Obligatory Control and Coordinated Deletion as Korean Subject Diagnostics: An Experimental Approach

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Ji-Hye Kim, Yong-hun Lee, and Eunah Kim. 2015. Obligatory Control and Coordinated Deletion as Korean Subject Diagnostics. *Language and Information 19.1*, 75–101. This study investigated the distribution of subject properties in Korean. Based on the previous studies on so-called 'subjecthood diagnostics' in Korean Multiple Subject Constructions (MSCs), the current study investigates how different subject properties are distributed in single subject constructions (Non-MSCs) and MSCs. Focusing on two distinct subject properties – obligatory control (OC) of PRO and coordinated deletion (CD) – an empirical syntactic experiment was designed to test how these two subjecthood diagnostics behave in the Non-MSC and MSC environments. Seventy Korean native speakers were tested over magnitude estimation task, composed of 80 Korean sentences representing different subject properties in single or multiple subject constructions. Overall results showed (i) both OC and CD can be used as subjecthood diagnostic tests in the Non-MSC environments, but (ii) that only OC can be used as a subjecthood diagnostic test in the MSC environments. (**Soongsil University, Chungnam National University, and Seoul National University**)

Key words: Subject, Multiple Subject Construction, subjecthood diagnostics,

magnitude estimation, obligatory control, coordinated deletion

1. Introduction

What makes a subject (as a Grammatical Relation (GR)) in a sentence has been one of the controversial linguistic topics, not to mention of Korean syntax, in the past several decades. In Korean, where NPs occur with Case markers, the noun that bears the Nominative Case typically serves as Grammatical Subject. For example, in (1a) and (1b), the NP *Cheli*, which has the Nominative Case marker '-ka', is the Grammatical Subject, regardless of its linear position in the sentence. However, things become more complicated when it comes to a different type of sentence construction, in which more than one Nominative Casemarker occur with different NPs in a sentence as in (1c) and (1d).

(1) a. Cheli-**ka**   Yenghi-lul   ttayli-ess-ta
        Cheli-NOM Yenghi-ACC hit-PAST-DEC
        'Cheli hit Yenghi.'

     b. Yenghi-lul   Cheli-**ka**   ttayli-ess-ta
        Yenghi-ACC Cheli-NOM hit-PAST-DEC
        'Cheli hit Yenghi.'

     c. Cheli-**ka**   apeci-**ka**   pwuca-i-ta
        Cheli-NOM father-NOM rich-COPULA-DEC
        'It is Cheli whose father is rich.'

     d. Cheli-**ka**   apeci-**ka**   hoysa-**ka**   pwuca-i-ta
        Cheli-NOM father-NOM company-NOM rich-COPULA-DEC
        'It is Cheli whose father's company is rich.'

This type of sentences is called Double Nominative Constructions/Multiple Nominative Constructions (DNCs/MNCs) or Double Subject Constructions/Multiple Subject Constructions (DSCs/MSCs), since more than one Nominative markers (or subjects) occur in one sentence. The name DNCs/MNCs were assigned by the approach assuming a unique subject in a sentence, which claims that the outer nominatives in the construction are not subject (Yoon 1986, Yoon 1989, Hong 1991, Park 1995, Schütze 2001, etc.). This approach analyzes the outer NPs in such constructions as topic or focus that can be assigned outside the domain of syntax (i.e., semantically or in discourse, etc.). Another approach takes the similar position, claiming that there can be multiple subjects in such construction created by different syntactic procedures (e.g., derivation) (C. Youn 1990, Cho 2000, etc.). This approach took the first NP in MSCs to be possessor of the second NP and introduced what is called 'Possessor Ascension' analysis, showing the status of possessor (i.e., first NP) as 'derived subject' in multiple layers of derivation within the framework of Relational Grammar. However, this approach still claims that the subject is unique in a sentence in each procedure, taking a similar position

as the former[1]. The third approach, which is taken to be the main assumption in the current study, names the construction DSCs/MSCs, assuming that all the NPs bearing Nominative Case marker '-ka' are subjects (in different ways) in such sentences (Park 1973, Teng 1974, Lee 1997, Heycok 1993, Kang 2002, Yoon 2004, 2007, 2009, etc.). This approach opens up a way to have multiple subjects in one sentence, which serves the basis of the current study.

The goal of this paper is to investigate how the subjecthood diagnostic tests behave in the Non-MSC and MSC environments. Though there are several sub-jecthood diagnostic tests which have been proposed in Korean syntax, we chose two of them: Obligatory Control (OC) and Coordinated Deletion (CD). In order to examine how these two diagnostics influence the acceptability of sentences in the Non-MSC and MSC environments, we took an experimental approach. We per-formed two experiments (acceptability judgment tasks), where 70 Korean native speakers participated. Magnitude estimation was used to measure the acceptability of the native speakers. After the experiments, we extracted the values for target sentences and analyzed them using R. Through the experiments, we found that OC and CD behave differently in the Non-MSC and MSC environments.

The organization of the paper is as follows. In Section 2, theoretical background is provided with previous studies on subjecthood diagnostic tests. Section 3 will be dedicated to the explanation of methodology of the current experimental design: research materials and method. In Section 4, statistical analysis of the data using a (generalized) linear model will be presented. Section 5 is for discussion and tentative conclusion for the study.

2. Previous Studies

2.1 Subjecthood Tests in Korean
To test the validity of the above claims, it is inevitable to mention what is called 'Subject Diagnostics' in Korean. A representative list of properties proposed at one time or another, which diagnoses subjecthood in Korean, is provided in (2) below.

(2) Proposed Subject Diagnostics in Korean (Yoon 1986, Hong 1991, Youn 1990, etc.)

a. Nominative case-marking

b. Controller of optional plural-marking

c. Controller of subject honorification

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[1] There are also other approaches such as explaining multiple case constructions in terms of discourse structure (Hong 2014). Ryu (2013) takes the non-argument approach of first NP in MSCs by considering the first NP in MSCs adjunct of the second NP. However, though Ryu (2013)'s approach may explain the type of MSCs where the two NPs have less relations (cf. 3c, d), it cannot explain the other type of MSCs where the two NPs have inherent possessive relations to each other (cf. 3a, b). It also cannot explain the general observation of other approaches that take the first NP to have sentential predicate as indicated in the previous studies (Teng 1974; Park 1973, 1982; Lee 1987; Heycok & Lee 1989; Heycok 1993; Chae & Kim 2008).

    d. Target of Subject-to-Object raising

    e. Target of Control

    f. Controller of PRO in complement (obligatory) control

    g. Controller of PRO in adjunct control

    h. Controller of coordinated deletion

    i. Antecedent of (subject-oriented) anaphors

    j. Exhaustive-listing interpretation of ' − ka/-i'

Many previous studies tried to use the above diagnostics in MSCs, since MSCs constitute a testing ground for the adequacy of these diagnostics. If MSCs have a unique subject, the set of subject properties will be applied to only one NP in MSCs consistently. However, if MSCs have (derivationally or at a single level of representation) multiple subjects, subject properties will be distributed across distinct NPs.

Under the assumption of a unique subject in MSCs, Yoon (1986) evaluated some of the diagnostics as identifying subjects in Korean and concluded that only three of the suggested diagnostics are reliable: i) Subject honorification, ii) Equi controller in obligatory control, iii) Controller of coordinated deletion. On the other hand, reflexive binding, Subject-to-Object raising (SOR), and exhaustive listing interpretation were claimed to be not valid subject diagnostics. Later, K-S Hong (1991) reduced the list to Subject honorification and equi controller in obligatory control, claiming that non-subjects can also control coordinated deletion. Hong (1991) further proposed that there were distinct subject-like notions which were responsible for some of the other claimed subject diagnostics.

By contrast, Yoon (1990) considered a larger set of subject properties by relying on the notion of derivational subjecthood, within the framework of Relational Grammar. In Yoon (1990), some of the subject properties rejected by Yoon (1986) and Hong (1991) are considered to be still subject properties, since different properties can be captured by derivationally different subjects in multiple layers in this approach.

The approach assuming a unique subject analysis claims that the outer nominative NPs in MNCs/MSCs are topic or focus, or something other than subjects. However, Yoon (2004, 2007, 2009) refuted such claim by providing some examples of MNCs/MSCs that cannot be explained by topic or focus analysis. The following sentences show such examples. In (3a), the outer nominative NP *Cheli* can be interpreted as focus, compared to (3b) where Cheli is interpreted as topic in a topic construction. On the other hand, (3c) shows a different case with the same construction, where the outer nominative NP pihayngki 'airplane' is better interpreted as topic, rather than focus. The interpretation of (3c) is more similar to the meaning of sentence in a topic construction (cf. 3d); the focus interpretation for (3c), which is 'It is airplanes that the 747 is the biggest' is pragmatically odd.[2]

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[2] As for another approach taking the first NP to be non-subject (Youn 1990, Cho 2000), it can be applied in the type of MSCs shown in (3a, b), but cannot explain the other type of MSCs

(3) a. Cheli-**ka**   apeci-ka   onul hakkyo-ey osiessta
        Cheli-NOM father-NOM today school-LOC came
        'It is Cheli whose father came to school today.'

     b. Cheli-**nun** apeci-ka   onul hakkyo-ey osiessta
        Cheli-TOP father-NOM today school-LOC came
        'Speaking of/as for Cheli, his father came to school today.'

     c. Pihayngki-**ka** 747-i   ceyil khuta
        Airplane-NOM 747-NOM most be.big-DEC
        'As for airplanes, the 747 is the biggest/≠?It is airplanes that the 747
        is the biggest.'

     d. Pihayngki-**nun** 747-i   ceyil khuta
        Airplane-TOP 747-NOM most be.big-DEC
        'As for airplanes, the 747 is the biggest.'

As shown from the above examples, it is difficult to say that the outer nomina-
tive NP in MSCs is always topic, since there is an apparent difference in meaning
between the MSC in (3a) and the Topic construction in (3b). In addition, the sen-
tences in (4) shows that MSCs cannot be interpreted as Topic construction, since
replacing the nominative marker '-ka' in (4a) with the Topic marker '-nun' as
shown in (4b) results in ungrammaticality.

(4) a. I   hakkyo-ka   enehakkwa-ka   cohta-nun somwun-un
        This school-NOM linguistics.dept-NOM good-REL romor-TOP
        kecis-i-ta
        false-COPULA-DEC
        'The rumor that the linguistic department in this school is excellent is
        false.'

     b. *? I hakkyo-nun enehakkwa-ka   cohta-nun somwun-un
        This school-TOP linguistics.dept-NOM good-REL romor-TOP
        kecis-i-ta
        false-COPULA-DEC
        'The rumor that the linguistic department in this school is excellent is
        false.'

Based on the observations including the examples above[3], Yoon (2004, 2007,
2009) claimed that the rightmost NP that takes VP as predicate in MSCs are
Grammatical Subject (GS), whereas the outer NP in MSCs isa different type of
subject, taking the whole embedded clause as its predicate (Teng 1974; Park 1973,
1982; Lee 1987; Heycock and Lee 1989; Heycock 1993; Chae and Kim 2008). Yoon

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shown in (3c, d).

[3] Yoon (2009) provided further reasons why MSC should not be treated as a derived NP (such
as topic or focus) by mentioning of idiomatic expressions and subjacency violation. For more
detailed discussion, see Yoon (2009).

(2004, 2007, 2009) claims that the outer NP in MSCs - Major Subject (MS) - is licensed semantically and pragmatically, aside from having its status in syntax (Kuroda 1986, Heycock and Doron 2003). The term Major Subject has also been introduced to denote the first NP in MSCs in various previous studies in Korean (Choi 1937; Park 1973, 2001; Yoon 2003). These studies used terms such as Minor Subject, subject or Grammatical Subject to designate the second NP in MSCs (Choi 1937, Heycock and Doron 2003, Kuroda 1986, Park 1973, 2001, Yoon 2003). This type of analysis can be found in many previous studies providing the split subject analysis, which explain the distribution of different subject properties by decomposing subjecthood into more elementary notions—typically, the pivot and the most prominent (core) argument (Dixon 1994, Falk 2006). This explains the case of single subject constructions in Korean by considering the subject NP to be both pivot and the most prominent argument. However, in MSCs, the two notions are split: The highest subject (MS) is regarded as pivot, whereas the lowest subject (GS) as the prominent-argument. The MS in an MSC can only be a pivot since it is never selected as a direct argument of predicates. Therefore, the properties controlled by the MS are those of the pivot, while those controlled by the GS are those of subject-as-prominent-argument.

Yoon (2004, 2007, 2009) argued most of the claimed subject properties are indeed subject properties, distributed in different types of subjects – Major Subject (MS) and Grammatical Subject (GS) in one sentence. In a single subject construction, the subject represents the properties of both MS and GS. However, in MSC, subject properties can be distributed over different subjects (MS and GS), as shown below in (5) and (6).

(5) Diagnostics for Grammatical Subjects (GS):

    a. Controller of subject honorification

    b. Controller of optional plural-marking

    c. Controller of PRO in complement (obligatory) control

    d. Antecedent of (subject-oriented) anaphors

(6) Diagnostics for Major Subjects (MS):

    e. Target of Subject-to-Object raising

    f. Nominative case-marking

    g. Controller of PRO in adjunct control

    h. Controller of coordinated deletion

The present study investigates i) whether some of the listed subject diagnostics are valid in picking out subjects over non-subjects in a single subject construction, and ii) how the selected subject diagnostics behave in the case of MSCs, focusing on smaller set of diagnostics out of the comprehensive list given earlier. One of the

selected diagnostics for testing in the current study is Obligatory Control (OC), which is considered to be a valid subject diagnostic in most of the studies in Korean literature. This is regarded as a diagnostic for Grammatical Subject (GS) in Yoon (2004, 2007, 2009). The other diagnostic to be tested in this study is Coordinated Deletion (CD), the one that is considered a diagnostic for Major Subject (MS) rather than GS in Yoon (2009).

2.2 Obligatory Control as a Subjecthood Diagnostic Test

Yoon (2009) claimed that Obligatory Control (OC) is a valid diagnostic of Grammatical Subjects (GS). Major Subjects (MS) cannot serve as the controller in the processes of Obligatory Control, as is shown in (7) below. The sentence in (7a), which represents single subject construction (Non-MSC), makes sense only when the subject 'Cheli's brother' is interpreted as the controller of PRO in the embedded clause; the non-subject possessor 'Cheli' cannot be the controller of the PRO. In MSC shown in (7b), PRO should be controlled by Cheli's brother (GS) rather than Cheli (MS).

(7) a. Cheli$_i$-uy tongsayng$_j$ -i [PRO$_{*i/j}$ yuhak-ul ka-ko]   siphehanta
         C-GEN   brother-NOM study.abroad-ACC go-COMP wants
         'Cheli's brother wants to study abroad.'

     b. Cheli$_i$-ka(MS) tongsayng$_j$ –i(GS) [PRO$_{*i/j}$ yuhak-ul ka-ko]
         C-NOM   brother-NOM   study.abroad-ACC go-COMP
         siphehanta
         wants
         'Cheli's brother wants to study abroad.'

This can entail the question as to why the subject properties are distributed as they are in MSCs. As mentioned earlier, many approaches claiming the split subject diagnostics explain this by decomposing subjecthood into the pivot and the most prominent (core) argument (Dixon 1994, Falk 2006). In MSC, MS is usually considered a pivot (i.e., *Cheli* in (7b)), whereas GS is the subject-as-prominent-argument of the predicate (i.e., brother in (7b)). For this reason, we can expect Obligatory Control to be a diagnostic more appropriate for selecting GS over MS in its property. According to Falk (2006), Grammatical Subject (GS) is the subject as prominent-argument; therefore, it can control properties sensitive to prominent argument status. Complement subject control in many approaches is based on argument structure (Pollard and Sag 1994), which can explains why only the GS, not MS figures as a controller in obligatory control in MSCs.

2.3 Coordinated Deletion as a Subjecthood Diagnostic Test

On the other hand, Coordinated Deletion (CD) seems to be the opposite case, as claimed in Yoon (2009). In case of single subject construction (i.e., Non-MSC) as shown in (8a), the deleted NP of the second coordinated conjunct (i.e., *Yenghi-lulsilhehanta* 'hates Yenghi') is construed as the subject (i.e., Cheli), which is the pivot as well as the subject-as-prominent-argument. On the other hand, (8b) shows

that Sentential Predicate (SP) of MSCs can be coordinated with VPs. The deleted subject in the second conjunct in (8b) is naturally interpreted as the higher subject (MS) 'Cheli' and cannot be interpreted as 'Cheli's head', which is GS. Likewise, the Major Subject (MS) 'Boston' in (8c) is interpreted as the deleted subject of the second conjunct (i.e., very beautiful); however, attempting to interpret the deleted subject as GS (i.e., tourists) results in weird interpretation.

(8) a. [Cheli$_i$–ka Dongswu$_j$-lul cohaha-ko], [e$_{i/*j}$ Yenghi-lul   acwu
        Cheli-NOM Dongswu-ACC like-CONJ   Yenghi-ACC   very
        silhehan-ta]
        hate-DEC
        'Cheli likes Dongswu and hates Yenghi.'

     b. Cheli$_i$ -ka [[meli$_j$–ka   coh-ko] [e$_{i/*j}$ acwu sengsilha-ta]]
        C-NOM   head-NOM good-CONJ   very sincere-DEC
        'Cheli is smart and sincere.'

     c. Boston$_i$ –i [[kwankwangkayk$_j$ –i manhi chac-ko][e$_{i/*j}$ acwu
        B-NOM   tourists-NOM   a.lot visit-CONJ   very
        alumtap-ta]]
        beautiful-DEC
        'Boston is city that tourists often visit and is very beautiful.'

Falk (2006:16) mentioned 'shared argument in coordinate clauses' as a cross-linguistic diagnostic that is sensitive to subject-as-pivot status. From this view, the examples in (8) can be interpreted not as the constituent coordination of VP under a shared subject, but as the coordination of clauses where the null subject pivot of the second clause is controlled by MS pivot of the first clause. Though many researchers attempted to verify which diagnostics are valid subject diagnostics, they have not been tested empirically, to the best of our knowledge. That is, empirical evidence obtained through experimental studies are needed. Therefore, the current experimental study was designed to test the knowledge of Korean native speakers on their interpretation of subjecthood in both single subject construction (i.e., non-MSC) and MSCs, focusing on the two diagnostics: Obligatory Control (OC) and Coordinated Deletion (CD).

3. Research Methods and Procedures

3.1 Research Question and Hypotheses
The research questions of the current study are the following:

(i) Are Obligatory Control (OC) and Coordinated Deletion (CD), which have been claimed as subject diagnostics in the literature, valid in picking out a subject in single subject constructions?

(ii) Which Nominative-marked NP(s) do(es) each diagnostic pick out in Multiple Subject Constructions (MSC)?

The hypotheses and predictions are as follows:

Hypothesis 1: Both OC and CD will pick out the subject in single subject constructions.

Hypothesis 2: In MSCs, however, the two diagnostics may show preference over different NPs.

Prediction 1: In non-MSC (single-subject construction), both diagnostics – OC and CD – will pick out the subject (which is pivot as well as subject-as-prominent-argument) of the sentence rather than non-subject. That is, both diagnostics will show preference (i.e. higher acceptability) for the sentences where the subject controls the diagnostic property in comparison to the sentences where a non-subject controls the diagnostic property.

Prediction 2-1: In MSC, Obligatory Control (OC) diagnostic will prefer GS (i.e., subject-as-prominent-argument) over MS (i.e., pivot) as the controller of the PRO. In other words, the sentences where GS is interpreted as the controller of the PRO will be accepted more than those with MS controller of PRO.

Predication 2-2: In MSC, Coordinated Deletion (CD) diagnostic will prefer MS over GS as the deleted subject of the second conjunct in the coordination. Thus, the sentences where MS is naturally interpreted to be the deleted subject in the second conjunct will be more accepted, compared to the sentences where GS is interpreted to be the deleted subject in the second conjunct.

3.2 Experimental Design
3.2.1 Participants. Seventy Korean native speakers (ages ranging between 21 and 45) residing in and near Seoul, South Korea participated in the experiment. They were either current university students or graduates of universities in Korea.

3.2.2 Materials. The main task used in the experiment was an acceptability judgment task using Magnitude Estimation (ME) in which the participants were asked to draw different lengths of lines to indicate the naturalness (acceptability) of a given sentence (after reading the sentence). An acceptability judgment task (also known as native speakers' intuition test) is known to be a psychological experiment which can be used to obtain the subconscious knowledge of native speakers in a given language (Carnie, 2012).[4] There are several different methods to measure the native speakers' acceptability: 5-points or 7-points Likert scale or magnitude estimation (ME).

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[4] There is a controversy between two similar terms: *acceptability* and *grammaticality*. However, Schütze and Sprouse (2013) mentioned that *grammaticality* judgment is a misleading term. They said: "Since a grammar is a mental construct not accessible to conscious awareness, speakers cannot have any impressions about the status of a sentence with respect to that grammar." Recently, Song et al. (2014) also pointed this problem. This paper follows these previous studies and uses the term *acceptability*, rather than *grammaticality*.

Among them, we decided to use ME rather than Likert scale because of the following two reasons.[5] First, though the experiments using Likert scales may be easier than those using ME, the former has a theoretical problem. As several previous studies including Lodge (1981) pointed out, if we use the Likert scale in the acceptability judgment tasks, there is no guarantee that one interval between two adjacent scales is identical with those in another part of scales. That is, the interval between Scale 1 and Scale 2 may represent different impressions as that between Scale 3 and Scale 4. However, if we adopt the ME, the problem can be solved since more gradient ratings are available. Second, there is also a statistical problem. Originally, the Likert scale belongs to an ordinal variable in the statistics. Therefore, strictly speaking, non-parametric analyses have to be applied to the scale.[6] The values measured with ME become a ratio variable, and parametric tests can be applied to the values.

There are two methods in ME: numeric estimates and line drawings. However, as Bard et al. (1996) pointed out, the participants of experiments tend to think that numeric estimates are something like academic test scores and they limit their responses to a somewhat categorical scale. Accordingly, we employed the line drawings in our experiment. That is, the participants were instructed to draw a line which corresponds to the acceptability of the given sentence. After the experiment, we measured the length of the lines with a ruler (by *mm*).

The test materials consisted of 80 Korean sentences in total: 40 sentences testing the OC (obligatory control) diagnostic and 40 sentences testing the CD (coordinated deletion) diagnostic. Within each data set, 20 target sentences (4 type conditions X 5 tokens) were constructed to test each diagnostic. The other 20 sentences represented filler sentences that were designed to distract the attention of the subjects. The filler sentenceswere constructed based on the structure of the target items. However, the sentences excluded the tested subject diagnostic properties. For example, to construct filler items for OC diagnostic, the covert PRO position was filled by overt reflexive *caki*. On the other hand, the fillers for CD were constructed by replacing the deleted NP position with an overt pronoun.

The target sentence types were varied based on 2X2 conditions, according to sentence type (i.e., Non-MSC vs. MSC) and type of NP the given diagnostic property matches with (i.e., NP1 (i.e., non-subject possessor in Non-MSC/MS in MSC) vs. NP2 (i.e., GS)). The basic sentence structure types are shown below.

(9) a. Non-MSC (single subject construction) sentences
       Type 1: [[NP1]poss [**NP2]nom** Predicate + **diagnostic property**]
       Type 2: [[**NP1]poss** [NP2]nom Predicate + **diagnostic property**]

     b. MSC sentences
       Type 3: [[NP1: MS]nom [[**NP2: GS]nom** Predicate + **diagnostic**

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[5] For more detailed discussion on Likert scales and ME, see Lee (2013) and Lee (2014).

[6] There is also claim that the parametric approaches such as t-test or ANOVA is applicable to the Likert scale. The reason why this is possible is that repeated measurement with the Likert scale may have properties similar to ratio variables. However, originally the Likert scale is an ordinal variable, and non-parametric analyses have to be applied to the scale. Even though we assumed that the Likert scale is a ratio variable, if the distribution does not follow the normal distribution, non-parametric tests have to be applied.

   property]]]
   Type 4: [[**NP1: MS]nom** [[NP2: GS]nom Predicate + **diagnostic**
   property]]]

  Some example sentences used as target items in CD (Coordinated Deletion) diagnostic based on the structures shown in (9) are given below in (10). The sentence in (10a) shows the example where the subject 'Yenghi's company' is deleted in the second conjunct. In contrast, the sentence in (10b) represents the case where the deleted NP in the second conjunct is forced to be construed as the non-subject possessor (i.e., Yenghi), as is forced by its predicate of the second conjunct. The design of the sentence construction was originally from the expectation that the sentences like (10a), where the subject is interpreted as the deleted item are considered more natural/acceptable than the ones like (10b). The same design was applied in constructing the MSC sentences. While the sentence in (10c) shows the example where GS (i.e., company) of the first conjunct is construed as the deleted item (i.e., the subject) of the second conjunct, the one in (10d) represents the case in which MS (i.e., Yenghi) in the first conjunct is construed as the deleted subject. It is expected that the sentences in (10c) and (10d) are accepted in different degrees in their naturalness.

(10) Non-MSC (Type 1, Type 2)

   a. Yengh$_i$–uy hoysa$_i$–ka   kananha-ci-man, e$_i$ talun
    Yenghi-POSS company-NOM poor-though,   e other
    hoysa-tul-pota yumyengha-ta
    companies-than be famous-DEC
    'Although Yenghi's company is poor, it is more famous than other
    companies.'

   b. Yenghi$_i$-uy hoysa-ka   kananha-ci-man, e$_i$ pwuyuhan
    Yenghi-POSS company-NOM poor-though,   e rich
    kacok-kwa san-ta
    family-with live-DEC
    'Although Yenghi's company is poor, her family is rich.'

   MSC (Type 3, Type 4)

   c. Yengh$_i$-ka hoysa$_i$–ka   kananha-ci-man, e$_i$ talun
    Yenghi-NOM company-NOM poor-though,   e other
    hoysa-tul-pota yumyengha-ta
    companies-than be famous-DEC
    'Speaking of/as for Yenghi, although her company is poor, it is more
    famous than other companies.'

d. Yenghi$_i$-ka   hoysa-ka   kananha-ci-man, e$_i$ pwuyuhan
Yenghi-NOM company-NOM poor-though,   e   rich

kacok-kwa   santa
family-with   live-DEC

'Speaking of/as for Yenghi, although her company is poor, her family
is rich.'

On the other hand, the test items for Obligatory Control diagnostic were con-
structed in a different manner, which is due to the nature of the task involving oblig-
atory control. For instance, (11a) shows an example of single subject construction
(i.e., non-MSC) where PRO is controlled by the subject 'Cheli's brother'. On
the contrary, it is impossible to make non-subject NP (i.e., possessor Cheli) in
(11a) control PRO, because the subject in the sentence usually controls the PRO
unless a specific condition (where the non-subject NP is forced to be construed as
PRO) is given. Therefore, we gave a mini-discourse right after the target sentence,
which provides a forced interpretation where non-subject rather corresponds with
the interpretation of the PRO. For example, (11b) represents the case where the
mini-discourse matches the interpretation of the subject as the controller of the
PRO. On the other hand, (11c) shows the case where the mini-discourse causes
a conflict between the interpretation of the PRO in the first sentence (i.e., Cheli'
s brother) and the discourse entity who is interpreted to be the agent of 'going
abroad to study' in the second sentence. The participants are expected to consider
the flow of the two sentences in (11b) natural in resolution of PRO, whereas they
are expected to regard the flow of the two sentences in (11c) unnatural or weird.
The actual test sentences in the experiment was presented in the format of (11b,
c) with the mini-discourse.

(11)   Obligatory Control Diagnostic: Non-MSC (Type 1, Type 2)

a. Cheli$_i$–uy   tongsayng$_j$-i   [naynyen-ey-nun   PRO$_{*i/j}$
Cheli-POSS brother-NOM [next.year-TIME-TOP PRO

yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
study.abroad-ACC without.fail will go]-COMP say-PAST-DEC

'Cheli's brother said that he (=Cheli's brother) would go to study
abroad next year no matter what./*Cheli's brother said that
he (=Cheli) would go to study abroad next year no matter what.'

b. Cheli$_i$–uy   tongsayng$_j$-i   [naynyen-ey-nun   PRO$_i$
Cheli-POSS brother-NOM [next.year-TIME-TOP PRO

yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
study.abroad-ACC without.fail will go]-COMP say-PAST-DEC

(Mini-discourse)

Kulayse ku-uy tongsayng-un susulo-uy yuhakcakum-ul
So   his   brother-TOP self-POSS fund.for.studying.abroad.-ACC

mou-ki wihay yelsimhi ton-ul   peless-ta.
raise   to   diligently money-ACC earn-PAST

'Cheli's brother said that he would go study abroad the next year no
matter what. Therefore, Cheli's brother worked hard to raise funds for his
own studying.'

c. Cheli–uy   tongsayng$_j$-i [naynyen-ey-nun   PRO$_i$
   Cheli-POSS brother-NOM [next.year-TIME-TOP PRO

   yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
   study.abroad-ACC without.fail will go]-COMP say-PAST-DEC
   (Mini-discourse)

   Kulayse ku-uy tongsayng-un himtun hyengpyen-eyse-to
   So   his   brother-TOP needy circumstances-in-although

   hyeng-ul   yuhakponay-ki   wihay ton-ul   yelsimhi
   his.brother-ACC study.abroad.send to   money-ACC diligently

   peless-ta.
   earn-PAST
   'Cheli's brother said that he would go study abroad the next year no mat-
   ter what. Therefore, Cheli's brother worked hard to raise funds for Cheli
   although their family is in needy circumstances.'

Likewise, the MSC sentences in (12a-c) were designed the same way: the tar-
get sentence in (12a) was presented with a mini-discourse as shown in (12b, c).
While the mini-discourse interpretation in (12b) matches with that of the previous
sentence (i.e., the target MSC sentence) containing the GS as proper controller
of the PRO, the one in (12c) makes a conflict in its interpretation with the pre-
vious MSC sentence with respect to the choice of the possible controller of the
PRO between MS and GS. Therefore, the test item in (12c) is not considered as
natural as (12b) in the flow between the two sentences (i.e., target sentence and
mini-discourse), due to the conflict of interpretations between the target sentence
and the mini-discourse.

(12)   Obligatory Control Diagnostic: MSC (Type 3, Type 4)

a. Cheli$_i$–ka   tongsayng$_j$-i [naynyen-ey-nun   PRO$_{*i/j}$
   Cheli-NOM brother-NOM [next.year-TIME-TOP PRO

   yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
   study.abroad-ACC without.fail will go]-COMP say-PAST-DEC
   'Speaking of Cheli/as for Cheli, his brother said that he would go study
   abroad next year no matter what/*Speaking of Cheli/as for Cheli,his brother
   said that he would go study abroad next year no matter what.'

b. Cheli$_i$–ka   tongsayng$_j$-i [naynyen-ey-nun   PRO$_i$
   Cheli-NOM brother-NOM [next.year-TIME-TOP PRO

   yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
   study.abroad-ACC without.fail will go]-COMP say-PAST-DEC
   (Mini-discourse)

   Kulayse ku-uy tongsayng-un susulo-uy yuhakcakum-ul
   So   his   brother-TOP self-POSS fund.for.studying.abroad.-ACC

   mou-ki wihay yelsimhi ton-ul   peless-ta.
   raise   to   diligently money-ACC earn-PAST
   'Speaking of Cheli/as for Cheli,his brother said that he would go study
   abroad the next year no matter what. Therefore, Cheli's brother worked hard
   to raise funds for his own studying.'

c. Cheli–ka   tongsayng-i [naynyen-ey-nun   PRO$_i$
Cheli-NOM   brother-NOM [next.year-TIME-TOP   PRO

yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
study.abroad-ACC without.fail   will go]-COMP   say-PAST-DEC
(Mini-discourse)

Kulayse ku-uy tongsayng-un himtun   hyengpyen-eyse-to
So   his   brother-TOP   needy   circumstances-in-although

hyeng-ul   yuhakponay-ki   wihay ton-ul   yelsimhi
his.brother-ACC   study.abroad.send to   money-ACC   diligently

peless-ta.
earn-PAST
'Speaking of Cheli/as for Cheli, his brother said that he would go study abroad the next year no matter what. Therefore, Cheli's brother worked hard to raise funds for Cheli although their family is in needy circumstances.'

3.2.3 Procedures. Participants were first given a simple one-page questionnaire survey about biographical information such as age, gender and dialect(s) together with a consent form for participating in the experiment. They were then asked to proceed to take the main task. In the main task, participants were required to draw a line for each sentence, according to the degree of acceptability/naturalness of the given sentence. While the CD diagnostic was given with the instruction of focusing on the acceptability of the given sentence in each item, the OC diagnostic was presented with a modified instruction that the participant should measure how acceptable/natural the transition of the two consecutive sentences (i.e., target sentence and mini-discourse) was for each test item.

4. Analysis of Results

4.1 Normality Tests

After we collected the data for acceptability judgment, we extracted the values for target sentences. Then, we performed four normality tests, in order to check if we could apply parametric tests.[7] If the distributions follow the normal distribution, we can apply the parametric tests such as *t*-test, ANOVA, or (ordinary) linear regression test. However, if the distributions do not follow the normal distribution, we have to apply the non-parametric tests such as Wilcoxon test, Friedman test, or generalized linear regression test.[8]

When we performed the normality tests, we found that most of the datasets do not follow the normal distribution. Some are positively skewed, and others have a slightly bimodal distribution. Accordingly, we decided to apply non-parametric

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[7] We do not provide the detailed procedure of the normality tests here. For details, see Johnson (2008), Lee (2013), and Lee (2014).

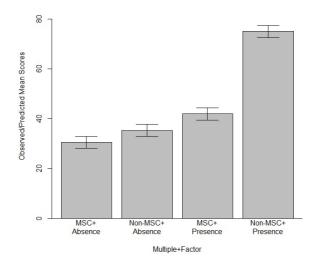[8] A non-parametric test is applied (i) when the variable is a nominal/categorical or ordinal variable or (ii) when the variable is an interval or ratio variable and the distribution of data does not follow the normal distribution. A generalized linear regression test is a non-parametric test since either condition is satisfied. When the second condition is satisfied, two options are available. First, we assume that an ordinary regression model is strong enough to overcome the problems of non-normality and we apply an ordinary regression model. Second, we apply a generalized ordinary regression model. This paper adopts the second option.

tests to analyze our data.[9]

4.2 Regression Tests

In order to examine how each factor (obligatory control and coordinated deletion) affect the acceptability of the sentences, we performed generalized regression tests. Agresti (2007) pointed out that a generalized regression test is available when the distribution does not follow the normal distribution. Accordingly, we applied the test to examine how each factor affects the acceptability of the sentences.

4.2.1 Obligatory Control. In the target sentences of OC, since we have two factors ($\pm$MSC and $\pm$OC), we have four types of combinations. The following graph illustrates the degree of acceptability in these four types of combinations. Here, *Multiple* is the variable for $\pm$MSC, and *Factor* refers to $\pm$OC (i.e., +OC (Presence): PRO is construed by Grammatical Subject; -OC (Absence): PRO is not construed by Grammatical Subject).The I-shaped lines in the bars represent 95% confidence intervals (CIs).

[Figure 1] Bar Plots of the Data Sets for Obligatory Control

As you can observe, 'Non-MSC+Presence (-MSC, +OC)' combination (i.e., single subject construction with PRO controlled by Grammatical Subject) shows distinctively higher acceptability, whereas the others have lower and similar acceptability. Note that the three combinations with lower acceptability have similar degree of acceptability, as their 95% CIs demonstrate. What is also noticeable

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[9] Someone may say that an ordinary regression test is possible even though our data do not follow the normal distribution. The reason is that the test is robust enough to solve the problem of non-normality. However, when we checked the normality of residuals during the regression tests, we found that the residuals did not follow the normal distributions. In such a case, it is reasonable to apply a generalized linear regression model.

is that 'MSC+Absence (+MSC, -OC)' combination (i.e., MSC where MS is construed to be the controller of the PRO) received the lowest acceptability.

In order to examine how two factors (±MSC and ±OC) affected the acceptability of sentences, we performed a (generalized) regression test. The following table illustrates the analysis results. Here, Multiple is the variable for ±MSC and Factor is that of ±OC.

[Table 1] Results of Regression Tests (OC)

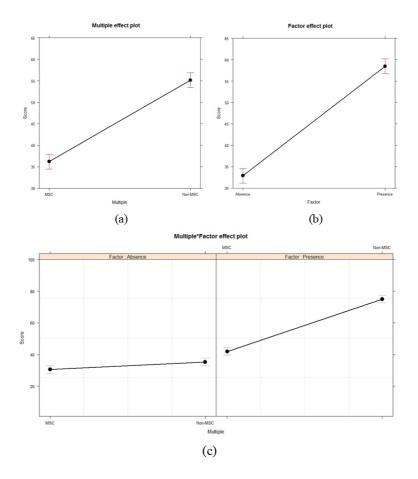|	Estimate	Standard Error	t	p	
(Intercept)	45.6886	0.6237	73.26	.000	***
Multiple1	-9.4886	0.6237	-15.21	.000	***
Factor1	12.7843	0.6237	20.50	.000	***
Multiple1:Factor1	-7.0815	0.6237	-11.36	.000	***

As you can see in this table, both factors (*Multiple1* and *Factor1*) significantly influenced the acceptability of the sentences ($p < .001$). There is also an interaction between two factors, as the *p*-value of *Multiple1:Factor1* indicates ($p < .001$).

To graphically represent the effects of the factors and their interaction, we got the effect plot for the data set. Figure 2 has the effect plots.

In Figure 2-(a), the average score of Non-MSC is much higher than that of MSC, and the difference is statistically significant. Note that the 95% CIs do not overlap. Likewise, the average score of Presence is much higher than that of Absence in (b), and the difference is statistically significant. The effect plot in Figure 2-(c) demonstrates the interaction between the two factors. If there is no interaction between two factors, the two lines in Absence and Presence have to be parallel. If there is an interaction, however, the two lines are not parallel. Note that the two lines in (c) are not parallel. This means that there is an interaction between two factors ±MSC and ±OC.

These interaction plots demonstrate how the two factors (OC and MSC) affected the acceptability of sentences. Since they do not demonstrate how the factor ±OC independently affected the acceptability of sentences in Non-MSC and MSC respectively, in order to examine how the factor ±OC affected the acceptability of sentences in MSC and Non-MSC, we divided each data set into two groups (Non-MSC and MSC). We performed a generalized linear regression test for each data set and drew the effect plots. Though we do not provide the analysis results with tables as in the Table 1, the effect plots are provided with the *F* value and *p*-value, as shown in Figure 3 below.

Let's first examine the Non-MSC cases, where we have a single subject. As you can see in (a) of Figure 3, +OC improved the acceptability of the sentences and the improvement was statistical significant ($p < .001$). This result can be interpreted more clearly, if we compare each condition with the sentences in (11b-c) from the earlier section, which are repeated in (13a-b) below.
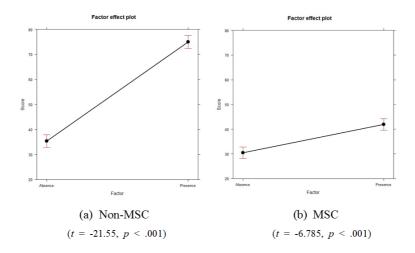
(a)

(b)

(c)

[Figure 2] Effect Plots for OC Data Set

(13)   a. Cheli–uy   tongsayng$_j$-i [naynyen-ey-nun   PRO$_i$
          Cheli-POSS   brother-NOM [next.year-TIME-TOP   PRO

          yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
          study.abroad-ACC without.fail   will go]-COMP   say-PAST-DEC
          (Mini-discourse)

          Kulayse ku-uy tongsayng-un susulo-uy   yuhakcakum-ul
          So   his   brother-TOP   self-POSS fund.for.studying.abroad.-ACC
          mou-ki wihay yelsimhi   ton-ul   peless-ta.
          raise   to   diligently   money-ACC earn-PAST
          'Cheli's brother said that he would go study abroad the next year no
          matter what. Therefore, Cheli's brother worked hard to raise funds for his
          own studying.'

(a) Non-MSC

(t = -21.55, p < .001)

(b) MSC

(t = -6.785, p < .001)

[Figure 3] Effects Plots of ±OC for Target Sentences

b. Cheli–uy   tongsayng$_j$-i [naynyen-ey-nun   PRO$_i$
   Cheli-POSS brother-NOM [next.year-TIME-TOP PRO

   yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
   study.abroad-ACC without.fail will go]-COMP   say-PAST-DEC
   (Mini-discourse)

   Kulayse ku-uy tongsayng-un himtun hyengpyen-eyse-to
   So   his   brother-TOP   needy circumstances-in-although

   hyeng-ul   yuhakponay-ki   wihay ton-ul   yelsimhi
   his.brother-ACC study.abroad.send to   money-ACC diligently

   peless-ta.
   earn-PAST
   'Cheli's brother said that he would go study abroad the next year no mat-
   ter what. Therefore, Cheli's brother worked hard to raise funds for Cheli
   although their family is in needy circumstances.'

From the examples above, (13a) has +OC, whereas (13b) has –OC. As the
effect plot in Figure 3-(a) indicates, (13a) has higher acceptability than (13b), and
the difference is statistically significant. This means that the factor ±OC correctly
picked up the subject of the sentences in the Non-MSC sentences. That is, the
effect plot in (a) indicates that the factor ±OC can be used as a subjecthood test
in the Non-MSC (single subject) environment.

As for the MSC cases, where we have multiple subjects, we can see that +OC
improved the acceptability of the sentences as shown in (b) of Figure 3, and the
improvement was statistically significant (p < .001). This result can be understood
more clearly when we examine Figure 3 with the following sentences in MSC from
(12b-c) in the earlier section, which are repeated in (14a-b) below.

(14) a. Cheli–ka   tongsayng$_j$-i [naynyen-ey-nun   PRO$_i$
          Cheli-NOM   brother-NOM [next.year-TIME-TOP PRO

          yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
          study.abroad-ACC without.fail will go]-COMP say-PAST-DEC

          (Mini-discourse)

          Kulayse ku-uy tongsayng-un susulo-uy yuhakcakum-ul
          So   his   brother-TOP self-POSS fund.for.studying.abroad.-ACC

          mou-ki wihay yelsimhi ton-ul   peless-ta.
          raise   to   diligently money-ACC earn-PAST

          'Speaking of Cheli/as for Cheli,his brother said that he would go study
          abroad the next year no matter what. Therefore, Cheli's brother worked
          hard to raise funds for his own studying.'

      b. Cheli$_i$–ka   tongsayng-i [naynyen-ey-nun   PRO$_i$
          Cheli-NOM   brother-NOM [next.year-TIME-TOP PRO

          yuhak-ul   kkok   kakeyssta]-ko   malhay-ss-ta
          study.abroad-ACC without.fail will go]-COMP say-PAST-DEC

          (Mini-discourse)

          Kulayse ku-uy tongsayng-un himtun hyengpyen-eyse-to
          So   his   brother-TOP needy   circumstances-in-although

          hyeng-ul   yuhakponay-ki   wihay ton-ul   yelsimhi
          his.brother-ACC study.abroad.send to   money-ACC diligently
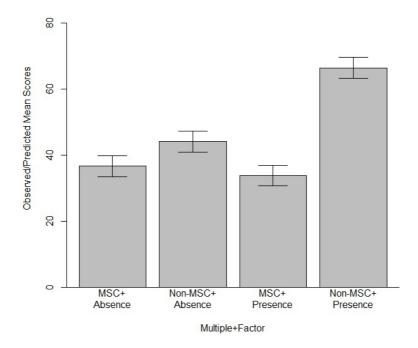
          peless-ta.
          earn-PAST

          'Speaking of Cheli/as for Cheli, his brother said that he would go study
          abroad the next year no matter what. Therefore, Cheli's brother worked
          hard to raise funds for Cheli although their family is in needy circumstances.'

In the examples above, (14a) has +OC, whereas (14b) has –OC. As the effect
plot in Figure 3-(b) indicates, (14a) has higher acceptability than (14b), and the
difference is statistically significant. This means that the factor ±OC correctly
picked up the subject (i.e., GS) of the sentences in the MSC sentences. That is,
the effect plot in Figure 3-(b) indicates that the factor ±OC can be used as a
subjecthood test that picks out GS in the MSC (multiple subjects) environment.In
summary, two effect plots in Figure 3 indicate that the factor ±OC can be used as
a GS subjecthood diagnostic test in both Non-MSC and MSC environment.

4.2.2 Coordinated Deletion. In the target sentences of CD, since we have two
factors (now ±MSC and ±CD), we have four types of combinations. The following
graph illustrates the degree of acceptability in these four types of combinations in
the data set for CD. Now, *Factor* refers to ±CD (+CD (Presence): the deleted
NP in the second conjunct is construed as Grammatical Subject; -CD (Absence):
the deleted NP in the second conjunct is construed as NP that is not Grammatical
Subject).

As you can observe, two combinations in Non-MSC have higher acceptability
than those in MSC. Also, note that the CIs in Absence appear to overlap but
those of Presence are clearly distinguished, which means +CD where the GS is
construed as the deleted NP had significantly different acceptability between MSC
and Non-MSC environments.

[Figure 4] Effects Plots of ±OC for Target Sentences

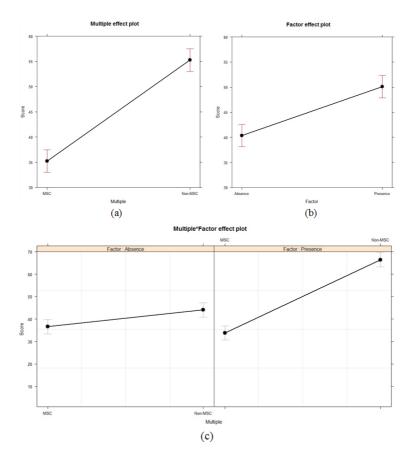Now, to examine how the two factors (±MSC and ±CD) affected the acceptability of sentences, we also performed a (generalized) regression test. The following table illustrates the analysis results. Here, *Multiple* is the variable for ±MSC and *Factor* is that of ±CD.

[Table 2] Results of Regression Tests (CD)

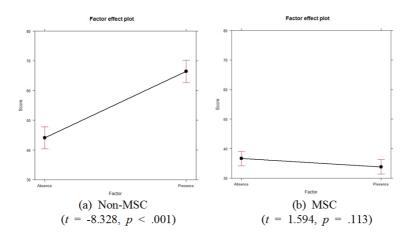|	**Estimate**	**Standard Error**	***t***	***p***	
(Intercept)	45.2332	0.8041	56.256	.000	***
Multiple1	-10.0246	0.8041	-12.467	.000	***
Factor1	4.8803	0.8041	6.070	.000	***
Multiple1:Factor1	-6.2946	0.8041	-7.829	.000	***

As you can see in this table, both factors (*Multiple1* and *Factor1)* significantly influenced the acceptability of the sentences ($p < .001$). There is also an interaction between two factors, as the *p*-value of *Multiple1:Factor1* indicates ($p < .001$).

To graphically represent the effects of the factors and their interaction, we got the effect plot for the data set. Figure 5 below shows the effect plots.

[Figure 5] Effect Plots for CD Data Set

In Figure 5-(a), the average score of Non-MSC is much higher than that of MSC, and the difference is statistically significant.In Figure 5-(b), the average score of Presence is much higher than that of Absence, and the difference is statistically significant.These tendencies are similar to those of OC sentences.This implies that +CD had a positive effect on the acceptability of sentences. The effect plot in (c) demonstrates the interaction between the two factors. As you can observe, the two lines in (c) are not parallel, which means that there is an interaction between two factors MSC and CD. Though the plots in Figure 5 above show us how the two factors (MSC, CD) affected the acceptability of sentences, they do not demonstrate how the factor ±CD affected the acceptability of sentences in Non-MSC and MSC respectively. As in the ±OC data set, to examine how the factor ±CD affected the acceptability of sentences in each environment, we divided each data set into two groups (Non-MSC and MSC), to perform a (generalized) linear regression test for each data set and drew the effect plots. The following graphs show us the effects plots.

(a) Non-MSC
($t = -8.328, p < .001$)

(b) MSC
($t = 1.594, p = .113$)

[Figure 6] Effects Plots of ±CD for Target Sentences

These effect plots in Figure 6 demonstrate how the factor CD affected the acceptability of sentences in MSC and Non-MSC. Comparing the result patterns with sample sentences will be helpful as well. In Non-MSC cases shown in (a) of Figure 6, +CD improved the acceptability of the sentences and the improvement was statistical significant ($p < .001$). The following sentences in (15a-b) in Non-MSC are repeated from (10a-b).

(15) a. Yengh–uy   hoysa–ka   kananha-ci-man, e talun
       Yenghi-POSS company-NOM poor-though,   e other
       hoysa-tul-pota   yumyengha-ta
       companies-than   be famous-DEC
       'Although Yenghi's company is poor, it is more famous than other companies.'

     b. Yenghi-uy   hoysa-ka   kananha-ci-man, e pwuyuhan
       Yenghi-POSS company-NOM poor-though,   e rich
       kacok-kwa   san-ta
       family-with   live-DEC
       'Although Yenghi's company is poor, her family is rich.'

In (15) above, (15a) has +CD, whereas (15b) has –CD. As the effect plot in Figure 6-(a) indicates, (15a) has higher acceptability than (15b), and the difference is statistically significant. This means that the factor CD correctly picked up the subject of the sentences in the Non-MSC sentences. That is, the effect plot in Figure 6-(a) indicates that the factor ±CD can be used as a subjecthood test in the Non-MSC (single subject) environment.

However, MSC cases, where we have multiple subjects, showed different pattern of results. As you can in (b) of Figure 6, +CD did not improve the acceptability of the sentences and the difference was statistically not significant ($p = .113$).

Comparing the data with the following sentences in MSC below in (16) (repeated from (10c-d)) will be helpful to interpret the results in terms of ±CD in MSC.

(16) a. Yengh-ka   hoysa–ka   kananha-ci-man,   e talun
Yenghi-NOM company-NOM poor-though,   e other

hoysa-tul-pota   yumyengha-ta
companies-than   be famous-DEC

'Speaking of/as for Yenghi, although her company is poor, it is more famous than other companies.'

b. Yenghi-ka   hoysa-ka   kananha-ci-man,   e pwuyuhan
Yenghi-NOM company-NOM poor-though,   e rich

kacok-kwa   santa
family-with   live-DEC

'Speaking of/as for Yenghi, although her company is poor, her family is rich.'

The examples (16) above show that (16a) has +CD, whereas (16b) has –CD. As the effect plot in (b) indicates, (16a) has lower acceptability than (14b), and the difference was not statistically significant. This means that the factor ±CD did not pick up the subject of the sentences correctly in the MSC sentences. That is, the effect plot in (b) indicates that the factor ±CD cannot be used as a subjecthood test in the MSC (multiple subjects) environment. In summary, the two effect plots in Figure 6 indicate that the factor ±CD can be used as a subjecthood diagnostic test in the Non-MSC environment, but the factor cannot be used as a subjecthood diagnostic test in the MSC environment.

5. Discussion and Conclusion

The current study investigated how different Korean subject diagnostics – Obligatory Control (OC) diagnostic and Coordinated Deletion (CD) diagnostic – behave in distinct sentence constructions (i.e., single subject construction (Non-MSC) and Multiple Subject Construction (MSC)). The main hypotheses and the predictions tested through the experiment were the following:

Hypothesis 1: Both OC and CD will pick out the subject in Non-MSCs (single subject constructions).

Hypothesis 2: In MSCs, however, the two diagnostics may show preference over different NPs.

Prediction 1) In Non-MSCs, both diagnostics will pick out the subject of the sentence rather than non-subject.

Prediction 2-1) In MSCs, Obligatory Control (OC) diagnostic will prefer GS over MS as the controller of the PRO.

Prediction 2-2) In MSCs, Coordinated Deletion (CD) diagnostic will prefer MS over GS as the deleted subject of the second conjunct.

The results of the Acceptability Judgment Task using Magnitude Estimation showed the following:

1) With OC diagnostic, the sentences in Non-MSC environment received significantly higher acceptability when the PRO is construed to be the Subject through the interpretation of the mini-discourse, compared to the cases where the non-subject NP was construed to be the PRO. (The relevant pattern of the results can be seen in Figure 1 in the earlier section.) Through this result, Prediction 1 is borne out.

2) OC further shows the similar pattern even with the sentences in MSC environment: When the PRO is construed to be the Grammatical Subject through the interpretation of mini-discourse, the sentences received significantly higher acceptability than those when the PRO is construed to be the Major Subject with the given mini-discourse interpretation[10]. This result indicates that OC has a tendency of preferring Grammatical Subject over Major Subject in MSC environment, which goes well with Prediction 2-1.

3) With the CD diagnostic, the sentences in Non-MSC environment received significantly higher acceptability when the deleted NP in the second conjunct in coordination is construed to be the Subject, compared to when the deleted NP is construed to be a non-subject NP[11]. This pattern of result is similar to the one with OC in Non-MSC environment, through which Prediction 1 is completely borne out.

4) On the other hand, CD in the MSC environment does not show statistically significant difference (as shown in Figure 4): There was no significant difference between the case where the deleted NP in the second coordinated conjunct is construed to be Grammatical Subject (GS) of the MSC and the case where it is construed as Major Subject (MS) of the sentence. Through this result, Prediction 2-2 is not borne out.

Through the results of the experiment, Hypothesis 1 is strongly supported since both subjecthood diagnostics correctly selected the subject (i.e., in Non-MSCs). With respect to the split subject analysis, this pattern of results is very predictable since the subject in single subject construction serves as pivot (i.e., MS), and at the same time, subject-as-prominent-argument (i.e., GS) as well.

On the other hand, Hypothesis 2 stating that each diagnostic may have different preference over distinct NPs seems not supported completely. As for the case of OC (Obligatory Control) diagnostic, the diagnostic showed clear preference for GS over MS in MSC environments. It seems that OC diagnostic supports Hypothesis 2 by representing diagnostic property that picks out subject-as-prominent-argument when there is more than one subject in a sentence. This pattern of results seems to support approaches assuming split subjects (Dixon 1994, Falk 2006).

In case of CD diagnostic with MSCs, the diagnostic does not show a clear preference for one of the two NPs in MSCs. There was no significant difference

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[10] The relevant pattern of the results can be shown in Figure 1 in the earlier section.
[11] The relevant pattern of the results can be shown in Figure 4 in the earlier section.

between the case where the deleted NP in the second conjunct in the coordination is construed as GS and the one where MS is construed to be deleted. This seems not supporting Hypothesis 2 and the diagnostic does not seem to work in case of MSCs.

Through the present experimental study, we can tentatively conclude that Obligatory Control diagnostic claimed in many previous studies (Yoon 1986, Hong 1991, Chung 1990, Yoon 2004, 2007, 2009) seems to be a valid diagnostic discriminating the Subject from non-subjects in a single-subject construction. This diagnostic also seems to pick out GS rather than MS in MSCs, which was claimed in Yoon (2004, 2007, 2009). On the other hand, Coordinated Deletion diagnostic seems to be a valid subjecthood diagnostic in a single-subject construction, but not a valid subjecthood diagnostic that picks out a single subject in MSCs.

The future study should deal with other subjecthood diagnostics claimed in literature. Also, the follow-up study should use non-subject NPs other than Possessors of Subject NPs in single subject sentences. Though the current experiment was based on the construction with non-subject NPs that are Possessors of Subject NPs because of the need to create parallel/matching structures between Non-MSCs and MSCs, Possessor of Subjects may not be distinct enough from clear non-Subjects (such as Objects, Indirect Objects, adjunct, etc.) in terms of their ability to control Subject properties.

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