Dependency formation interacts with case: Evidence from Korean double nominative constructions

Juyeon Cho & Rebecca Tollan*

Abstract. The subject-object asymmetry in relative clauses, where structures containing subject dependencies are typically easier to process than those with object dependencies, has been previously attributed to both grammatical function (subject > object) as well as morphological case (e.g., NOM > ACC). We investigate processing of Double Nominative Constructions (“DNCs”) in Korean, where the object exceptionally has nominative case like the subject (i.e., NOM-NOM). This enables isolation of grammatical function and case as possible factors driving the so-called “subject advantage.” We find that dependency formation is more costly in DNCs as compared with NOM-ACC structures, especially for object relative clauses. We tie this effect to distinctness in morphological case of the subject and object, suggesting that the less morphosyntactically distinct the subject and object are, the more difficult it is to process DNCs in dependencies.

Keywords. subject advantage; Korean long-distance dependencies; double case constructions; nominative objects

1. Introduction. Long-distance dependencies between two (or more) elements in a sentence have long been a key focus of the attention of psycholinguistic and formal linguistic research. A long-distance dependency consists of a word or phrase, called a filler, whose meaning is dependent on the information in a different position in the sentence, called a gap (typically indicated with an underscore). Because the gap is null and often not adjacent to the filler itself, processing long-distance dependencies (e.g., wh-interrogative clauses (1a) or relative clauses (1b)) requires establishing a link between these two positions.

(1) English long-distance dependencies
   a. Who did John meet ___ yesterday? (Wh-interrogative)
   b. I know the person who John met ___ yesterday. (Relative clause)

This phenomenon has been widely researched through the lens of relative clauses, where there is a dependency between the head noun, which introduces a relative clause, and a gap at some position within the relative clause. Numerous previous studies of several unrelated languages have found a general processing advantage for relative clauses with a subject gap (subject relative clause; SRC (2a)) over those with an object gap (object relative clause; ORC (2b)) (e.g., Chinese: Lin & Bever 2006; English: King & Just 1991; Dutch: Donkers, Hoeks, & Stowe 2013; French: Holmes & O’Regan 1981; German: Schriefers, Friederici, & Kuhn 1995; Japanese: Miyamoto & Nakamura 2003; Korean: Kwon, Polinsky, & Kluender 2006; a.o.).

(2) Subject and object relative clauses (King & Just 1991:582)
   a. SRC: The reporter [that ___ attacked the senator]$_{RC}$ admitted the error.
   b. ORC: The reporter [that the senator attacked ___]$_{RC}$ admitted the error.

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The asymmetry between the processing of (2a) versus (2b) is known as the subject advantage: SRCs are typically easier to process than ORCs. Over the past four decades, several proposals concerning the underpinning(s) of the subject advantage have been put forth (e.g., Bever 1970; Keenan & Comrie 1977; Gibson 1998; O’Grady, Lee, & Choo 2003; Carreiras, Duñabeitia, Vergara, De La Cruz-Pavía, & Laka 2010; Polinsky, Gallo, Graff, & Kravtchenko 2012; Tollan, Massam, & Heller 2019). One prominent line of reasoning is that “subjects” are more salient, or “accessible” in the mental representation than objects are (e.g., hierarchical structure: O’Grady et al. 2003; accessibility: Keenan & Comrie 1977), which predicts the subject advantage to be a cross-linguistically universal feature of human sentence processing. However, the syntactic accessibility of subjects as being solely due to their grammatical status/syntactic superiority, as per Keenan & Comrie (1977), has been revisited in more recent work. Specifically, literature in formal morphosyntax has highlighted the role of morphological case in contributing to the accessibility of different kinds of noun phrases. Importantly, NPs with nominative case are more accessible than NPs with accusative case, as far as syntactic operations like verb agreement are concerned (Bobaljik 2008). Morphological case and grammatical function are often difficult to tease apart because NPs with nominative case are usually subjects, and NPs with accusative case are usually objects, meaning that the two potential sources of accessibility apply to the same NP. Recent works on ergative-absolutive languages (where transitive subjects get ergative case instead of nominative case) have begun to tease apart these two factors (e.g., Carreiras et al. 2010; Polinsky et al. 2012; Tollan et al. 2019), with mixed results. The present study builds on this line of work, by investigating the processing relative clauses in Korean. We compare SRCs with ORCs, considering two different case alignments: Nominative-Accusative (NOM-ACC; in which the subject has nominative case and the object has accusative case, as per previous studies of NOM-ACC languages), and Nominative-Nominative (NOM-NOM; where, exceptionally, both the subject and the object have nominative case). This latter type of construction is known in Korean literature as a “Double Nominative Construction” (DNC).

In the next section, we provide further background on both subject advantage and Korean DNCs, in turn. Moving forward, Section 3 details a novel experiment dependency formation in DNCs versus prototypical NOM-ACC constructions. Section 4 provides a discussion of our findings, and Section 5 concludes.

2. Background and motivations.

2.1. Subject advantage. Several hypotheses have been proposed to account for the processing asymmetry between subject and object in relative clauses. One type of prevailing account attributes subject advantage to language universal factors such as hierarchical distance (O’Grady et al. 2003), accessibility (Keenan & Comrie 1977), or perspective shift (Bever 1970). Keenan & Comrie’s (1977) Accessibility Hierarchy (3), for instance, proposes that an NP’s “accessibility”, or visibility in formal syntactic operations like dependency formation and verb agreement can be stated in terms of grammatical function. This means that if a language allows dependency formation of any one kind of NP, it also allows dependency formation of all NP types to its left (and higher) in the hierarchy.

(3) Accessibility Hierarchy (Keenan & Comrie 1977)

Subject > Direct Object > Indirect Object > Oblique > Genitive

However, it has also been proposed that it is morphological case, not a grammatical function, which predicts accessibility of NPs (Otsuka 2006; Bobaljik 2008). The Morphological
Case Accessibility Hierarchy (4), re-casts the hierarchy in (3) in terms of case as opposed to grammatical function: NPs bearing unmarked cases (nominative or absolutive) are more accessible than NPs with other (more “marked”) cases. Importantly, for languages of nominative-accusative alignment, subjechhood and unmarked case converge.

(4) Morphological Case Accessibility Hierarchy (Otsuka 2006; Bobaljik 2008)
Unmarked case (NOM, ABS) > Dependent case (ERG, ACC) > Lexical/oblique case (DAT)

The idea of morphological case being the source of accessibility has led to the proposal that case marking, and not “subjechhood” itself, drives subject-object asymmetries in the processing of filler-gap dependencies. This has been based on the study of ergative-absolutive languages (e.g., Carreiras et al. 2010; Polinsky et al. 2012; Tollan et al. 2019, a.o.). In ergative languages, the subject of a transitive verb is marked as ergative whereas the subject of an intransitive verb, and the object of a transitive verb, are absolutive (in contrast to nominative-accusative languages in which the subject is nominative and the object is accusative). The difference between ergative subjects on the one hand, and absolutive subjects on the other, thus enables the isolation of case marking while holding grammatical function (i.e., subjechhood) constant. Previous findings from studies of ergative languages showed that dependencies of the NP with a morphologically unmarked case (here, ABS) were easier to process than dependencies of the NP with a marked case (here, ERG). Carreiras et al. (2010), for example, found a preference for dependencies with absolutive objects over dependencies with ergative subjects in Basque. Similarly, Tollan et al. (2019) also provided evidence from Niuean that dependencies with an absolutive gap were easier to process than those with an ergative or oblique gap, in both subject and object wh-questions.

As mentioned, this morphological case-based view, has been only borne out of studying ergative languages. This is because, in nominative languages, isolating subjechhood and case is inherently less intrinsic: both transitive and intransitive subjects have nominative case, and thus, the subject advantage overlaps with any advantage for case unmarkedness. As highlighted in Tollan et al.’s (2019) study of Niuean (Polynesian), comparing an ergative subject with an absolutive subject necessarily also requires comparing two or more different lexical verbs across conditions, as in (5). This introduces a potential confounding factor: The processing advantage for absolutive case (as in Tollan et al. 2019) might be driven by the preferences for certain thematic roles in each verb (e.g., patient in ‘chase’ event, agent in ‘copy’ and ‘run’ event), not purely by morphological case alone.

(5) Niuean (Tollan et al. 2019:4)

a. Transitive verb (ERG-ABS)
Ko e pusi fē ne tutuli tumau e lapiti?
PRED cat which PAST chase always ABS rabbit
‘Which cat always chased the rabbit?’

b. Transitive verb (ABS-OBL)
Ko e pusi fē ne fifitaki tumau ke he lapiti?
PRED cat which PAST copy always OBL rabbit
‘Which cat always copied the rabbit?’

c. Intransitive verb (ABS)
Ko e pusi fē ne poi tumau ke he lapiti?
PRED cat which PAST run always OBL rabbit
‘Which cat always ran to the rabbit?’
Such changes in main verbs are inevitable in ergative languages, as the case frame and the verb type cannot be teased apart: changes in one of them will necessitate changes in the other. These limitations leave us with the possibility of testing the case-based hypothesis by turning to a special construction found in some nominative languages such as Korean, known as a Double Nominative Construction, and using the same lexical verb root across conditions. We discuss these kinds of DNCs next.

2.2. Double Nominative Constructions in Korean. In Korean, a nominative-accusative language with SOV word order, the subject is typically marked with a nominative case regardless of the transitivity of the verb (6a-b), and the object of a transitive verb is marked accusative (6b). However, Korean also has DNC constructions ((6c), where the nominative case marker (e.g., -i / ka in Korean) is realized on more than one nominal – usually two consecutive nominals in a single clause (Yoon 2015) – often both the subject and object.

(6) Korean
   a. Mary-ka tali-ess-ta. [intransitive]
      Mary-NOM run-PAST-DECL
      ‘Mary ran’
   b. Mary-ka Lee-lul mwusewe-*hay)-ss-ta. [transitive: NOM-ACC]
      Mary-NOM Lee-ACC be.afraid-do-PAST-DECL
      ‘Mary was afraid of Lee.’
   c. Mary-ka Lee-ka mwusewe-(ci)-ess-ta. [transitive: NOM-NOM]
      Mary-NOM Lee-NOM be.afraid-become-PAST-DECL
      ‘Mary was afraid of Lee.’

Specifically, one type of DNCs called “nominative object constructions” requires two NPs, both of which are selected by the psych-predicates. In these nominative object DNCs, case alternation on the subject is possible: the subject can be followed by either a nominative marker (7a), a dative marker, or two case markers stacked (7b).

(7) Nominative object construction
   a. Mary-ka Lee-ka mwusewe(-ci)-ess-ta.
      Mary-NOM Lee-NOM be.afraid-become-PAST-DECL
      ‘Mary was afraid of Lee.’
   b. Mary-hanthey(-ka) Lee-ka mwusewe(-ci)-ess-ta.
      Mary-DAT(-NOM) Lee-NOM be.afraid-become-PAST-DECL
      ‘Mary was afraid of Lee.’

A nominative object, unlike a nominative subject, does not show any properties of subjecthood (aside from the fact that it is marked with nominative case) as evident from subject honorification and anaphor binding (e.g., Shibatani 1977; Y.-K. Kim 1995; J.-B. Kim 2000). First, in Korean, there is an honorific verbal affix –si that expresses the speaker’s respect toward the referent of the subject. In nominative object DNCs, only NP1 can trigger this honorific agreement (8a), but NP2 cannot (8b).

(8) Subject honorification (J.-B. Kim 2000:166)
      Teacher-HON-NOM John-NOM fearsome-HON-DECL
      ‘The teacher fears John.’
      John-NOM teacher-HON-NOM fearsome-HON-DECL
      ‘John fears the teacher.’
Second, the anaphor *caki* can take a subject NP1 as its antecedent, but not NP2 (9a) (C. Kim 2005; Park 2011). The pattern is the same in non-DNCs (9b) where only the subject can bind the anaphor.

(9) **Anaphor (modified from Kim 2000:166)**

a. Tom1-i Mary2-ka caki1/*2 pan-eyse ceyil mwuswe(-ci)-ta.
   Tom-NOM Mary-NOM self class-LOC most fearsome-become-DECL
   ‘Tom fears Mary the most in his/*her classroom.’

b. Tom1-i Mary2-lul caki1/*2 pan-eyse ceyil mwusewe-*(ha)-ta.
   Tom-NOM Mary-ACC self class-LOC most fearsome-do-DECL
   ‘Tom fears Mary the most in his/*her classroom.’

These nominative object DNCs are comparable to non-DNC minimal pairs (i.e., canonical transitive sentences with two structural cases; NOM-ACC) in that they share some syntactic properties of the second NP not being a subject, but an object. The distinction between the subject and object in these DNCs is relevant to the debate on what underlies subject-object processing asymmetries in relative clauses. Henceforth, any DNCs used in this study are “nominative object” DNCs only. Furthermore, because both subject and object are nominatives, we can expect that the effect of case can be teased apart from any genuine effect of subjecthood in DNCs. The type of light verb varies across case alignment manipulation (e.g., obligatory -ha- in non-DNCs vs. optional -ci- in DNCs), but they are in complementary distribution (Lim 1997; D. Jung 2002). More crucially, the same lexical psych predicates can be maintained in Korean unlike ergative languages, which makes DNCs (NOM-NOM) eligible for being compared with canonical transitive non-DNCs (NOM-ACC).1

2.3. **Research Question and Predictions.** Our goals of this study are to further investigate (i) what the source of subject advantage is, and (ii) how the effect of case marking interacts with subject advantage in DNCs. More specifically, we explore how two possible factors, grammatical function and/or case marking, interact with processing DNCs in long-distance dependency formation (as in e.g., relative clauses).

If the subject advantage is primarily *structurally-driven*; that is, it is derived by the grammatical status or syntactic superiority of the subject, there should be no difference between DNCs and non-DNCs regarding subject-object asymmetry: both should yield a subject advantage as the subject is always more accessible; thus, we should find a subject advantage across-the-board. If the subject advantage is *morphologically-driven*, however, with a preference for dependencies of NPs with unmarked case, the subject-object asymmetry in DNCs would be

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1 In formal syntax, double case configurations have posed a challenge for traditional case theories such as the Agree model or the Dependent case model, because two NPs in a single clausal configuration appear with the same morphological case, rather than distinct cases. This often requires some additional assumptions such as Multiple Agree (Hiraiwa 2001, 2005) or Cyclic dependent case assignment (Levin 2017) to explain double case configurations. The need for any special case assignment mechanism led us to the hypothesis that case assignment affects the acceptability of DNCs. Some studies on ergative languages have found that syntactic ergativity – the ban on extracting transitive ergative subjects in a subset of ergative languages – results from locality properties of absolutive case assignment (Coon, Pedro, & Preminger 2014; Ershova 2022). Since it has not been extended to nominative languages such as Korean, our study can provide evidence of how case assignment will affect the dependencies across languages.
smaller or non-existent: The gap in ORCs of DNCs (i.e., with a nominative object) should be easier to process compared to the equivalent gap in non-DNCs (i.e., with an accusative object).

3. Experiment: DNCs in filler-gap dependencies. This experiment examines the source of subject advantage in filler-gap dependencies by comparing the processing of Korean DNCs and canonical NOM-ACC RC sentences. Two factors, syntactic structure (RC type: SRC, ORC) and case alignment (Case: NOM-ACC, NOM-NOM), were manipulated in a 2x2 factorial design. Following Kwon et al. (2006), we take difficulty in processing filler-gap dependencies to be reflected in reading time at the head noun position (Table 1, W3), and possibly also at the following word (W4) due to any spillover effect, as well as accuracy rates to subsequent comprehension questions about the content of the relative clause.

3.1. Participants. Forty-eight native speakers of Korean (ages 18 - 40) were recruited from university communities based in Seoul, Korea. They have normal or corrected to normal vision and were naïve to the purposes of the study. They have traveled and/or lived abroad less than a year before the age of 16, and primarily schooled in Korea. Two participants were excluded from the analysis because their average accuracy in comprehension questions was lower than 75%.

3.2. Materials and Procedure. Filler-gap dependencies in Korean DNCs were examined by comparing them to those in canonical (i.e., NOM-ACC) RC sentences. Subject RCs normally contrast with object RCs in terms of case marking of noun phrases in RCs. In canonical NOM-ACC alignment, there is a clear distinction between SRCs (Table 1, a) and ORCs (Table 1, c) in terms of case marking: The former contains a subject gap and ACC-marked overt NP whereas the latter contains an object gap and NOM-marked overt NP. On the other hand, filler-gap dependencies in DNCs can give rise to global syntactic ambiguity between an SRC interpretation (Table 1, b) and an ORC interpretation (Table 1, d) because both have a single NOM-marked overt NP within a relative clause. To disambiguate these types of relative clause, subject honorification was used: In ORCs (Table 1, c-d), with non-displaced honorific subjects, the embedded verb is suffixed by the subject honorific suffix, following N. Kim, Moulton, & Heller (2021). In addition, a minimal pair of light verbs (‘do’: NOM-ACC / become’: NOM-NOM) was added to disambiguate the case alignment even when one of the NPs is displaced while keeping the same psych-verb across conditions.

<table>
<thead>
<tr>
<th>Word 1 [SUBJ/OBJ-VERB-2]</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>a/b. SRC &amp; [NOM-ACC/NOM-NOM]</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>감독님(을/이)</td>
<td>(좋아한/좋아진)</td>
<td>배우는</td>
<td>출연을</td>
<td>결정했다.</td>
</tr>
<tr>
<td>DirectorHON-[ACC/NOM] like-{do/become}-ADN</td>
<td>actor-TOP</td>
<td>starring-ACC</td>
<td>decided</td>
<td></td>
</tr>
<tr>
<td>‘The actor who likes the directorHON decided to star (in the movie).’</td>
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</tr>
<tr>
<td>c/d. ORC &amp; [NOM-ACC/NOM-NOM]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>감독님께서</td>
<td>(좋아하신/좋아하신)</td>
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<td></td>
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</table>

Table 1. A sample 2x2 item set

The sentences with RCs consisted of a prenominal RC with the following head noun (subject of the main verb), an object, and the main verb. There were 16 critical items in total. Using a Latin-square design, each subject was assigned to one of the four lists. We also used 32
fillers: half of the fillers were intransitive sentences, and the other half were sentences that involve the noun phrase selecting a clausal complement (e.g., *The fact that someone liked the director was famous at work.*; we will discuss this type of filler in detail in Section 3.5). There were an equal number of NOM-ACC and NOM-NOM constructions in the clausal complement fillers. To ensure that participants paid attention to the content of the RC, each sentence was followed by a comprehension question. The correct answer was always “True” for all critical items and intransitive fillers, and “False” for clausal complement fillers. Each subject saw 48 items (16 critical, 32 fillers) once each, presented in a pseudo-randomized order (where critical items did not appear more than twice in a row; adjacent critical items were of different conditions).

The experiment was run by the online software PCIbex (Zehr & Schwarz 2018). Participants were asked to read the context and the following sentence and answer the True/False question. On each trial, the sentence was presented word-by-word using a non-cumulative moving window display. The reading times for each word were measured. After the final word of each sentence, participants were asked to answer the comprehension question with either True or False. The experiment began with three practice trials.

### 3.3. Results

Forty-six participants were included in the analysis as their average accuracy in comprehension questions was equal to or above 75%. Of 736 critical trials, 2 trials with incorrect responses were excluded. Outliers were replaced with the average reading time for each condition if the measure was (i) longer than 10 seconds, and/or (ii) above 2SD for each condition, which affected about 2% of the data.

The mean reading times for each word are shown in Figure 1. A mixed-effects linear regression model with crossed random effects for participants and items (Baayen, Davidson, & Bates 2008) was fit to the data, using the lme4 package in R 4.0.3 (Bates, Mächler, Bolker, & Walker 2015). We used parsimonious models: Following Bates et al. (2015), we first fitted the model with the maximal random effect structure, as justified by the design, that would allow for convergence. We then simplified this by removing slopes for random effects that did not significantly improve the fit of the model.

![Figure 1. Mean reading times per word position (with 95% CI error bars)](image)

At Word 3 region (e.g., *actor-*TOP), which is the critical region, it is found that ORCs were slower than SRCs ($\beta = 104.24, SE = 38.27, t = 2.724, p = .007$), NOM-NOM was slower than NOM-ACC ($\beta = 176.28, SE = 38.28, t = 4.605, p < .001$), and there was a significant interaction ($\beta$
Thus, we ran a second model with nested fixed effects, asking about the effects of case at each level of RC type: This revealed that the main effect of case was driven primarily by ORCs, where the effect of case was significant ($\beta = 255.13, \text{SE} = 54.21, t = 4.707, p < .0001$). The effect of case was only marginal in SRCs ($t = 1.803, p = .072$). At Word 4 region, there was again, a main effect of RC type and Case: ORCs were slower than SRCs ($\beta = 69.037, \text{SE} = 15.211, t = 4.539, p < .0001$), NOM-NOM slower than NOM-ACC ($\beta = 40.411, \text{SE} = 15.218, t = 2.655, p = .008$), but there was no significant interaction ($\beta = 4.084, \text{SE} = 30.420, t = 0.134, p = .893$).

3.4. INTERIM DISCUSSION. Our results showed that SRCs were easier to process than ORCs, consistent with the subject advantage found in previous studies (e.g., Kwon et al. 2006). These results thus provide evidence for syntactic superiority hypothesis that subject-object asymmetry can, in general, be attributed to grammatical function (e.g., Keenan & Comrie 1977). Furthermore, however, we found a main effect of morphological case: NOM-ACC was easier than NOM-NOM, affirming the relevance of this factor. This effect of case, however, was not in the direction predicted by case markedness hypothesis (where NOM-NOM would be predicted as being easier than NOM-ACC). Interestingly, there was also an interaction of RC type and morphological case, revealing ORCs in NOM-NOM to be more difficult than those in NOM-ACC, in particular. We reason that this difficulty in NOM-NOM conditions might be related to the issue of extraction out of DNCs, as, in formal syntactic literature NOM-NOM constructions require some further accounts in addition to traditional case assignments (e.g., Hiraiwa 2001, 2005; Levin 2017), which might point towards the need for some additional processing mechanism, and/or lead to reduced acceptability.

However, since DNCs in Korean have widely been reported as grammatical constructions in the literature (e.g., Lee 2003; Yoon 2015), there is no a priori reason to assume that judgments on DNCs ought to be degraded in any way. To provide an indication of whether the processing cost in NOM-NOM constructions is particular to long-distance dependency/extraction configurations, we further examined if there is any possibility that this penalty of DNCs (and subject advantage) is limited to dependency formation by analyzing a subset of the filler items which did not involve extraction.

3.5. FILLER ANALYSIS: DNCs IN NON-DEPENDENCIES. Let us first look at the structure of relative clauses in Korean. These are pre-nominal, and have no overt complementizer, however, the predicate of a relative clause is suffixed by the adnominal marker -(nu)n.

(10) Relative clause (cf. Kwon et al. 2006:3)

\[\text{Hyengsa-ka} \quad \text{i} \quad \text{hyeppakha-n} \quad \text{kica:i} \]

Detective-NOM the threaten-ADN reporter

‘The reporter whom the detective threatens’

This adnominal marker alone, however, does not distinguish relative clauses from clausal complements of nouns. As Kwon et al. (2006:3) noted, the predicate of complement clauses modifying nouns is also marked by the same marker.

(11) Clausal complement of a noun

\[\text{[Hyeongsa-ka} \quad \text{hyeppakha-n] sasil} \]

Detective-NOM threaten-ADN fact

‘The fact that the detective threatens someone’
Although the gap inside the relative clause and the head noun ‘reporter’ corresponds to dependency in (10), there is no such dependency in (11); instead, the relevant silent element is a null pronoun instead of a gap. As these two different constructions look alike on the surface, it is the semantics of the head noun alone which disambiguates relative clauses and complement clauses of the noun. If the head noun was compatible with the predicate within the embedded clause, the preceding clause would be considered as a headed relative clause; if it was not (and it is often a factual noun), then the preceding one would be a clausal complement.

One type of filler used in our experiment includes these clausal complement sentences (e.g., The fact that someone liked the director was famous at work.). Korean clausal complement clauses look like relative clauses on the surface, but importantly, they do not involve filler-gap dependencies. To counterbalance the length and format of the items, the filler items also had similar factorial manipulations to the critical experimental items discussed above: the location of pro (Subject pro, Object pro) and (like the critical items) case alignment (NOM-ACC, NOM-NOM), as displayed in Table 2. Furthermore, the same set of psych predicates used in the critical items was also used in fillers (this prevented participants from identifying critical items by virtue of them having certain types of predicates).

<table>
<thead>
<tr>
<th>a/b. Subject pro &amp; {NOM-ACC/NOM-NOM}</th>
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<tbody>
<tr>
<td>이사님(을/이)</td>
</tr>
<tr>
<td>Board.director</td>
</tr>
<tr>
<td>‘The surprising fact that someone liked the board director was famous at work.’</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>c.d. Object pro &amp; {NOM-ACC/NOM-NOM}</th>
</tr>
</thead>
<tbody>
<tr>
<td>이사님께서</td>
</tr>
<tr>
<td>Board.director</td>
</tr>
<tr>
<td>‘The surprising fact that the board director liked someone was famous at work.’</td>
</tr>
</tbody>
</table>

Table 2. A sample filler item set

If the processing difficulty was due to the factors relating to how double case constructions respond to the presence of a null element, we would expect a slowdown in clausal complement (CC) structures at the same region (Table 2, W4) that corresponds to the critical region (Table 1 above, W3). If the penalty was specifically due to the presence of a long-distance dependency, however, there should be no such penalty in CCs because, instead of having a gap as in relative clauses, a null pronoun pro was assumed to occur within CCs without forming any dependencies.

The results from filler analysis showed that at Word 4 region, there was no significant difference in the reading time between subject pro sentences and object pro sentences ($p = .990$) nor between NOM-NOM and NOM-ACC ($p = .129$), and no significant interaction ($p = .509$). There were no other effect at Word 3 (all ps > .12) and Word 5 (all ps > .14). This confirms the earlier processing difficulty of DNC constructions as being particular to dependency formation/extraction (specifically, of a nominative object).

4. General discussion. To summarize the results, we found an overall subject advantage (consistent with Kwon et al. 2006). This leads to the idea that subject-object asymmetry is, at least in part, an effect of grammatical function (Keenan & Comrie 1977). Interestingly moreover,
there was also a DNC penalty, wherein NOM-NOM configurations were costly compared with NOM-ACC ones. This processing difficulty was found in dependencies (RCs), but there was no evidence of the same penalty with non-dependencies (CCs). Finally, the processing penalty of NOM-NOM was reduced in SRCs as compared with in ORCs.

We hypothesize that the effect of case frame is due to the nature of the object in NOM-NOM constructions as compared with in NOM-ACC constructions. In generative syntactic literature, it has been argued that the NOM subject and NOM object in NOM-NOM are both assigned case by T(ense), whereas the NOM subject and ACC object in NOM-ACC are assigned case by two different heads – T and v, respectively (Koizumi 1995; Takahashi 2010). This non-distinctness in the source of case assignment between the subject and object could incur a greater processing difficulty: Processing dependency configurations involves encoding of an NP and then storing it in working memory, and this process is, in part, dependent on how distinct the NP is from other NPs in the same configuration (Schlesewsky & Bornkessel 2004; Bornkessel-Schlesewsky & Schlesewsky 2009a, 2009b). In this sense, our results point out one of the two NOM-marked NPs in NOM-NOM, being insufficiently distinct from the other.

However, we also found that the difficulty of NOM-NOM was somewhat alleviated in SRCs. We reason that this is driven by the fact that the DNC actually allows case alternation on the subject (as discussed above in Section 2.2): Recall that the nominative marker on the subject can alternate with a dative marker or a topic marker, as in (12).

(12) Case alternation on subject (modified from Park & Kim 2022:1488)
Nay-{ka/eykey/nun} kangaci-ka coh-ta.
I-{NOM/DAT/TOP} puppy-NOM like-DECL
‘I like puppies./As for myself, I like puppies.’

Thus, when the subject is extracted in an SRC, having a gap in the subject position allows people to interpret the subject as having either a dative marker or a topic marker (or a NOM marker), because the surface string is consistent with all three of these options. Previously, Jung (2014) noted that in a production task eliciting sentences with different types of psych verbs, the topic marker was often used to replace structural case markers (e.g., NOM). Since it is a gap, the (underlying) case marker that people assume might not be clear in dependency formation. Still, we can see the differences between SRCs and ORCs: in SRC, it is ambiguous whether it is an actual NOM-NOM or NOM object construction with a case-alternating subject, whereas, in ORCs, it is unambiguously NOM-NOM with an overt NOM subject, and the aforementioned distinctiveness penalty applies.

To summarize, our results suggest that NOM-NOM is more difficult to process than NOM-ACC in dependency configuration. This processing difficulty further interacts with what kind of relative clause dependencies is involved (SRC vs. ORC). Taken together, we argue that the penalty for DNCs results from morphosyntactically-driven distinctiveness (Schlesewsky & Bornkessel 2004; Bornkessel-Schlesewsky & Schlesewsky 2009a, 2009b), which impacts NOM-NOM (and ORCs, specifically).

5. Conclusion. In this study, we have investigated how the processing of relative clauses is influenced by both grammatical function and case marking by looking at Korean, a language with both NOM-ACC and NOM-NOM case frames. Like Kwon et al. (2006), we found a subject-object asymmetry in long-distance dependencies in Korean. However, by further teasing apart the possible factors of subject-object asymmetry in accusative languages, we showed that processing difficulty in dependency indeed interacts with the morphological case. This paper
provides evidence that processing in dependency formation with nominative objects is particularly difficult, which we hypothesize to result from a lack of (non-ambiguous) case-distinctness of the subject and object in these types of constructions.

References


