-honorific

In sum, Korean honorific agreements can be teased apart in terms of the directionality and the optionality: i) required agreement which is a forward processing (6), repeated in (11a), and ii) optional agreement which is a backward processing (10), repeated in (11b).

a. required agreement (retrieval processing)

(11) Subject-honorific ... Verb-honorific

b. optional agreement (predictive search processing)

Therefore, (11a) pertains to retrieval processing while (11b) pertains to predictive processing, highlighting the relevance of honorific agreements in these distinct linguistic processes because the primary difference between these two strategies is their directionality (i.e., forward vs. backward). By examining situations where an attractor intervenes between the subject and verb honorific dependents, we, therefore, can gain a better understanding of the processing of both required and optional honorific agreements.

To investigate this further, a self-paced reading experiment was conducted. In the following section, we present our findings that demonstrate how the prediction of the attraction effect in Korean honorific agreements varies depending on the processing strategies employed. We provide a detailed account of the experiment that we conducted,

including its methodology and results.

3. Experiment

3.1 Participant

Fifty native speakers of Korean participated in the experiment. They were naive about the purpose of the experiment. Participants received $5 for participation in the experiment. The experiment took 20-30 minutes.

3.2 Stimuli

The stimuli employed in our study involved a main clause and an embedded adjunct clause in the form of (11). The honorific features of the main clause subject and the embedded clause subject were varied in our experiment, with ***H*** representing Honorific and ***N*** representing Non-honorific. The embedded verb did not include the honorific affix *-si* in all conditions to test predictive reading of *-si* after parsing an honorific embedded subject although it is optional. The matrix verb always included the honorific affix *-si*, which renders conditions (11c) and (11d) with non-honorific matrix subjects ungrammatical.

(12) H / N H (attractor) / N

*{cwuim-nim-i / *Cayhwuni-ka}* *ppalli* [*{paksa-nim-i /Minho-ka}*
chief$_{\text{-HON-NOM}}$ / Cayhwuni$_{\text{-NOM}}$ quickly doctor$_{\text{-HON-NOM}}$ /Minho$_{\text{-NOM}}$

sanghwangul *phaakha-key*] *motun*
situation$_{\text{-ACC}}$ Figure out-$_{\text{C}}$ all

pokose-lul *nemkyecwu-si-ess-ta.*
document$_{\text{-ACC}}$ Hand over$_{\text{-HON-PAST-DEC}}$

a. HH: '*The chief* handed over all documents to him so that the doctor could figure out the situation quickly.'
b. HN: '*The chief* handed over all documents to him so that Minho could

figure out the situation quickly.'

c. *NH: '*Cayhwun* handed over all documents to him so that the doctor could figure out the situation quickly.'

d. *NN: '*Cayhwun* handed over all documents to him so that Minho could figure out the situation quickly.'

By introducing the honorific affix *-si-* to the main verb while excluding it from the embedded verb, this stimuli design allows us to effectively investigate the two main employed processing strategies. For example, we anticipate observing certain effects of predictive processing on the embedded verb. As mentioned earlier, in order to test the effect of the attractor linearly intervening between the main subject and the main verb, the embedded subject was the attractor, which is different from Kwon and Sturt (2016) where the matrix subject was the attractor. Additionally, we expect to observe corresponding effects of retrieval processing on the main verb. The specific predictions are outlined in the following section 3.4. Sixteen sets of experimental sentences (64 sentences = 16 sets x 4 conditions) were created. They were distributed with fillers across 4 groups in a Latin Square design.

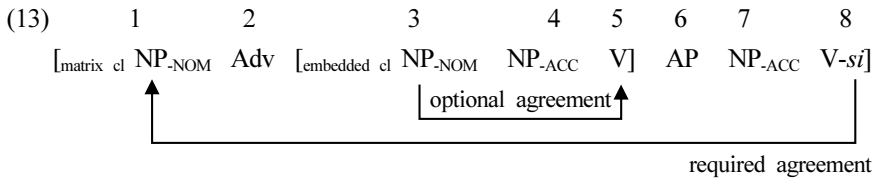
3.3 Procedure

We conducted a self-paced reading experiment utilizing the web-based platform PCIbex Farm. Stimulus presentation employed a word-by-word approach, allowing participants to proceed at their own pace while ensuring non-cumulative exposure. To familiarize participants with the self-paced moving window technique, a practice session was included. Once participants indicated their readiness by pressing a button, the experiment sentences were presented on the screen. These sentences were initially masked with dashes, and participants used the Space Bar to reveal subsequent words.

Following the presentation of each sentence, a comprehension task was administered. The comprehension questions were designed to assess participants' understanding of the target sentences' content. For instance, in the case of sentences (12), participants were asked, *Who handed over all documents to Minho/the doctor?* The comprehension questions were addressed from either the main clause or the embedded clause, with equal distribution across the different sets of sentences.

3.4 Prediction

The schema of our stimuli is in (13). The critical word positions are the embedded verb (region 5), which was always marked with the absence of the honorific marker *-si-*, and the matrix verb (region 8), which was always marked with the presence of the honorific marker *-si-*.



HH:	Honorific	Honorific
HN:	Honorific	Non-honorific
NH:	*Non-honorific	Honorific
NN:	*Non-honorific	Non-honorific

Once again, honorific feature matching happens within the same clause boundary. Since personal names (e.g., *Cayhwun* in (12): Non-honorific) in main subjects are not paired with honorifics in Korean, the presence of an honorific marker *-si-* on the main verb induces ungrammaticality.

The processing strategies depending on the agreement types (optional *vs.* required) yield the following predictions.

Table 2. Predictions

	Predictions (> : faster)
Predictive processing	NN > HH, NH, HN on region 5 (embedded verb)
Retrieval processing	NH > NN on region 8 (matrix verb)

Based on different processing strategies, the manifestation of attraction effects can vary across regions. If a parser actively seeks the honorific marker *-si-* to resolve the dependency and match the honorific feature of the noun phrase, similar to the predictive-search strategy, we anticipate a significant slowdown in reading times for the

embedded verbs, which do not bear honorific feature, after encountering honorific noun phrases in either main or embedded clauses (as in conditions HH, HN, and NH).

During the later processing of the main verb that includes the honorific affix *-si*, the retrieval process may be initiated. Thus, in the structure (13), an attraction effect might be observed on the matrix verb. In this case, the reading time for condition NH in region 8 (the matrix verb with the affix *-si-*) would be faster compared to condition NN, attributed to the erroneous temporal resolution of honorific dependencies due to the honorific feature on the embedded subject that matches the honorific feature on the main verb.

4. Results

4.1 Analysis and results

Comprehension accuracy for each condition is given in Table 3 and Figure 1. The reading times are in Table 4 and Figure 2. To ensure data quality, we cleaned the data following the three steps. We initially assessed the participants' performance on the comprehension check-up questions to ensure their understanding of the experimental sentences during the task. Each participant demonstrated high comprehension accuracy with above 87.0%, indicating that they paid close attention to the sentences. As a result, we included data from all participants in the subsequent analysis.

Next, we examined the reading times (RTs) for the critical sentences in both conditions across the critical, spill-over, and wrap-up regions. Prior to conducting statistical analyses, we applied data trimming procedures in the following steps. Firstly, we excluded the data that were incorrectly answered on the comprehension questions, resulting in a loss of 4.8% of the total data. Next, RTs shorter than 100 ms and longer than 5000 ms were removed as outliers, which affected 0.7% of the total data. Additionally, RTs exceeding three standard deviations from the mean of all RTs were excluded, resulting in a loss of 2% of the total data.

To analyze the reading time data, we employed Linear Mixed Effect Regression (LMER) analysis using the lme4 R package (Bates et al. 2015). The regression included two fixed-effect factors: the honorific features of the main subject and the embedded subject (H vs. N), as well as their interaction. The predictors, namely, honorific features

of the matrix subject and the embedded subject were contrast-coded. Honorific feature (H) was coded as +1/2, and Non-honorific feature (N) was coded as -1/2 for both matrix and embedded subjects. For each region of interest, a separate LMER model was constructed for the reading time data.

Comprehension accuracy rates were analyzed using a generalized LME model with a binomial distribution. The regression models incorporated crossed-random intercepts for participants and items. The initial random effect structure followed the approach outlined by Barr et al. (2013), starting with the maximal random effect structure. If models with the maximal random effect structure did not converge, we progressively simplified the random effect structure until convergence was achieved.

In Table 5, the regression analyses produced coefficients, standard errors, and t-values (or z-values for the logit model) for each fixed effect and interaction. The slope column reports whether the random slope parameter corresponding to a fixed-effect factor was included in the model for participants or items. For the linear models, a coefficient was considered significant at α=0.05 if the absolute value of t exceeded 2 (Baayen 2008). P-values for the binomial logit model were obtained from the Z score.

Lastly, planned (paired) contrasts are reported using the Tukey test, performed with the emmeans function in the emmeans package (Lenth 2021) in R (R Core Team 2021).

Table 3. Comprehension accuracy

Condition 1 (Matrix subject)	Condition 2 (embedded subject)	Accuracy (standard errors)
H	H	95.83% (0.0051)
H	N	94.79% (0.0056)
N	H	95.83% (0.0051)
N	N	94.27% (0.0059)

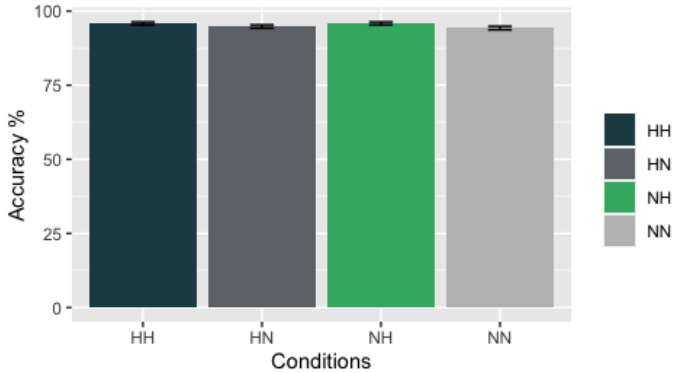


Figure 1. Accuracy rate of the comprehension test

Table 4. Mean reading times (ms) (standard errors)

	R1	R2	R3	R4	R5 $V_{Embedded}$	R6	R7	R8 V_{Matrix}
HH	541 (16)	533 (16)	715 (38)	688 (28)	608 (19)	587 (22)	507 (16)	691 (32)
HN	566 (22)	533 (16)	671 (29)	628 (22)	555 (17)	638 (28)	530 (18)	632 (26)
NH	559 (18)	536 (17)	646 (29)	684 (27)	592 (21)	617 (24)	538 (18)	794 (44)
NN	547 (17)	532 (17)	650 (30)	707 (30)	537 (15)	654 (28)	521 (15)	784 (40)

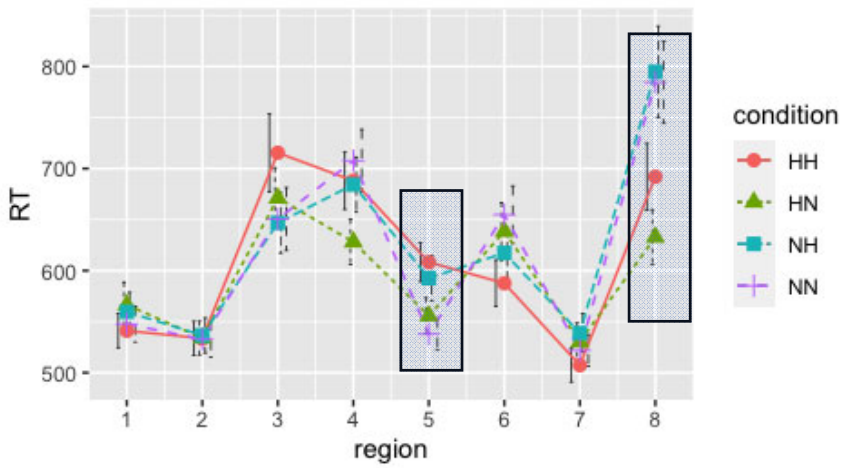


Figure 2. Reading time results

Table 5. Generalized Linear Mixed Effects results for reading times

	Estimate	SE	t	slope
R5				
(intercept)	577.142	22.086	26.131	(p, i)
Matrix subject	14.779	18.064	0.818	(p, i)
Embedded subject	53.142	18.064	2.942*	(p, i)
Mat * Emb subject	2.088	36.151	0.058	(p, i)
R6				
(intercept)	630.29	31.02	20.319	(p, i)
Matrix subject	-22.5	21.69	-1.037	(p, i)
Embedded subject	-45.2	21.67	-2.086	(p, i)
Mat * Emb subject	-17.8	43.36	-0.411	(p, i)
R7				
(intercept)	527.307	21.258	24.805	(p, i)
Matrix subject	11.003	17.883	0.615	(p, i)
Embedded subject	6.108	17.884	0.342	(p, i)
Mat * Emb subject	40.441	35.762	1.131	(p, i)
R8				
(intercept)	733.25	36.63	20.019	(p)
Matrix subject	-126.64	32.93	-3.846*	(p)
Embedded subject	32.36	32.87	0.985	(p)
Mat * Emb subject	55.99	65.75	0.852	(p)

Figure 2 displays the results from each group after the data trimming process. Visual inspection of the graph indicates that at the region 5 (the critical embedded verb position), there was a main effect of the honorific feature of the embedded subject. The embedded subjects with honorific features (HH:608 ms, NH: 592 ms) elicited longer reading times compared to those without honorific features (HN: 555 ms, NN: 537 ms). This indicates that the honorific feature mismatch between the embedded subject and the embedded verb led to overall processing difficulty. The results from this study suggest that processing strategy employed in Korean subject-verb honorific agreements may align with the predictive processing.

In region 8, the matrix verbs consistently contained the honorific marker *-si-*, rendering the non-honorific main subjects ungrammatical. The statistically significant slow reading times of NH and NN conditions were observed, compared to HH and HN (the main effect of the matrix subject as in Table 4). Assuming that the honorific marker

-si- on the main verb triggers retrieval processes, it may result in an attraction effect of the embedded subject, carrying honorific features. However, contrary to our initial expectations, we did not observe a significant reading time difference between the NH (potential illusion) and NN (ungrammatical) conditions (Tukey test: estimate = -4.37, SE = 46.5, df = 630, t = -0.096, p = 0.99). We only observed grammaticality effect, such that the overall reading time of ungrammatical sentences (Non-honorific matrix subject) was slower than grammatical sentences (Honorific matrix subject) (Main effect of the matrix subject t = -3.846 in Table 4). In addition, since region 8 is a wrap-up region, the integrative processing effect can happen (Caplan and Waters, 1999). For instance, the effect of the honorific mismatch between the embedded subject and the embedded verb are descriptively observed as the reading time difference between HH and HN even though they are not statistically significant (Tukey test: estimate = -60.36, SE = 46.5, df = 631, t = -1.299, p = 0.56).

4.2 Discussion

Since the retrieval process entails accessing information stored in memory, the retrieval process is initiated by the dependent element processed later. Thus, the application of this parsing strategy to Korean honorific agreements suggests that retrieval will occur when the parser encounters the honorific affix *-si-* attached to the verb. Since the embedded verbs do not carry honorific features in our stimuli design, there is no item that triggers the retrieval process for the honorific agreement. Thus, the slowdown of H-main conditions at region 5 (i.e., embedded verb) cannot be accounted for by the retrieval processing strategy.

Instead, if the predictive processing is involved in Korean honorific agreements, the parser will proactively predict the presence of honorifics on the verb as soon as the honorific nouns are identified. The results suggest that Korean honorific agreements may involve different processing strategies, such as “active search” strategy similar to other long-distance dependencies in Korean (i.e., *wh*-Q dependency). We observed the significant slow reading time on the embedded verb when the honorific feature between the embedded subject and the embedded verb were mismatched. This suggests that Korean speakers tend to strongly predict an honorific marker for the honorific dependency resolution in the upcoming sentence after encountering an honorific noun,

even though Korean honorific agreements are not obligatory.

In addition, the absence of a significant reading time difference between the two ungrammatical conditions (the potential illusion condition and the ungrammatical condition) in region 8 also suggests the predictive processing for resolving honorific dependencies. However, we acknowledge that the interpretation of the reading time results in region 8 can be viewed differently. The lack of an attraction effect in region 8 does not necessarily rule out the possibility of retrieval processing. In Korean, the embedded subject and verb precede the matrix verb, leading to the completion of agreement between them before the parser encounters the matrix verb. As a result, the embedded subject may no longer act as a distractor at this point. Moreover, as highlighted by the anonymous reviewer, the difference in outcomes from Kwon and Sturt's (2019) research may be attributed to methodological distinctions, specifically the divergence between their eye-tracking experiment and our web-based self-paced reading experiment.

Furthermore, it is a well-established observation that readers tend to spend more time on sentence- or clause-final words compared to sentence- or clause-internal words (Aaronson and Scarborough 1976; Just and Carpenter 1980; Rayner et al. 1989; Caplan and Waters 1999). This phenomenon, known as sentence or clause wrap-up effect, has been traditionally attributed to integrative processing that occurs towards the end of a sentence or clause (Just and Carpenter 1980; Rayner et al. 2000). Considering that region 8 represents the wrap-up phase, the reading time results may also reflect the integrative processing involved in comprehending the entire sentence.

5. Conclusion

This research aimed to examine the processing mechanisms involved in subject-verb honorific agreements in Korean. In contrast to the findings of Kwon and Sturt (2016), this study specifically focused on investigating the impact of an attractor that intervenes linearly between the main subject and the main verb. Optional agreement: predictive reading… These results suggest that the processing strategy employed in Korean subject-verb honorific agreements may align with the active search model. However, the question of whether this active search model is applicable to other head-final languages, such as Japanese, remains for future research.

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