BOUND VARIABLE CONSTRUAL WITH A 'DISCONTINUOUS' BINDER

EMI MUKAI
University of Southern California

1. Introduction
It is well known that, in languages like Japanese, a number(#)-classifier(cl) sequence (#-cl) can appear without any case-marker or copula attached to it, as indicated in (1).

(1)  a. *Gakusei-ga* (kinoo) **san-nin** kita (koto) '(that) three students came (yesterday)'
    Student-NOM (yesterday) three-CL came (that)
    b. John-ga *hon-o* (kinoo) **san-satu** yonda (koto) '(that) John read three books (yesterday)'
    John-NOM book-ACC (yesterday) three-CL read (that)

Unlike those in (1), the #-cl sequences in (2) are immediately followed by a case-marker/postposition or a copula.

(2)  a. ... **san-nin**-ga/o/ni/kara/to/de ... (#-cl followed by a case-marker/postposition)
    ... three-CL-NOM/ACC/DAT/from/with/by
    b. ... **san-nin**-no N ... (#-cl followed by -no)
    ... three-CL-no N
    c. ... **san-nin** da. (#-cl followed by the copula da)

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1 There is no unified view as to how to analyze *no* in (2b). Some assume that it is a genitive case-marker (see Kitagawa & Ross 1982: 23 for references), while some declare that it is a pre-nominal form of the copula *da* (e.g., Kuno 1973: 25). I will simply gloss it as NO for now, though I am more inclined to pursue the latter idea since *no* can be replaced by *datta*, the past form of the copula *da* (with varying degrees of surface unnaturalness).
In this paper, we shall call a \#-cl such as those in (1) a \textit{floating numeral}, following the common practice in the field, purely for the purpose of exposition. For brevity of presentation, we shall often use \#-cl$_{FN}$ in place of a \textit{floating numeral}. Also for the sake of exposition, we shall refer to the noun phrase whose amount is 'counted' by \#-cl or \#-cl$_{FN}$ as the \textit{(intended) host NP}.$^2$

A combination of a floating numeral and its host NP can seem to serve as a binder.

(3) \textbf{Binder: combination of automobile company and three-\textit{CL}; Bindee; so-\textit{ko}}

\begin{align*}
\text{Zidoosyagaisya-ga} & \quad \text{(kinoo) san-sya} \quad [\text{so-\textit{ko-no} roodookumiai-}\text{o} \quad \text{hihansita.}} \\
\text{automobile:company-NOM (yesterday) three-\textit{CL} that-place-\textit{NO} labor:union-ACC} & \quad \text{criticized} \\
\end{align*}

\textit{'Each of the three automobile companies criticized its labor union (yesterday).'}

When the Bound Variable Construal is discussed in the literature, however, floating numerals are almost never used as the intended binder (except in Hasegawa 1993, Hoji & Ishii 2004, Miyagawa & Arikawa 2007). Since the floating numeral and its intended host NP do not (have to) form a constituent (at least on the surface), let us call such a binder a \textit{discontinuous} binder.

The main issue of this paper is how the Bound Variable Construal with a 'discontinuous' binder should be constrained. In section 2, we argue for (4), as opposed to (5), as a necessary condition for the construal in question.$^3$

(4) Our claim:

\begin{align*}
\text{A and \#-cl$_{FN,A}$, combined, can be taken as a binder of B only if (the trace of) A (in an A-position) c-commands B (in an A-position) at LF.}
\end{align*}

(5) The claim that we reject:

\begin{align*}
\text{A and \#-cl$_{FN,A}$, combined, can be taken as a binder of B only if (the traces of) both A (in an A-position) and \#-cl$_{FN,A}$ c-command B (in A-position) at LF.}
\end{align*}

In short, we maintain that it is the positions of A and B (i.e., \textit{arguments}) at LF, \textit{not that of \#-cl$_{FN,A}$}, that is relevant for the Bound Variable Construal in question. This claim will be supported by the results of experiments which test whether the interpretation in question is possible in the schema in (6), where the combination of the subject (NP$_{Subj}$) and the floating numeral (\#-cl$_{FN-Subj}$) is intended to bind an element inside the object (NP$_{Obj}$).

(6) \begin{align*}
\text{NP$_{Subj}$-NOM} & \quad \text{NP$_{Obj}$-ACC} \quad \text{\#-cl$_{FN-Subj}$ V-T}
\end{align*}

Sentences conforming to the schema in (6) (or its variants) have long been 'special' (at least since the 1980s) in the sense that they are often claimed to be degraded or unacceptable. In section 3, we see how the discussion in section 2 is evaluated in terms of this historical issue.

In section 4, we argue against Miyagawa & Arikawa 2007, which attempts to capture the (un)acceptable status of (6) (or its variants) by crucially claiming that the surface Subject-Object-

$^2$ Throughout this paper, \#-cl sequences (whether they are 'floating' or not) are shown in bold font, and their host NPs in italic font.

$^3$ Note that \#-cl$_{FN,X}$ stands for a floating numeral whose host NP is X.
Bound Variable Construal with a 'Discontinuous' Binder

Verb (SOV) order in general can correspond to two distinct types of LF representations. We show that their proposal would wrongly predict the paradigms in section 2 and the discussion will lead us to the conclusion that the SOV order necessarily corresponds to an LF representation in which $S$ asymmetrically c-commands $O$, as has been widely accepted in the field.\(^4\) Section 5 concludes the paper.

2. Bound Variable Construal involving a 'discontinuous' binder

2.1. Basic paradigm with a 'discontinuous' binder

It has been claimed in the past literature (Saito 1985, 1992, Hoji 1985, Ueyama 1998 among many others) that we obtain a paradigm such as (7) in Japanese with the intended binder being a 'non-floated' quantificational expression.

(7) An observed paradigm with a quantificational expression (non-floated):
   a. $\text{NP}\_\text{Subj-NOM} [\text{NP} \ldots b \ldots]_\text{Obj-ACC} V$-T (Binder: $\text{NP}_\text{Subj}$; Bindee: $b$)
   b. $^*\text{NP} \ldots b \ldots]_\text{Subj-NOM} \text{NP}_\text{Obj-ACC} V$-T (Binder: $\text{NP}_\text{Obj}$; Bindee: $b$)
   c. $[\text{NP} \ldots b \ldots]_\text{Obj-ACC} \text{NP}_\text{Subj-NOM} V$-T (Binder: $\text{NP}_\text{Subj}$; Bindee: $b$)

(7b) and (7c) are said to exhibit weak crossover effects and 'reconstruction' effects, respectively. The schemata in (7) are exemplified in (8).

(8) a. Cf. (7a).
   $[55\% \text{ izyoo-no}_\text{tihoozititai}]_{\text{Subj}}$-ga $[\text{so-ko-no}_\text{syokuin}]_{\text{Obj}}$-o $\text{hihansita}$.  
   'Each of 55\% or more local governments criticized its own staff member(s).'

b. Cf. (7b).
   $[\text{so-ko-no}_\text{syokuin}]_{\text{Subj}}$-ga $[55\% \text{ izyoo-no}_\text{tihoozititai}]_{\text{Obj}}$-o $\text{hihansita}$.  
   'Its own staff member(s) criticized each of 55\% or more local governments.'

c. Cf. (7c).
   $[\text{so-ko-no}_\text{syokuin}]_{\text{Obj}}$-o $[55\% \text{ izyoo-no}_\text{tihoozititai}]_{\text{Subj}}$-ga $\text{hihansita}$.  
   (Lit.) 'Its own staff member(s), each of 55\% or more local governments criticized.'

The contrast in (7) is accounted for if we assume (9) and (10), which have been widely accepted in the field.

(9) a. The surface Subject-Object-Verb (SOV) order necessarily corresponds to an LF representation in which $S$ asymmetrically c-commands $O$.

b. The surface Object-Subject-Verb (OSV) order can correspond to an LF representation in which $S$ asymmetrically c-commands $O$.\(^5\)

\(^4\)As will be noted in section 4, Hoji & Ishii 2004 has made the same point, making recourse to a different set of data.

\(^5\)In addition to (9b), it has also been claimed that the surface OSV order can correspond to an LF representation in which $O$ asymmetrically c-commands $S$. That the surface OSV order can correspond to two distinct types of LF
(e.g., Kuroda 1970, Saito 1985, Hoji 1985 among many others)

(10) A necessary condition for the Bound Variable Construal:

\[ A \text{ can be taken as a binder of } B \text{ only if (the trace of ) } A \text{ (in an A-position) c-commands } B \text{ (in an A-position) at LF.} \]

Because of (9a), the condition in (10) is satisfied in (7a) but not in (7b). In the case of (7c), the condition can be satisfied due to (9b) although its surface linear order between the intended binder and the intended bindee is the same as that in (7b).

Sentences with a 'discontinuous' binder also exhibit weak crossover effects and so-called reconstruction effects, as exemplified by (11a) and (11b), respectively.

(11) a. An instance of weak crossover effects:

\[ \text{Binder: combination of } \text{automobile company} \text{ and three-CL; Bindee: so-ko} \]

\[ *[\text{So-ko-no roodookumiai]-ga } zidoosyagaisya-o \text{ (kinoo) san-sya} \text{ hihansita.} \]

\[ \text{that-place-NO labor:union-NOM automobile:company-ACC (yesterday) three-CL criticized} \]

(Int.) 'Its labor union criticized each of the three automobile companies (yesterday).'

b. An instance of so-called reconstruction effects:

\[ \text{Binder: combination of } \text{automobile company} \text{ and three-CL; Bindee: so-ko} \]

\[ [\text{So-ko-no roodookumiai]-o } zidoosyagaisya-ga \text{ (kinoo) san-sya} \text{ hihansita.} \]

\[ \text{that-place-NO labor:union-ACC automobile:company-NOM (yesterday) three-CL criticized} \]

(Lit.) 'Its labor union, each of the three automobile companies criticized (yesterday).'

In (11a) (the SOV order), the object is the intended host NP of the floating numeral san-sya and the subject contains the intended bindee, whereas in (11b) (the OSV order), the subject is the intended host NP of san-sya and it is the 'scrambled' object that contains the intended bindee.

The preceding observations (including (3) above) regarding the 'discontinuous' binder are summarized in (12).

(12) An observed minimal pair with a 'discontinuous' binder:

a. \[ NP_{\text{Subj}}-\text{ACC} (...) \#-\text{cl}_{\text{FN-Subj}} [NP \ldots b \ldots]_{\text{obj}}-\text{ACC} V-T \]

(Binder: \( NP_{\text{Subj}} \text{ and } \#-\text{cl}_{\text{FN-Subj}} \); Bindee: \( b \)) (Cf. (3).)

b. \[ *[NP \ldots b \ldots]_{\text{Subj}}-\text{NOM} NP_{\text{obj}}-\text{ACC} (...) \#-\text{cl}_{\text{FN-Obj}} V-T \]

(Binder: \( NP_{\text{obj}} \text{ and } \#-\text{cl}_{\text{FN-Obj}} \); Bindee: \( b \)) (Cf. (11a).)

c. \[ [NP \ldots b \ldots]_{\text{Obj}}-\text{ACC} NP_{\text{sub}}-\text{NOM} (...) \#-\text{cl}_{\text{FN-Subj}} V-T \]

(Binder: \( NP_{\text{subj}} \text{ and } \#-\text{cl}_{\text{FN-Subj}} \); Bindee: \( b \)) (Cf. (11b).)

representations is based in part on the observations that the intended Bound Variable Construal is possible in (i) as well as in (7c), and that the two intended scope interactions are possible in (ii).

(i) \[ NP_{\text{obj}}-\text{ACC} [NP \ldots b \ldots]_{\text{Subj}}-\text{NOM} V-T \]

(Binder: \( NP_{\text{obj}} \); Bindee: \( b \))

(ii) \[ NP_{\text{obj}}-\text{ACC} NP_{\text{Subj}}-\text{NOM} V-T \]

a. (Wide-scope: \( NP_{\text{subj}} \); Narrow-scope: \( NP_{\text{obj}} \))

b. (Wide-scope: \( NP_{\text{obj}} \); Narrow-scope: \( NP_{\text{subj}} \))

Due to space limitation and some complication with regard to sentences conforming to the schema in (iii)—such sentences do not (readily) allow the intended scope interpretation, unlike (ii-b) (first discussed in Hasegawa (1993: (18)-(20)))—we will not discuss such cases in this paper. My forthcoming dissertation will deal with this issue.

(iii) \[ *NP_{\text{obj}}-\text{ACC} (...) \#-\text{cl}_{\text{FN-Obj}} NP_{\text{sub}}-\text{NOM} V-T \]

(Wide-scope: \( NP_{\text{obj}} \text{ and } \#-\text{cl}_{\text{FN-Obj}} \); Narrow-scope: \( NP_{\text{subj}} \))
The paradigm in (7) is thus duplicated in (12). We have also conducted an experiment on (12a), (12b) and (12c) and its results are summarized in (13). The results are in harmony with my own judgments.

(13) Number of informants: 20 (0: Unacceptable, 100: Acceptable)

<table>
<thead>
<tr>
<th></th>
<th>(12a)</th>
<th>(12b)</th>
<th>(12c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>93</td>
<td>6</td>
<td>85</td>
</tr>
</tbody>
</table>

Now, how should the condition in (10) be revised so as to account for cases with a 'discontinuous' binder? Hoji & Ishii (2004) propose (5), while maintaining that a floating numeral is base-generated at its surface position as an adverb (as is assumed in many other works such as Fukushima 1991a/b, Gunji & Hasida 1998, Takami 1998, Kobuchi-Philip 2003, Ishii 1999, Kawazoe 1999, Nakanishi 2004, 2007a/b).

(5) The claim that we reject:
A and \#-clFN,A, combined, can be taken as a binder of B only if (the traces of) both A (in an A-position) and \#-clFN,A c-command B (in A-position) at LF.

Under Hoji & Ishii's (2004) analysis, therefore, sentences conforming to (12b) are predicted to be unacceptable because neither the floating numeral nor its host NP (i.e., the object) c-commands the intended binddee inside the subject at LF. In the cases of (12a) and (12c), on the other hand, the required c-command relation is satisfied at LF and thus they are predicted to be acceptable.

2.2. Claim: A necessary condition for Bound Variable Construal
While we agree with Hoji & Ishii (2004) that a floating numeral is base-generated as an adverb in its surface position, we however diverge from them on (5), by proposing (4).

(4) Our claim:
A and \#-clFN,A, combined, can be taken as a binder of B only if (the trace of) A (in an A-position) c-commands B (in an A-position) at LF.

What differentiates (4) and (5) is whether or not the \#-clFN-Subj should c-command the intended binddee. Consider (14).

(14) \( NP_{\text{Subj}} \text{NOM} [NP \ldots b \ldots]_{\text{Obj-ACC}} \#-\text{cl}_{\text{FN-Subj}} \text{V-T} \) (Binder: \( NP_{\text{Subj}} \) and \#-clFN-Subj; Bindee: b)

In (14), the intended binder is the 'discontinuous' binder consisting of the floating numeral (i.e., \#-clFN-Subj) and its intended host NP (i.e., the subject), and the intended binddee, b, is contained in the intervening element (i.e., the object). The sentence in (15) is an instance of (14).

(15) An example of (14): Binder: automobile company and three-cl; Bindee: so-ko Zidoosyagaisya-ga [so-ko-no roodookumiai]-o san-sya hihansita. automobile:company-NOM that-place-NO labor:union-ACC three-cl criticized

\(^6\) In our experiments, the informants were asked to indicate how acceptable they found each example on a five-point scale by clicking one of the five radio buttons. Each reported judgment is later converted to a numerical value from '0' (the worst) to '100' (the best).
'Each of the three automobile companies criticized its labor union.'

Since the #-cl\text{FN-Subj} fails to c-command the intended bindee, we can use (14) as a crucial testing ground. If one adopts (5) as Hoji & Ishii (2004) do, the schema in (14) is predicted to be unacceptable because under (5), #-cl\text{FN-Subj} as well as the subject must c-command the intended bindee. Under (5), therefore, (14) forms a minimal pair with (12a) (repeated below), which is predicted to be not unacceptable.

\begin{verbatim}
(12) a. NP\text{Subj-NOM} (...) #-cl\text{FN-Subj} [NP ... b ...]_\text{Obj-ACC} V-T (Binder: NP\text{Subj} and #-cl\text{FN-Subj}; Bindee: b)
\end{verbatim}

Under (4), on the other hand, it is only the intended host NP that must c-command the intended bindee (i.e., the position of the floating numeral is irrelevant). (14) (as well as (12a)) is thus predicted to be not impossible, satisfying the condition in (4).

Provided in (16) is the summary of the different predictions.

\begin{verbatim}
(16) Summary of the predictions:

\begin{tabular}{|c|c|}
\hline
 & (12a) & (14) \\
\hline
Under H&I (i.e., under (5)) & OK & unacceptable \\
Under our proposal (i.e., under (4)) & OK & OK \\
\hline
\end{tabular}
\end{verbatim}

We have conducted an experiment to test the predictions, and the result of the experiment supports our proposal as indicated in (17).

\begin{verbatim}
(17) Number of informants: 20 (0: Unacceptable, 100: Acceptable)

\begin{tabular}{|c|c|}
\hline
 & (12a) & (14) \\
\hline
Average score & 94 & 37 \\
\hline
\end{tabular}
\end{verbatim}

One might consider the contrast between (12a) and (14), which is certainly significant, as support for Hoji & Ishii 2004. However, the score for (14), '37', is too high to be regarded as supporting evidence for their claim if we adopt (18) (suggested in a series of works by H. Hoji (e.g., Hoji 2010)) as our standard for experimental results.\footnote{(18) is a consequence of adopting (i) and the "Maximize Testability" heuristic.}

(i) a. Our goal is to investigate the properties of the Computational System.
   b. We use informant judgments to construct and evaluate the validity of hypotheses concerning the Computational System.

(i-a) and (i-b) are widely accepted assumptions in generative grammar since its inception, and the "Maximize Testability" heuristic is closely related to the hypothetico deductive method adopted here. To be concrete, we propose the view in (ii) to ensure to maximize the testability of our hypotheses.

(ii) An informant (more or less) accepts sentence $\alpha$ under a specified interpretation only if he/she successfully comes up with a numeration that produces (i) a PF representation that is non-distinct from $\alpha$ and (ii) an LF representation that satisfies the necessary condition(s) for the specified interpretation.

By assuming (ii) and modus tollens, we obtain (iii).

(iii) Deduced prediction based on (ii) and modus tollens;

When it is a consequence of one's theory that there is no numeration—and hence the informant cannot come up with such a numeration—that would produce (i) a PF representation non-distinct from $\alpha$ and (ii) an LF representation that satisfies the necessary condition(s) for the specified interpretation, we predict that informants judge sentence $\alpha$ under the specified interpretation unacceptable.
The score for (i.e., the informant judgments on) what is predicted to be unacceptable should turn out to be '0' (i.e., 'completely unacceptable') (or quite close to '0');\(^8\) otherwise, at least some of the hypotheses that have given rise to the prediction are not valid (or something is wrong with how the experiment is conducted).

It should also be pointed out that in the experimental results reported in (13), what is predicted to be unacceptable has come out '6', quite close to '0'. That the result for (14) (i.e., '37') is not as low as '0' thus indicates that Hoji & Ishii's 2004 prediction regarding (14) is disconfirmed.

Therefore we conclude that (4) can, but (5) cannot, be a necessary condition for the Bound Variable Construal. That is to say, it is the positions of A and B (i.e., arguments) at LF, not that of \(\#\text{-}\text{cl}_{FN,A}\) even if there is one, that is crucial in order for A or a 'discontinuous' binder consisting of A and \(\#\text{-}\text{cl}_{FN,A}\) to be a binder of B.

3. The 'non-local' cases in details

As we have briefly mentioned in section 1, sentences of the form in (19) are often claimed to be degraded or unacceptable. Let us call cases like (19) the 'non-local' cases.

(19) One instance of 'non-local' cases: \((=6)\)

\[
\begin{array}{c}
\text{NP}_{\text{Subj}} \text{NOM} \\
\text{NP}_{\text{Obj}} \text{ACC} \\
\text{\#-cl}_{FN,\text{Subj}} \\
\text{V-T (Canonical order)}
\end{array}
\]

The defining factors of the 'non-local' cases are the following three properties: (i) the subject is the intended host NP of the floating numeral, (ii) the \(\#\text{-}\text{cl}_{FN}\), represented as \(\#\text{-}\text{cl}_{FN,\text{Subj}}\) and its intended host NP (i.e., the subject) are not adjacent to each other because of the object intervening between the two, and (iii) the subject and the intervening object are in their canonical SOV order.\(^9\) In this section, we briefly go over how the 'non-local' cases have been treated in the past literature and consider how the discussion in section 2 should be evaluated in terms of this historical issue.

3.1. A bit of history

It was first observed in Kuroda 1980 and Haig 1980 that sentences of the form in (19) (one form of the 'non-local' cases) are degraded.

Miyagawa (1989: 21 and elsewhere) claims that the 'non-local' cases are unacceptable because there is no grammatical derivation that can correspond to them.\(^10\) More specifically,
Miyagawa (1989: 30, 70) proposes that #-cl_{FN} and its host NP should mutually c-command each other and sentences conforming to the 'non-local' cases are unacceptable due to the violation of this requirement. Since Miyagawa 1989, the putative unacceptability in question has become the standard judgment in the field, and the mutual c-command requirement (or its variants) between #-cl_{FN} and its intended host NP has (or have) been regarded as being responsible for their unacceptability (e.g., Fukushima 1991a/b, Hasegawa 1993 among others).

Let us briefly summarize Miyagawa 1989: chapter 2. He claims that the subject, the object, and the predicate in a sentence are combined with each other in a binary fashion, but when a sentence contains one or more #-cl_{FN}'s (as well as adverbs such as *kinoo* 'yesterday'), the structure building involving the #-cl_{FN} is ternary as indicated in (20). Note that in (20) the S dominates NP_{Subj}-NOM, #-cl_{FN-Subj} and VP, and the VP dominates NP_{Obj}-ACC, #-cl_{FN-Obj} and V.

(20) (Based on Miyagawa 1989: 33, (51))

\[
[S \text{NP}_{Subj}^-NOM \#-cl_{FN-Subj} [VP \text{NP}_{Obj}^-ACC \#-cl_{FN-Obj} V]]
\]

The NP_{Subj} asymmetrically c-commands the NP_{Obj} in (20). The #-cl_{FN-Subj} in (20) is associated with the subject (NP_{Subj}^-NOM), whereas the #-cl_{FN-Obj} in (20) is associated with the object (NP_{Obj}^-ACC), which is ensured by the mutual c-command condition between the floating numeral and its host NP. Under Miyagawa's (1989) analysis, (21a) and (21b) are the two logically conceivable representations for (19), neither of which is a grammatical representation.

(21) a. *\([S \text{NP}_{Subj}^-NOM \#-cl_{FN-Subj} [S \text{NP}_{Obj}^-ACC \#-cl_{FN-Obj} V] T]]\)

b. *\([S \text{NP}_{Subj}^-NOM [VP \text{NP}_{Obj}^-ACC \#-cl_{FN-Subj} V] T][T]\)

(21a) crashes due to the ban on scrambling of the subject (suggested in Saito 1985), and hence it cannot underlie the phonetic string in (19). The representation in (21b) cannot underlie (19) either, because NP_{Subj}^-NOM and #-cl_{FN-Subj} do not satisfy the mutual c-command requirement. Miyagawa (1989) thus concludes that (19) is unacceptable.

The observational claim that (19) is unacceptable started to be challenged in the mid 1990s (e.g., Gunji & Hasida 1998, Takami 1998, Mihara 1998, and Ishii 1999), and the new observation that some or quite a few sentences conforming to (19) are judged acceptable by some or many informants became serious counterexamples to Miyagawa (1989) and to those who maintained the standard judgment following Miyagawa. It is indeed easy to construct examples of the form in (19) that are acceptable, as illustrated in (22B).

(22) Takami 1998: (17):

A: Ko-no sinkan zassi, uretemasu ka.

'This new magazine is selling Q'

B: Ee, kesa-mo \textit{gakuseisan-ga so-re-o go-nin katteikimasitayo}.

'Yes, it also happened this morning that five students came and bought it.'
3.2. On the grammatical status of the 'non-local' cases

There are two ways to interpret the state of affairs that sentences of the form in (19) are not always unacceptable. One way is to claim that the form in (19) can in principle be grammatical (i.e., it can correspond to a grammatical pair of PF and LF representations) but due to some factors independent of the grammar, one may sometimes find it unacceptable. The other way is to maintain that some instances of the form in (19) are grammatical while the others are not.

We take the former option, along with Hoji & Ishii (2004), by maintaining (9a) and adopting the assumption that a floating numeral can freely be base-generated in its surface position as an adverb.

(9) a. The surface SOV order **necessarily** corresponds to an LF representation in which S asymmetrically c-commands O.

The discussion in section 2 has been made with the assumption that the 'non-local' cases are in principle grammatical and it is not the matter of grammar why some sentences conforming to (19) are sometimes judged as degraded or unacceptable by some informants. This first option is compatible with the suggestion by Takami (1998) and Mihara (1998) (among many others) that the acceptability of sentences conforming to (19) is heavily affected by extra-grammatical factors. The proponents of the latter option would have to specify how this claimed ambiguity can be explained, and how their proposal can be put to empirical test. The testability issue, however, seems difficult to handle, to say the least, because Takami's (1998) and Mihara's (1998) suggestions just noted above seem quite plausible; there is not a single claim, as far as we know, that has taken the latter option and at the same time successfully overcome the testability issue.

We review in the following section Miyagawa & Arikawa 2007, one instance of the works pursuing the latter option. We will first summarize their analysis, and point out that under their analysis, the basic paradigm seen in section 2.1 cannot be captured. In addition, we review Hoji & Ishii's (2004) argument against Miyagawa & Arikawa 2007, which makes reference to the Bound Variable Construal in different instances of the 'non-local' cases than those discussed in section 2.2. 11

4. Possible LF representation for the SOV order

4.1. Miyagawa & Arikawa 2007

Putting aside #-clFN momentarily, let us first consider Miyagawa & Arikawa's (2007: 656-660) view of the possible derivations of the SOV order in Japanese. Miyagawa & Arikawa 2007 diverges from Miyagawa 1989 regarding what kind of LF representations the SOV order can correspond to. Miyagawa & Arikawa 2007 adopts (23), contrary to the widely held view, recorded in (9a), that the surface SOV order unambiguously corresponds to a representation in which S asymmetrically c-commands O at LF, which is accepted in most of the generative works including Miyagawa 1989.

(23) The proposal by Miyagawa & Arikawa 2007:

The surface SOV order **can** correspond to **either**
(i) a representation in which S asymmetrically c-commands O at LF or
(ii) one in which O asymmetrically c-commands S at LF.

They propose that T\(^{ti}\) triggers EPP-driven movement of an NP to the spec of TP, and that the target NP of this movement can be the object as well as the subject (Miyagawa & Arikawa 2007: 656). As a consequence of this proposal and the widely-accepted assumption that A’-moved elements undergo reconstruction at LF (Miyagawa & Arikawa 2007; 657, 659, footnote 5), the SOV order can correspond to two distinct types of pre-spell-out representations and those of LF representations. In one type, the subject is in the spec of TP as an A-moved element as in (24a).

(24) a. Before-spell-out representation for the SOV order, pattern 1

\[
\begin{array}{c}
\text{TP} \ [\text{NP}_{\text{Subj}} \ [\text{T} \ [\text{vp} \ \text{NP}_{\text{Obj}} \ [\text{vp} \ [\text{NP}_{\text{Obj}} \ \text{v}] \ [\text{T}]]]]] \\
\text{A-movement (EPP-driven)}
\end{array}
\]

b. At LF; NP\(_{\text{Subj}}\) asymmetrically c-commands NP\(_{\text{Obj}}\).

In the other type, it is the object that is in the spec of TP and the subject appearing before the object on the surface is due to A’-movement as in (25b). When the latter type goes into the LF component, the subject undergoes reconstruction and the object ends up asymmetrically c-commanding the subject at LF as summarized in (25b).

(25) a. Before-spell-out representation for the SOV order, pattern 2

\[
\begin{array}{c}
\text{TP} \ [\text{NP}_{\text{Subj}} \ [\text{T} \ [\text{vp} \ \text{NP}_{\text{Obj}} \ [\text{vp} \ [\text{NP}_{\text{Subj}} \ [\text{vp} \ [\text{NP}_{\text{Obj}} \ \text{v}] \ [\text{T}]]]]] ]]
\end{array}
\]

b. At LF,
(i) NP\(_{\text{Subj}}\) (A’-moved element) undergoes reconstruction.
(ii) NP\(_{\text{Obj}}\) asymmetrically c-commands NP\(_{\text{Subj}}\).

Let us now return to the 'non-local' cases. Miyagawa & Arikawa (2007: 650) claim that #-cl\(_{\text{FN}}\) and its intended host NP start out as being dominated by the same node. In their analysis, no movement is allowed at PF and nothing can 'tuck-in' to the middle of the constituent dominating #-cl\(_{\text{FN}}\) and its host NP.\(^{12}\) It thus follows that a floating numeral and its intended host NP are not adjacent to each other on the surface **only if** at least either one of the two elements have undergone movement before Spell-out. Specifically in the case of (19), it is NP\(_{\text{Subj}}\) that undergoes movement.

When they are first taken from the numeration, #-cl\(_{\text{FN}}\) and its intended host NP undergo the operation **Merge** in a way that they get dominated by a single constituent. Therefore when the SOV sentence involves #-cl\(_{\text{FN-Subj}}\), we should always have (26) at one (very early) stage of the structure building.

\(^{12}\) Though it is not clearly mentioned in Miyagawa & Arikawa 2007 that there is no movement at PF nor any 'tucking-in' operation, it must be so assumed in order for their analysis to be coherent.
When the NP\textsubscript{Subj} undergoes movement, stranding the floating numeral, it thus follows that the spec of vP is occupied by the constituent containing \#-cl\textsubscript{FN} (as well as the trace of the NP\textsubscript{Subj}). In order to obtain the desired surface order of the NP\textsubscript{Obj} appearing between NP\textsubscript{Subj} and \#-cl\textsubscript{FN-Subj}, the object moves up to the spec of TP and the subject in (19) necessarily undergoes A'-movement as indicated in (25).

To sum up so far; according to Miyagawa & Arikawa’s (2007) proposal, though the SOV order itself can logically correspond to the two types of derivations as shown above, the ‘non-local’ case in (19) is acceptable only if it corresponds to the derivation of the type in (25); that is, to the derivation in which the NP\textsubscript{Obj} asymmetrically c-commands NP\textsubscript{Subj} at LF.

4.2. Facts against Miyagawa & Arikawa 2007: Weak Crossover effects with a ‘discontinuous’ binder

The simplest but biggest problem for Miyagawa & Arikawa 2007 is that, due to the adoption of (23), they no longer can capture the basic paradigms in (7) and (12) (repeated below), whether a ‘discontinuous’ binder is involved or not.

(7) An observed paradigm with a quantificational expression (non-floated):
   a. NP\textsubscript{Subj}^NOM [NP ... b ...]\textsubscript{Obj}^ACC V-T  (Binder: NP\textsubscript{Subj}; Bindee: b)
   b. *[NP ... b ...]\textsubscript{Subj}^NOM NP\textsubscript{Obj}^ACC V-T  (Binder: NP\textsubscript{Obj}; Bindee: b)
   c. [NP ... b ...]\textsubscript{Obj}^ACC NP\textsubscript{Subj}^NOM^V-T  (Binder: NP\textsubscript{Subj}; Bindee: b)

(12) An observed minimal pair with a ‘discontinuous’ binder:
   a. NP\textsubscript{Subj}^NOM (...) \#-cl\textsubscript{FN-Subj} [NP ... b ...]\textsubscript{Obj}^ACC V-T  (Binder: NP\textsubscript{Subj} and \#-cl\textsubscript{FN-Subj}; Bindee: b)  (Cf. (3).)
   b. *[NP ... b ...]\textsubscript{Subj}^NOM NP\textsubscript{Obj}^ACC (...) \#-cl\textsubscript{FN-Obj} V-T  (Binder: NP\textsubscript{Obj} and \#-cl\textsubscript{FN-Obj}; Bindee: b)  (Cf. (11a).)
   c. [NP ... b ...]\textsubscript{Obj}^ACC NP\textsubscript{Subj}^NOM(...) \#-cl\textsubscript{FN-Subj} V-T  (Binder: NP\textsubscript{Subj} and \#-cl\textsubscript{FN-Subj}; Bindee: b)  (Cf. (11b).)

With (23), nothing prevents (7b) and (12b) from corresponding to a representation in which the subject is c-commanded by the object, and hence (7b) and (12b) are not predicted to be unacceptable anymore. Weak crossover violation cases, to the extent that the relevant judgments are robust, therefore constitute a strong argument against Miyagawa & Arikawa 2007.\textsuperscript{13}

\textsuperscript{13} One might still pursue the idea that (7b) and (12b) can logically correspond to grammatical LF and PF representations (as Miyagawa & Arikawa’s (2007) system allows) but they come out as unacceptable consistently due to some extra-grammatical factors. It is, however, not clear what we might gain by taking such an option.
4.3. Review of Hoji & Ishii’s (2004) arguments against Miyagawa & Arikawa 2007: Binding in the 'non-local' cases with a ditransitive verb

Hoji & Ishii (2004) consider another type of the 'non-local' case, as schematized in (27).

\[
(27) \quad \text{NP}_{D-Obj}^{\text{ACC}} \text{NP}_{Subj}^{\text{NOM}} \text{NP}_{I-Obj}^{\text{DAT}} \quad \#-\text{cl}_{FN-Subj} \quad V-T^{14,15}
\]

The NP_{I-Obj} intervening the intended host NP (i.e., \text{NP}_{Subj}) and the \#-\text{cl}_{FN-Subj} is hypothesized to be in the spec of TP (an A-position) in Miyagawa & Arikawa 2007; see (25). Therefore, what precedes the NP_{I-Obj} on the surface in (27), namely, \text{NP}_{D-Obj} and NP_{Subj}, should undergo reconstruction at LF. As a consequence, Hoji & Ishii (2004) point out that the following two predictions are made under Miyagawa & Arikawa 2007.\(^{16}\)

The first prediction is that the direct object (\text{NP}_{D-Obj}) in the sentence-initial position cannot be a binder of an element inside the subject (i.e., \text{b}).

\[
(28) \quad \text{Prediction 1 under Miyagawa & Arikawa 2007 (Based on Hoji & Ishii 2004: (10))}: \quad ^{*}\text{NP}_{D-Obj}^{\text{ACC}} \; \langle \text{NP}_{Subj}^{\text{NOM}} \; \text{NP}_{I-Obj}^{\text{DAT}} \quad \#-\text{cl}_{FN-Subj} \quad V-T
\]

The second prediction is that the direct object (\text{NP}_{D-Obj}) in the sentence-initial position cannot be a binder of an element inside the indirect object (i.e., \text{b}).

\[
(29) \quad \text{Prediction 2 under Miyagawa & Arikawa 2007 (Based on Hoji & Ishii 2004: (12))}: \quad ^{*}\text{NP}_{D-Obj}^{\text{ACC}} \quad \text{NP}_{Subj}^{\text{NOM}} \; \langle \text{NP}_{I-Obj}^{\text{DAT}} \; \#-\text{cl}_{FN-Subj} \quad V-T
\]

Hoji & Ishii (2004) conducted an experiment that contains three examples of each of the schemata in (28) and (29). Each of the scores given in (30) is the average score of the informant judgments on those three examples. The number of the informants is 10.

\[
(30) \quad \text{Number of informants: 10} \quad (0: \text{Unacceptable}, 100: \text{Acceptable})^{17}
\]

<table>
<thead>
<tr>
<th>Prediction under M&amp;A</th>
<th>Prediction 1: (28)</th>
<th>Prediction 2: (29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average score</td>
<td>84.5</td>
<td>87.2</td>
</tr>
</tbody>
</table>

The predictions are clearly disconfirmed. For instance, the sentences in (31) and (32) are instances of the schemata in (28) and (29), respectively, and the intended interpretation is readily available, contrary to the predictions.

\(^{14}\) (27) is regarded as another instance of the 'non-local' case since the intended host NP is the subject, it is not adjacent to the floating numeral due to NP_{I-Obj}, and the order between the intended host NP (i.e., the subject) and the intervening element (i.e., the indirect object) is in their canonical order. See right under (19) in section 2.2, where we have summarized the three characteristic properties of the 'non-local' cases.

\(^{15}\) The predictions made for (27) can also be made for (i).

\(^{16}\) See Hoji & Ishii’s (2004: footnote 3) for the third prediction, which is the combination of the two predictions noted in (28) and (29).

\(^{17}\) The results reported here are slightly updated versions of the originally reported results in Hoji & Ishii 2004.
(31) An instance that conforms to (28) (Hoji & Ishii 2004: (9))

55% izyoo-no robotto-o [so-itu-o tyuamonsita hito]-ga koozyoo-ni san-nin
55%:or:more-NO robot-ACC [that-thing-ACC ordered person]-NOM factory-DAT three-CL
okurikaesita (koto)
sent:back (fact)

'55% or more x, x = a robot, three persons who had ordered x sent x back to the factory'

(32) An instance that conforms to (29) (Hoji & Ishii 2004: (11))

55% izyoo-no robotto-o ten'in-ga [so-itu-o seisoozita koozyoo]-ni
55%:or:more-NO robot-ACC salesclerk-NOM that-thing-ACC manufactured factory-DAT
san-nin okurikaesita (koto)
three-CL sent:back (fact)

'55% or more x, x = a robot, three salesclerks sent x back to the factory that had manufactured x'

Their experiment also contains eleven examples of so-called weak crossover violation cases as in (33).

(33) An instance of the weak crossover violation cases

[So-ko-no torihikisaki]-ga 55% izyoo-no suupaa-o uttaeru (tositara...)
that-place-NO business:customer-NOM 55% or:more-NO supermarket-ACC sue (if:then...)

"(If) its business customer(s) sue(s) each of 55% or more of the supermarkets, (then..."

The average score of the reported judgments by the 10 informants is 3.5 (0: unacceptable, 100: acceptable), which shows striking contrast with the results in (30). Although the number of informants in their experiments is rather small and their design perhaps needs much improvement, the contrast just reported is quite suggestive. Hoji & Ishii (2004) thus conclude that (23) cannot be maintained, just as what we have concluded in section 4.2.18

To sum up; Miyagawa & Arikawa 2007 attempts to maintain that some instances of the 'non-local' cases are grammatical while the others are not (see 3.2), and some testable predictions have been deduced based on their claims. Those predictions, however, have been disconfirmed, as summarized in (30), indicating that their adoption of (23) (as well as the other parts of their analysis) is not valid.19

18 Miyagawa & Arikawa (2007: Appendix) do not consider Hoji & Ishii’s (2004) examples as serious counterexamples, remarking that those examples are not (readily) acceptable for them. Such a way of dismissing counterexamples is not compatible with our standard in (18) (see also footnote 7), because those examples are predicted to be unacceptable under Miyagawa & Arikawa's analysis.

Moreover, Miyagawa & Arikawa (2007: Appendix, 666) avoid considering Hoji & Ishii’s (2004) original examples because those examples are not 'easy to judge' for them. Instead, they consider sentences involving anaphoric dependency with zibun-zisin provided in Miyamoto & Sugimura 2005. Let us point out that this move is also problematic because predictions made under the hypothesis that zibun-zisin is a local anaphor has been clearly disconfirmed; see Hoji 2010 and the earlier references cited there.

19 Miyagawa (2010: 68-69) claims that the position(s) above the spec of TP can also be (an) A position(s). By stipulating so, he seems to successfully remove the counterexamples to Miyagawa & Arikawa 2007. That is to say, under Miyagawa 2010, it is no longer predicted that (28) and (29) are unacceptable and thus the results in (30) are
5. Concluding Remarks

We have claimed that it is the positions of A and B (i.e., arguments) that are crucial for the availability of a binding construal regardless of whether the binder is a single constituent or it is a 'discontinuous' binder consisting A and $\#cl_{FN-A}$. We have also maintained that the surface SOV order necessarily correspond to an LF representation in which $S$ asymmetrically c-commands $O$. Some experimental results have been presented in support of those claims.

Similar conclusions have been drawn with scope interaction though the space limitation prevents us from discussing it here. We thus obtain the following: it is the positions of A and B (i.e., arguments) at LF, not that of $\#cl_{FN-A}$, that is relevant for A and $\#cl_{FN-A}$ (i) to be a 'discontinuous' binder of B or (ii) to be a 'discontinuous' wide-scope taking element with respect to B.

We have been able to arrive at this conclusion by examining sentences with floating numerals in Japanese, which would not have been possible by studying languages that do not allow floating numerals (as freely as Japanese does). Taking the conclusion as a consequence of some properties of the Universal Grammar, we hope to regard the discussion in this paper as forming a (albeit rather small) basis for further investigation of the properties of the Computational System.

References

Hoji, H. 2010. Hypothesis testing in generative grammar: Evaluation of predicted schematic not problematic anymore; see Miyagawa 2010: footnote 5 of chapter 3). This move, however, does not give us any new testable predictions. Besides, the claim in question is crucially based on the validity of each of (i).

(i) a. In the Subject-Object-Verb-Neg order, the subject cannot take scope under Neg.
   b. Bound Variable Construal between a QP and pro is possible only if the former c-commands the latter at LF.
   c. Zen'in 'all' takes scope over Neg only if the former c-commands the latter at LF.
   d. Zibun-zisin is a [+A] element (i.e., a local anaphor), just like him/herself in English.

None of the generalizations/hypotheses in (i), however, is valid at least for the following reasons.

(ii) a. The observation that the subject cannot take scope under Neg does not seem valid, as various researchers including Kato (1988: 36) argues (despite the fact that Miyagawa attributes (i-a) to Kato 1988).
   b. That (i-b) is not valid has been pointed out and amply demonstrated in works such as Ueyama 1998 and Hoji 2003.
   c. Many informants find it quite easy to take zen'in as the wide-scope taking element irrespective of its position, not only with respect to Neg but also with respect to another scope-bearing NP.
   d. It has been shown that (i-d) is not valid; see Hoji 2010 and the earlier references cited there.
Bound Variable Construal with a 'Discontinuous' Binder


Kuroda, S.-Y. 1970. Remarks on the Notion of Subject with Reference to Words like also, even, or only. Part II. *Annual Bulletin, Research Institute of Logopedics and Phoniatrics* 4, 127-152. Tokyo: The University of Tokyo. (Reproduced as Kuroda 1992: chap. 2. (78-113).)


