1 Introduction

It has been accepted since the late 1980s (see Saito 1989, 1992, Ueyama 1998 among others) that clause-internal scrambling in Japanese exhibits both $A$- and $A'$-properties. With regard to Bound Variable Anaphora (henceforth BVA) and scope dependency, we can state the accepted observations as in (1) and (2).

(1) Having $A$-properties:
   a. BVA: $\boxed{[A \text{-ACC} ... [B ...]-\text{NOM} V}$
      \begin{tabular}{ll}
      Binder & Bindee \\
      \end{tabular}
      possible
   b. Scope: $[A \text{-ACC} B\text{-NOM} V$
      \begin{tabular}{ll}
      Wide & Narrow \\
      \end{tabular}
      possible

(2) Having $A'$-properties (i.e., exhibiting so-called reconstruction effect):
   a. BVA: $[B ...]-\text{ACC } \boxed{A \text{-NOM} V}$
      \begin{tabular}{ll}
      Bindee & Binder \\
      \end{tabular}
      possible
   b. Scope: $B\text{-ACC } A\text{-NOM} V$
      \begin{tabular}{ll}
      Narrow & Wide \\
      \end{tabular}
      possible

There are two competing approaches in capturing the dual properties. One is representational, and the other is derivational. The aim of this paper is to argue for the representational approach on the basis of experimental results.

2 Summary of the Past Works
2.1 Representational approach vs. Derivational approach

Under a representational approach (e.g., Mahajan 1990, Miyagawa 1997, Ueyama 1998, 2003), BVA and scope dependency are licensed at one designated level of representation (though the choice of the 'designated level' varies depending on the researchers), and the position of the scrambled object at
this level determines whether the scrambled object has an A-property or an A'-property.

Under a derivational approach (e.g., Webelhuth 1989, Saito 2003), on the other hand, BVA and scope dependency can be licensed at more than one level, and the dual properties in question are due to the timing of the licensing in the course of derivation.

In the rest of this section, we see one of the crucial differences between the two approaches, focusing on Ueyama 1998/2003 and Saito 2003 as the representative of each approach.

### 2.1.1 Representational approach—Ueyama 1998, 2003

Ueyama maintains that BVA and scope dependency are possible only if at LF, the intended binder c-commands the intended bindee in the case of the former and the intended wide-scope taking element c-commands the intended narrow-scope taking element in the case of the latter. She further claims that the scrambling construction can correspond to two distinct types of LF representations (as a result of two distinct types of derivations) as in (3).

(3) Proposed two derivations in Ueyama 1998, 2003 (Simplified)

<table>
<thead>
<tr>
<th>(3)</th>
<th>Proposed two derivations in Ueyama 1998, 2003 (Simplified)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Spell-Out</td>
</tr>
<tr>
<td>Derivation</td>
<td></td>
</tr>
<tr>
<td>for A-properties</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>TP</td>
</tr>
<tr>
<td>VP</td>
<td>T</td>
</tr>
<tr>
<td>O asymmetrically c-commands S</td>
<td>O asymmetrically c-commands O</td>
</tr>
<tr>
<td>Derivation for A'-properties</td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>TP</td>
</tr>
</tbody>
</table>

The scrambled object's A-property is due to the LF representation of the first derivation in (3), in which the scrambled object O c-commands the subject S. Its A'-property, on the other hand, is due to the second derivation in (3), where S c-commands O at LF and yet O precedes S on the surface because of the
adjunction of $O$ at PF. Due to the two types of LF representations, therefore, the observations in (1) and (2) are as expected under Ueyama's analysis.

2.1.2 Derivational approach—Saito 2003

Saito (2003) maintains that a scrambling construction corresponds to a single derivation in (4).

(4) Proposed derivation in Saito 2003 (Simplified)

- **Before the movement** of Object ($O$)

```
  TP  
  |   |
 VP  |   T
   S  |
    O
   V
```

Source of A'-properties

- **After the movement** of $O$

```
  TP  
  |   |
 VP  |   T
   S  |
    O
   V
```

Source of A-properties

Under this analysis, the dual properties in question are due to the timing of the licensing. A'-properties are due to the c-command relation before the movement of the object $O$ (see (4a)), while A-properties are due to the c-command relation after the movement of $O$ (see (4b)).

2.1.3 Crucial difference between the representational approach and the derivational approach

As pointed out in Hoji 2006, the difference between Ueyama's representational approach and Saito's derivational one is as follows: under Ueyama's, the 'scrambled' object cannot have A and A'-properties simultaneously because they are results of two distinct LF representations, while under Saito's, it can since one sentence corresponds to one derivation that can be the source of both A- and A'-properties at the same time.

2.2 Experiment conducted and reported in Hoji 2006

Hoji (2006) argues that the difference just noted leads us to the different predictions on the scrambling ditransitive construction in (5).

(5) (Hoji 2006: (117) (slightly adapted))

```
[O \ldots D\ldots],\text{-ACC} [S \ldots \gamma \ldots ]\text{-NOM} D\text{-DAT} e\gamma_1 \text{V-T}
```

Intended readings:
- (i) BVA between $O$ (binder) and $\gamma$ (bindee)
- (ii) BVA between $\xi$ (binder) and $\gamma$ (bindee)
Notice that the scrambled object $O$ as a whole is the intended binder of the element $\gamma$ inside the subject $S$, and at the same time, the scrambled object $O$ contains the element $\beta$ that is intended to be bound by the dative object $\alpha$. In order for the intended reading in (i) to arise, $O$ needs to have an A-property. In order for the one in (ii) to arise, on the other hand, $O$ needs to have an A'-property.

Under Ueyama's (1998, 2003) representational approach, it is predicted to be impossible to have (i) and (ii) simultaneously. On the other hand, under Saito's (2003) approach, both are predicted to be possible.

(6) is one of the examples included in Hoji's (2006: section 5) experiment.

(6) (Hoji 2006: (120) (slightly adapted))

\[
\begin{align*}
&\alpha \text{ so-ko-o hihansita kaikeisi toka dareka toka}_1-0 \\
&\beta \text{ that-place-ACC criticized accountant or somebody or]-ACC} \\
&\gamma \text{ so-itu-no koukou-no sensei\text{-ga} [that-person-GEN high:school-GEN teacher-NOM} \\
&\alpha \text{ 55\% izyoo-no kaisha\text{-ni ec1 suisensiteita (tositara...)} [55\% or:more-GEN company\text{-DAT recommended (if:then)...]} } \\
\end{align*}
\]

'If that person's high school teacher had recommended [\alpha some accountant or others who criticized [that place] to\beta (each of) 55 \% or more companies], ...'

Intended readings:

(i) BVA between $O$ (binder) and $so-itu$ 'that person' (bindee)
(ii) BVA between $\alpha$ (binder) and $so-ko$ 'that place' (bindee)

His experiment includes three such examples conforming to (5), and 16 informants participated in it. The average score on the three examples by the 16 informants was 2.25, quite close to zero ('completely unacceptable', on the 0-100 scale). This result suggests that the two readings are not possible simultaneously, providing support for Ueyama's representational approach over Saito's derivational approach.

3 New Experiment

3.1 Two distinct predictions

We have conducted another experiment along the lines of Hoji 2006, making recourse to the schema in (7). Notice that one of the readings at stake is scope dependency.

(7) $[\alpha ... \beta ...]_1$-ACC $S$-NOM $\alpha$-DAT $ec_1$ V-T
Intended readings:
(i) $O$ takes wide scope with respect to $S$.
(ii) BVA between $\alpha$ (binder) and $\beta$ (bindee)

In (7), the intended scope interaction in (i) is possible only if the 'scrambled' object $O$ has an A-property, while the intended BVA in (ii) is possible only if $O$ (i.e., the element that contains the intended bindee $\beta$) has an A'-property. While Ueyama's representational approach does not allow the two readings at the same time, Saito's derivational approach does. (8) is one instance of (7).

(8) An instance of (7):

\[
[O \text{So-ko-ni syuushoku sitagatteita san-nin-izyoo-no gakusei}]_{-o} \text{ ACC }
[O \text{That-place-DAT get:a:job wanted:to three-CL-or:more-GEN student}]_{-ACC}
[\varepsilon \text{go-nin-no gizyutusya]-ga sukunakutomo yot-tu-no kigyoo]-ni }
[S \text{five-CL-GEN technician]-NOM } \text{ at:least four-CL-GEN company]-DAT }
\epsilon c_1 \text{ syookaisita. introduced}
\]

(Lit.) '[\text{Three or more students who wanted to get a job at that place}],
\text{five technicians] introduced to [at least four companies] }\epsilon c_1.\]

Intended readings:
(i) $O$ takes wide scope with respect to $S$.
(ii) BVA between $\alpha$ (binder) and $\text{So-ko 'that place'}$ (bindee)

Ueyama predicts that the intended readings are impossible, while Saito predicts they are possible.

If the scrambled object $O$ need not to have A- and A'-properties simultaneously, the two analyses yield the same predictions. There are four such cases. Three of them are instances of the Accusative Object-Subject-Dative Object-Verb order, just like (7), but do not involve the two dependency readings at the same time (or none at all). The other case involves the two readings simultaneously, but does not involve a scrambled object.

The first three predictions are about (9), (10) and (11).

(9) $[O \ldots \beta \ldots]_{-ACC} \ S\text{-NOM } \alpha\text{-DAT } \epsilon c_1 \text{ V-T}$
Intended reading: Neither BVA nor scope interaction is involved

(10) $O_{-ACC} \ S\text{-NOM } \alpha\text{-DAT } \epsilon c_1 \text{ V-T}$
Intended reading:
$O$ takes wide scope with respect to $S$
Neither of the two readings is involved in (9), and only one of the two readings is asked in (10) and (11). In other words, $O$ can either have an $A$ or $A'$-property in (9), and it is only required to have an $A$-property in (10) or an $A'$-property in (11). As we have seen in sections 2.1.1 and 2.1.2, those are all possible under both analyses. We thus expect that the intended readings in (12), (13) and (14), for instance, are all acceptable to varying degrees; see Appendix.

(12) An instance of (9):

$$\text{[O Toyota-DET get:a job wanted:to three-CL-or:more-GEN student]-ACC \[ a-no gizyutusya-DET-NOM GM-DET ec_1 syookaisita. \]}$$

(Lit.) 'Three or more students who wanted to get a job at Toyota, that technician introduced to GM ec_1.'

Intended reading: Neither BVA nor scope interaction is involved.

(13) An instance of (10):

$$\text{[O Toyota-DET get:a job wanted:to three-CL-or:more-GEN student]-ACC \[ s go-nin-no gizyutusya-DET-NOM GM-DET ec_1 syookaisita. \]}$$

(Lit.) 'Three or more students who wanted to get a job at Toyota, five technicians introduced to GM ec_1.'

Intended reading: $O$ takes wide scope with respect to $S$.

(14) An instance of (11):

$$\text{[O So-ko-DET ni get:a job wanted:to student]-DET-NOM \[ a-no gizyutusya-DET-NOM that-gen technician-DET-NOM \[ sukanakutomo yot-tu-no kigyoo-DET-NOM ec_1 syookaisita. \]}$$

(Lit.) '(A/the) student(s) who wanted to get a job at that place, that technician introduced to at least four companies ec_1.'

Intended reading: BVA between (binder) and 'that place' (bindee).
The last one of the four predictions that the two analyses share is about (15). Notice that the word order in (15) is Subject-Dative Object-Accusative Object-Verb (S-DO-AO-V).

(15)  S-NOM [α ... β ...]-DAT O-ACC V-T

Intended readings:
(i) α takes wide scope with respect to O.
(ii) BVA between S (binder) and β (bindee)

There is no scrambled object to begin with, and thus no requirement of having an A-property and an A'-property simultaneously.6 (16) is one example conforming to the schema in (15).

(16) An instance of (15):
[Sukunakutomo yot-tu-no kigyoo]-ga
[At:least four-CL-GEN company]-NOM
[so-ko ni syuushoku sitagatteita san-nin-izyoo-no gakusei]-ni
[that-place-DAT get:a:job wanted:to three-CL-or:more-GEN student]-DAT
[go-nin-no gizyutusya]-o syookaisita.
[five-CL-GEN technician]-ACC introduced

(Lit.) '[S At least four companies] introduced to [α three or more students who wanted to get a job at that place] [O Five technicians].'

Intended readings:
(i) α takes wide scope with respect to O.
(ii) BVA between S (binder) and so-ko 'that place' (bindee)

The table in (17) summarizes the predictions.

(17) Summary of the predictions:

<table>
<thead>
<tr>
<th></th>
<th>(7)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Ueyama's Analysis</td>
<td>unacceptable</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Under Saito's Analysis</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>

3.2 Design and results of the experiment

The experiment was conducted online. There were nine examples that conform to each of the five schemata given in (7), (9), (10), (11) and (15), and 14 informants participated in the experiment. 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 was later
converted to a numerical value from '0' ('completely unacceptable') to '100' ('fully acceptable'), and the average score on each schema (the nine examples) by the 14 informants was calculated.

The table in (11) shows the results of the experiment.

(18) Results of the experiment:

<table>
<thead>
<tr>
<th>Schema</th>
<th>(7)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Score</td>
<td>0.33</td>
<td>98.00</td>
<td>76.00</td>
<td>69.00</td>
<td>91.67</td>
</tr>
</tbody>
</table>

(Completely unacceptable: 0; fully acceptable: 100)

4 Concluding Remarks

The results of the experiment dealing with BVA and scope dependency thus replicate those of Hoji's (2006) experiment (which dealt with two instances of BVA) and strongly favor Ueyama's representational approach over Saito's derivational approach.

The puzzle however remains if so-called a floating numeral quantifier (henceforth FNQ) is taken into account. An FNQ is the number-classifier sequence that appears without any case-marker or copula attached to it, and it can be separated from the noun phrase whose amount is 'counted' by FNQ (following the common practice in the field, I call such a noun phrase the host NP (of FNQ)). For instance, the bold-faced phrase san-nin 'three-cl.' and the italicized phrase gakusei 'student' in (19) are an instance of FNQ and its host NP, respectively.

(19) Gakusei-ga (kinoo) san-nin kita (koto)
Student-NOM (yesterday) three-CL came (that)
'(that) three students came (yesterday)'

Hasegawa 1993 observes that in the construction where the 'scrambled' object is the host NP of FNQ, FNQ and its host NP, combined, do not exhibit A-properties with respect to scope dependency.7

(20) Hasegawa's (1993) observations in terms of scope dependency:

a. The host NP's *not* having A-properties (Cf. (1b).):
   i. \(A_1\)-ACC FNQ, B-NOM V
      Wide  Narrow  impossible
   ii. \(A_1\)-ACC B-NOM FNQ, V
      Wide  Narrow  impossible

b. The host NP's having A'-properties (Cf. (2b).):
If this is a valid (i.e., repeatable) observation, it should mean that, in the cases where the 'scrambled' object is the intended host NP of FNQ, the scrambling construction necessarily corresponds to a derivation in which the 'scrambled' object has A'-properties under Ueyama’s representational approach, and we should seek a principled account of it. A more careful (empirical as well as theoretical) investigation is needed and I plan to address relevant issues in a separate work.

Appendix: The Fundamental Asymmetry in Generative Grammar

The research presented in this paper is a part of the research that investigates the properties of the language faculty by the hypothetico-deductive method. Since the inception of generative grammar in the 1950's, it has been claimed that humans have a mental organ (the language faculty), and generative grammatical research has been concerned, ultimately, with a discovery of the properties of the Computational System, assumed to be at the center of the language faculty.8 We have also adopted the view that informant judgments are a primary source of evidence for or against hypotheses concerning the Computational System. However, these basic assumptions have raised issues as to how hypotheses concerning the properties of the Computational System can be put to (rigorous) test. This testability problem stems from the indirect relationship between the object of inquiry (competence in the sense of Chomsky 1965) and what is observable (performance in Chomsky 1965—the informant judgment is an instance of that).

One of the key assumptions for solving the testability problem is as given in (21).

(21) The informant accepts a sentence 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 the presented sentence, and
(ii) an LF representation that satisfies the necessary condition(s) for the specified interpretation.
That is to say, if it follows from one's theory that there is no numeration that could produce (i) a PF representation that is non-distinct from sentence \( \alpha \) and (ii) an LF representation that satisfies the condition(s) for specified interpretation \( \gamma \), we predict that \( \alpha \) cannot be acceptable under \( \gamma \). Even if interpretation \( \gamma \) on sentence \( \alpha \) is predicted to be acceptable, on the other hand, the reading \( \gamma \) on sentence \( \alpha \) does not necessarily have to be actually acceptable, for there can be extra-grammatical factors that would prevent the informant from judging it acceptable. From (21) thus follows the fundamental asymmetry in (22).

(22) The Fundamental Asymmetry
   a. What is predicted to be unacceptable should be judged completely unacceptable.
   b. What is predicted to be acceptable should be judged acceptable to varying degrees.

Therefore, in our experiments, it is crucial that the average score on what is predicted to be unacceptable comes out as close to '0' ('completely unacceptable') as possible. If it does not, it means that the prediction is disconfirmed and something must be wrong with the experimental design and/or at least one of the hypotheses that are responsible for the prediction.

Now recall that Saito's analysis in the text discussion does not provide us any prediction that something is unacceptable, at least with regard to BVA or scope dependency in the 'short-distance' scrambling construction, while Ueyama's analysis does, as summarized in (17). Therefore, even with the results of the experiments in (18), one could still argue that the computational system can produce a grammatical PF-LF pair that corresponds to the sentences of the form in (7), as Saito's theory predicts, but the informants do not accept those sentences for some extra grammatical reason.

As Hoji 2006 concludes, however, I maintain that to the extent that Ueyama's (1998, 2003) analysis gives us a prediction on what is unacceptable and that prediction is not disconfirmed, it is to be regarded as being superior to Saito 2003, in line with (22), which I take as a key to rigorous testability in language faculty science as an exact science.

Notes

* I would like to thank Hajime Hoji for his feedback and suggestions. I also wish to thank Kiyoko Kataoka, Ayumi Ueyama, and the audience of WECOL 2011 for their comments, and the 14 informants for their judgments. The regular disclaimers apply.

1 In the first derivation in (3), the thematic object of the verb is not the 'scrambled' object but the \( oo \); see Ueyama 1998: section 2.5.2 and 2003: section 5.4 for details.
2 Assuming that noun phrases have several types of feature, Saito (2003) claims the timing of feature copying and feature deletion is responsible for A- and A'-properties. While the space limitation forces me to omit a detailed and more accurate summary of it, the omission does not affect the argument for the main point of the present paper.

3 Other proponents of a representational approach may have a different view from Ueyama as they assume that the scrambled object can be either in an A-position or in an A'-position due to the ambiguous (A- and A') nature of the movement operation (e.g., Mahajan 1990). Such a difference is inconsequential to our current discussion to the extent that the scrambled object cannot have an A-property and an A'-property simultaneously in such an analysis either.

4 I have converted Hoji's (2006) "-2-to+2" scale to the 0-100 scale for the ease of comparison with the other experiment that will be introduced later.

5 Hoji's experiment also contains instances of two more schemata where only one of the two readings is at stake. Those examples are predicted to be acceptable under both analyses. The average scores for them are 99.5 and 81.25 on the 0-100 scale, showing a sharp contrast with the score of 2.25 for the schema in (5).

6 It is straightforward that the intended reading in (ii) in (15) is predicted to be possible under both analyses if we maintain the widely-adopted assumption in the field that the subject c-commands the object in the 'unmarked' (Subject-Object-Verb) order.

The reading in (i) involves scope interaction between the two objects. There has been a debate regarding the hierarchical relation between the dative object and the accusative object. One view is that the dative object asymmetrically c-commands the accusative object just as the subject asymmetrically c-commands the object in the Subject-Object-Verb order (Hoji 1985, Saito 1992, Fukui 1993, Takano 1998, Yatsushiro 2003 among many others). The other view is that there is no such asymmetrical relation between the two objects as there is no such relation between the object and the subject in the Object-Subject-Verb order (Miyagawa 1997, Matsuoka 2003, Miyagawa & Tsujioka 2004 among many others).

While the issue is beyond the scope of this paper, I should like to note that, regardless of which view is chosen, Ueyama's analysis and Saito's analysis yield the same prediction that the reading in (i) as well as (ii) is acceptable in (15). That is because in either of the two views, the required c-command relation for (i) must be established in one (of the possible) LF representation(s) under Ueyama's analysis, and likewise, the required relation in question must be licensed at some level of derivation under Saito's analysis. Though the indices are used to show which NP is the host NP of FNQ in (20), they are not meant to be part of the theoretical devices.

Instances of (20a) are given in (i).

(i) a.  (Cf. (20a-i).)

\[
\text{Tihoozititai-o yot-tu, san-nin-no seizika-ga hihansita.}
\]
Local:govern:ACC four-CL three-CL-NO politician-NOM criticized

(Functionally: 'Four local governments, three politicians criticized ec, last year'.

b. (Cf. (20a-ii).)

\[
\text{Tihoozititai-o san-nin-no seizika-ga yot-tu, hihansita.}
\]
Local:govern:ACC three-CL-NO politician-NOM four-CL criticized

8 Hoji (2010: footnote 3) warns that a characterization of generative grammar in this way might be too narrow, citing works such as Culicover and Jackendoff 2005: chapter 1. I will not address this issue in this paper.

9 With regard to the 'long-distance' scrambling construction, Saito's (2003) analysis as well as Ueyama's (1998/2003) analysis yield predictions that something is unacceptable. Hoji 2006 contains detailed discussion of how reliably the predictions can be tested.

References


Emi Mukai
University of Southern California
Department of Linguistics, GFS 301
Los Angeles, CA 90089-1693
emukai@usc.edu