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The Proper Binding Condition Effect as a Consequence of Cyclic Linearization*

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1. Introduction

The aim of this paper is to propose a novel explanation of the paradigm found in Japanese scrambling. Relevant examples are shown in (1) below (based on Saito 2003:498-499).[1]

(1) a. Taroo-ga [$_{CP}$ Hanako-ga [$_{PP}$ Sooru-ni] iru to] omotteiru (koto)
Taroo-nom Hanako-nom Seoul-in is that think fact
'Taroo thinks [that Hanako lives [in Seoul]]'

b. [$_{PP}$ Sooru-ni]$_i$ Taroo-ga [$_{CP}$ Hanako-ga t_i iru to] omotteiru (koto)
Seoul-in Taroo-nom Hanako-nom is that think fact
'[In Seoul]$_i$, Taroo thinks [that Hanako lives t_i]'

c. [$_{CP}$ Hanako-ga [$_{PP}$ Sooru-ni] iru to]$_i$ Taroo-ga t_i omotteiru (koto)
Hanako-nom Seoul-in is that Taroo-nom think fact
'[That Hanako lives [in Seoul]]$_i$, Taroo thinks t_i'

d. *[$_{CP}$ Hanako-ga t_i iru to]$_j$ [$_{PP}$ Sooru-ni]$_i$ Taroo-ga t_j omotteiru (koto)
Hanako-nom is that Seoul-in Taroo-nom think fact
'[That Hanako lives t_i]$_j$, [in Seoul]$_i$, Taroo thinks t_j'

(1b) is derived from (1a) by scrambling of the PP *Sooru-ni* 'in Seoul', and (1c) involves scrambling of CP. Although both the PP and the CP can be scrambled, as in (1b-c), the ungrammaticality of (1d) indicates that once the PP is scrambled, it is not possible to further scramble the remnant CP, which contains the trace of the scrambled PP. Saito (1989) argues that (1d) is straightforwardly ruled out by the Proper Binding Condition (Fiengo 1977, henthforth PBC), which states that traces must be bound, since the trace of

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[1] To make the examples more natural, I will place *koto* 'the fact that' at the end of them if necessary. Note that English translations I provide for Japanese examples are intended to show the rough structure of the sentences, and the sentence final *koto* 'fact' is excluded from the translations.

the PP contained within the scrambled CP is left unbound. Since then, this paradigm has been explained by the PBC, but it is still controversial. Especially, the theoretical status of the PBC has been questioned (cf. Müller 1996). Alternatively, I propose in this paper that the PBC effect on scrambling, exemplified in (1d), can be captured as a consequence of linearization at PF. In particular, I argue that the effect follows from Fox and Pesetsky's (2003, 2005, henthforth F&P) theory of Cyclic Linearization, which claims that linear orderings of syntactic units are cyclically fixed, and the fixed orderings must be preserved at the end of each cycle, combined with Ko's (2007) hypothesis that the whole *v*P, including its edge, constitutes the relevant domain for linearization in languages like Korean and Japanese.

This paper is organized as follows. Section 2 briefly summarizes previous studies. Then, Section 3 introduces F&P's theory, and proposes an explanation of the PBC effect. Specifically, I illustrate that given F&P's theory, the derivations which give rise to the surface linear order like (1d) necessarily crash at PF. Section 4 concludes this paper.

2. Previous Studies

As mentioned in Section 1, Saito's (1989) explanation of the paradigm in (1) is based on the PBC. Müller (1996) finds, however, that remnant movement is in fact possible in some circumstances, so that the PBC is too restrictive. As stated in (2), remnant movement is allowed if the types of relevant movements are different from each other.

(2) *Müller's generalization* (Müller 1996:375)
Remnant XPs cannot undergo a certain type of movement if the antecedent of the unbound trace has undergone the same type of movement.

Then, Kitahara (1997) provides an elegant explanation of this generalization in terms of the Minimal Link Condition (MLC). Let us consider the schematic structure in (3).

(3) $[_{XP} \ldots X^0 [_{YP} \ldots Y^0 [_{ZP} \ldots Z^0 [_{WP} \ldots W^0 \ldots]]]]$

Suppose that the head Y^0 attracts the phrase WP to its Spec, and then X^0 attracts the remnant ZP to Spec, XP. If the features on Z^0 and W^0 are different, which means that ZP and WP undergo the different types of movement, this derivation must be possible because it observes the MLC, which requires the closest element to be attracted. On the other hand, if Z^0 and W^0 have the same feature, which implies that they undergo the same type of movement, the MLC forces the ZP to be attracted by Y^0, not WP. Thus, the derivation with Y^0 attracting WP and X^0 attracting the remnant ZP is impossible if ZP and WP undergo the same type of movement. Kitahara further suggests that the PBC effect on scrambling can be explained if scrambling is also feature-driven, since (1d) involves two instances of scrambling.

Although Kitahara's (1997) analysis is highly principled, Saito (2003) argues that the MLC-analysis fails to explain the paradigm in (4) below (based on Saito 2003:501).

(4) a. Hanako-ga Taroo-ni [PRO [$_{PP}$ Sooru-made] iku koto]-o meizita (koto)
Hanako-nom Taroo-to Seoul-to go fact-acc ordered fact
'Hanako ordered Taroo to go to Seoul'

b. Hanako-ga [$_{PP}$ Sooru-made]$_i$ Taroo-ni [PRO t_i iku koto]-o meizita (koto)
Hanako-nom Seoul-to Taroo-to go fact-acc ordered fact
'Hanako, to Seoul$_i$, ordered Taroo to go t_i'

c. [PRO [$_{PP}$ Sooru-made] iku koto]-ga$_i$ Taroo-ni t_i meizir-areta (koto)
Seoul-to go fact-nom Taroo-to ordered-was fact
'[To go to Seoul]$_i$ was ordered Taroo t_i'

d. *[PRO t_i iku koto]-ga$_j$ [$_{PP}$ Sooru-made]$_i$ Taroo-ni t_j meizir-areta (koto)
go fact-nom Seoul-to Taroo-to ordered-was fact
'[To go t_i]$_j$, to Seoul$_i$, was ordered Taroo t_j'

In (4a), the embedded clause is a control complement, whose head is the nominalizer *koto* 'fact'. (4b) is derived from (4a) by scrambling of the PP *Sooru-made* 'to Seoul'. (4c) shows that the complement clause can be passivized because of its nominal nature. The crucial example is (4d). In (4d), the PP is scrambled first, and then the complement clause is passivized. Saito (2003) argues that the MLC-analysis makes a wrong prediction, since the relevant types of movements in (4d) are different. He also argues that scrambling is not feature-driven, so that the MLC is irrelevant to the ungrammaticality of (1d).

Then, to explain the ungrammaticality of (1d) and (4d) uniformly, Saito (2003) proposes to reformulate the PBC as a condition on the application of Merge, which I will call the derivational PBC, as in (5) below.

(5) *Derivational PBC* (adopted from Saito 2003:507-508)
a. α is subject to Merge only if α is a complete constituent.
b. α is a *complete constituent* =$_{df}$ (i) α is a term, and (ii) if a position within α is a member of a chain γ, then every position of γ is contained within α.

(5) states, in effect, that a constituent that contains only a subpart of a chain cannot be subject to Merge. Given that movement involves Merge as its part, (1d) and (4d) are ruled out because it involves movement of a constituent that contains only the tail of the scrambling chain.

Although the derivational PBC in (5) nicely captures the empirical facts, it is far from clear why it exists in the grammar. In what follows, I propose that the empirical facts can be captured as a consequence of linearization at PF, arguing that the derivational PBC can be eliminated from the grammar.

3. Proposal

In this section, I propose a novel explanation of the PBC effect on Japanese scrambling, based on F&P's theory of linearization. In Section 3.1, I introduce F&P's theory. Then, in Section 3.2, I argue that the PBC effect follows from F&P's theory, combined with some independently motivated assumptions.

3.1 Cyclic Linearization and Linearization Preservation

Assuming that structure is built from bottom to top, F&P propose that when Spell-out applies to a domain D, the relative orderings of syntactic units within D are established.[2] F&P further propose that the result of Spell-out, which is called an *ordering statement*, is added to an *Ordering Table*. Given that Spell-out multiply applies to a single derivation (see Uriagereka 1999, Chomsky 2000, 2001, among others), an Ordering Table of a particular derivation cumulatively receives ordering information at each application of Spell-out. Besides, F&P assume that the relevant domain for linearization, which is called a *Spell-out Domain*, roughly corresponds to phases (Chomsky 2000, 2001), including at least CP and VP.[3] Then, F&P argue that as a consequence of cyclic Spell-out, once a linear order is established at a particular point of a derivation, it may not be revised or contradicted in a later step of the derivation. This property is termed *Linearization Preservation*, as in (6).

(6) *Linearization Preservation* (Fox and Pesetsky 2003:2)
The linear ordering of syntactic units is affected by Merge and Move *within* a Spell-out Domain, but is fixed once and for all at the end of each Spell-out Domain.

As a result of Linearization Preservation, if an Ordering Table contains two contradicting orderings, the derivation crashes at PF. For instance, suppose that it contains the ordering statements α<β ('<' means 'precede') and β<α. Then, because neither of the ordering statements can be deleted due to Linearization Preservation, α is forced to precede and follow β simultaneously, which is impossible by assumption. In effect, linear orderings of constituents are cyclically fixed and preserved at the end of each cycle.

To see how the system works, let us consider the schematic derivation in (7).[4]

(7) a. *Construction of D* → *Spell-out of D*
$[_D$ X Y Z] Ordering Table: **X<Y<Z**

b. *Merge of α with D*
α $[_D$ X Y Z] Ordering Table: X<Y<Z

c. *Movement of X across α* → *Spell-out of the next higher domain D'*
$[_{D'}$ ... X α $[_D$ t_X Y Z]] Ordering Table: X<Y<Z
X<α<Y<Z

d. *Movement of Y across α and X* → *Spell-out of the next higher domain D'*
*$[_{D'}$ ... Y α $[_D$ X t_Y Z]] Ordering Table: X<Y<Z
Y<α<X<Z

[2] As F&P note, an application of Spell-out may establish some other relations among syntactic units. Following F&P, however, I will concentrate on linear order.

[3] Following F&P, I ignore a distinction between *v*P and VP at this point. I will come back to this issue in Section 3.2.

[4] For ease of exposition, I will use a slightly informal notation for ordering statements. Besides, I will indicate the ordering statement which is newly added to the Ordering Table at the relevant step in boldface. Contradicting parts among ordering statements are indicated by shading.

Suppose that Spell-out applies to D, which consists of X, Y, and Z, as shown in (7a). Then, the Ordering Table gets an ordering statement X<Y<Z. Suppose further that a new constituent α is Merged with D, as in (7b). Given that Spell-out does not apply at this step, the Ordering Table does not contain any information about the relative order between α and the other constituents. Now, (7c-d) are possible subsequent steps. In (7c), the leftmost element within D, namely X, moves across α, and the higher Spell-out Domain D' is Spelled-out.[5] Then, the Ordering Table gets a new ordering statement X<α<Y<Z, which is totally consistent with the previously established ordering. Hence, the derivation can eventually converge. On the other hand, in (7d), Y moves across α and X, and D' is Spelled-out. As a result, the ordering statement Y<α<X<Z is added to the Ordering Table, which causes a contradiction: Y simultaneously precedes and follows X. Given Linearization Preservation, if the derivation proceeds to the step in (7d), it crashes at PF.

Then, is it impossible to move Y in (7a) to a higher domain? F&P argue that successive-cyclic movement of Y within D makes this possible. Let us consider the following derivation.

(8) a. *Movement of Y within D* → *Spell-out of D*
$[_D$ Y X t_Y Z] Ordering Table: **Y<X<Z**

b. *Movement of Y across α* → *Spell-out of D'*
$[_{D'}$ ... Y α $[_D$ t'_Y X t_Y Z]] Ordering Table: Y<X<Z
Y<α<X<Z

In (8a), Y moves to the edge of D, and then D is Spelled-out. As a result, the ordering statement Y<X<Z is added to the Ordering Table. Then, Y moves further, and the ordering statement Y<α<X<Z is established at the Spell-out of D', as shown in (8b). Notice that the Ordering Table in (8b) contains no contradiction. Hence, the derivation can eventually converge with the movement of Y. In this way, F&P explain why movement must proceed successive cyclically: Movement must go through the edge of each Spell-out Domain, otherwise the derivation crashes at PF.

F&P further extend their analysis to Holmberg's Generalization (cf. Holmberg 1999, among others). Simply put, Holmberg's Generalization states that Object Shift is possible if the verb moves out of the VP, as the Swedish examples in (11) show (based on Fox and Pesetsky 2005:17).

(9)	a.	Jag	kysste	henne	inte	$[_{VP}$ t_V	$t_O]$	
		I	kissed	her	not			
	b.	*…	att	jag	henne	inte	$[_{VP}$ kysste	$t_O]$
		…	that	I	her	not	kissed	

[5] Note that F&P assume that movement out of the Spelled-out domains is possible, and that traces are irrelevant for establishing linear orders. As for the former point, F&P argue that although their system allows syntax to access and examine the contents of the previously Spelled-out domains, it shares the idea that the system does not recomputed such the domains with the previous studies that assume Chomsky's conception of phases.

c. *Jag har henne inte [$_{VP}$ kysst t_O]
I have her not kissed

In (9a), the verb moves to the V2-position, and Object-Shift is allowed. On the other hand, the verb stays within VP in (9b-c) because of the presence of the complementizer *att* 'that' or the auxiliary *har* 'have', and Object-Shift is not possible in either case. Assuming that Object-Shift, unlike certain other instances of movement such as A-bar movement, does not make use of the edge of VP, F&P claim that the derivations of the sentences in (9) have (10) as their common part.

(10) *Construction of VP* → *Spell-out of VP*
[$_{VP}$ *kissed her*] Ordering Table: ***kissed<her***

Then, the derivations of the examples in (9) send the following ordering statements to their Ordering Tables at the Spell-out of CP, respectively:

(11) a. *Object-Shift + V-movement* (= (9a))
[$_{CP}$ *I kissed*$_i$ [$_{TP}$ *her*$_j$ *not* [$_{VP}$ t_i t_j]]]
Ordering Table: ***I<kissed<her<not***

b. *Object-Shift in an embedded clause* (= (9b))
*[$_{CP}$ *that* [$_{TP}$ *I her*$_i$ *not* [$_{VP}$ *kissed* t_i]]]
Ordering Table: ***that<I<her<not<kissed***

c. *Object-Shift in a clause with an auxiliary* (= (9c))
*[$_{CP}$ *I have* [$_{TP}$ *her*$_i$ *not* [$_{VP}$ *kissed* t_i]]]
Ordering Table: ***I<have<her<not<kissed***

Since the Ordering Table of each derivation has already received the ordering statement *kissed<her* at the step in (10), (11b-c) induce ordering contradictions. On the other hand, if the verb moves out of the VP and precedes the shifted object as in (11a), the established *kissed<her* order can be preserved. F&P argue that this is the reason why Object-Shift correlates with verb-movement.

3.2 Analysis

In this subsection, I argue that F&P's Linearization Preservation introduced above explains the PBC effect on Japanese scrambling. The crucial examples, (1d) and (4d), are repeated below as (12).

(12) a. *[$_{CP}$ Hanako-ga t_i iru to]$_j$ [$_{PP}$ Sooru-ni]$_i$ Taroo-ga t_j omotteiru (koto)
Hanako-nom is that Seoul-in Taroo-nom think fact
'[That Hanako lives t_i]$_j$, [in Seoul]$_i$, Taroo thinks t_j'

b. *[PRO t_i iku koto]-ga$_j$ [$_{PP}$ Sooru-made]$_i$ Taroo-ni t_j meizir-areta (koto)
go fact-nom Seoul-to Taroo-to ordered-was fact
'[To go t_i]$_j$, to Seoul$_i$, was ordered Taroo t_j'

In particular, I illustrate that their derivations necessarily crashes at PF, if we combine F&P's system with the following three assumptions.

(13) a. Spell-out Domains in Japanese and Korean include at least CP and *v*P.
b. Japanese is head-final.
c. Complement-to-Spec movement is impossible.

First, following Ko (2007), I assume that *v*P constitutes a Spell-out Domain in Japanese and Korean.[6] Second, following Saito and Fukui (1998), I further assume that Japanese is head-final, and this in turn implies that rightward adjunction is not allowed in this language. Finally, I assume following Abels (2003) that if XP is a complement of YP, XP cannot be moved to Spec, YP because it is "too local." This property is called Anti-locality.

Before proceeding, I briefly introduce Ko's (2007) argument for (13a) and Abels' (2003) for (13c). Let us start with Ko's (2007) hypothesis. Her claim is based on the account of the Korean examples in (14) and (15), which involve Numeral Quantifier (NQ) Floating (adapted from Ko 2007:50-51).[7] In these examples, NPs associated to NQs, which are called host NPs, and floating NQs are underlined.

(14) a. John-i maykcwu-lul sey-pyeng masi-ess-ta
John-nom beer-acc 3-classifier drink-past-declarative
'John drank three bottles of beer'
b. Maykcwu-lul John-i sey-pyeng masi-ess-ta
beer-acc John-nom 3-classifier drink-past-declarative
'John drank three bottles of beer'

(15) a. Haksayng-tul-i sey-myeng maykcwu-lul masi-ess-ta
student-plural-nom 3-classifier beer-acc drink-past-declarative
'Three students drank beer'
b. *Haksayng-tul-i maykcwu-lul sey-myeng masi-ess-ta
student-plural-nom beer-acc 3-classifier drink-past-declarative
'Three students drank beer'

As shown in (14), an object-related NQ and its host NP can be separated by the subject, while a subject-related NQ and its host NP cannot be intervened by the object, as in (15).

It is well known that NQ Floating obeys the mutual c-command condition, which requires that an NQ and its host NP c-command each other (cf. Miyagawa 1989). For instance, this condition captures the following contrast found in Japanese shown in (16).

[6]. Ko (2005) argues that Spell-out Domains in these languages also include VP (recall that F&P assume that VP is the Spell-out Domain for languages like Swedish). But this does not affect the analysis in this paper.

[7] The same paradigm is found in Japanese (see Saito 1985 and Miyagawa 1989, among others).

(16) a. Taroo-ga sono mise-de hon-o san-satu katta (koto)
Taroo-nom that store-at book-acc 3-classifier bought fact
'Taroo bought three books at that store'

b. *Taroo-ga sono hanasi-o tomodati-kara san-nin kiita (koto)
Taroo-nom that story-acc friend-from 3-classifer heard fact
'Taroo heard that story from three friends'

In (16a), the NQ *san-satu* can be associated with the host NP *hon-o* 'book', while in (16b), the NQ *san-nin* cannot be with the host NP *tomodati* 'friend'. Given that Case particles, unlike post-positions, do not project their own maximal projections, the host NP in (16a) can c-command the floating NQ, but the host NP in (16b) cannot because of the intervening maximal projection, namely PP. Then, the grammaticality of (14b) has been explained by assuming the trace of scrambling can also satisfy the mutual c-command requirement, as in (17), where the broken line indicates the mutual c-command relation.

(17) [… Obj_i … Subj [$_{VP}$ [$_{NP}$ t_i NQ_{obj}] …] …]

On the other hand, the ungrammaticality of (15b) has been puzzling in the literature, because it can in principle have the following derivation in (18).

(18) [… $Subj_j$ … Obj_i … [$_{NP}$ t_j NQ_{subj}] [$_{VP}$ t_i …] …]

In (18), the object is scrambled first, and then the subject is further scrambled across the scrambled object. This derivation gives rise to the surface order of (15b), observing the mutual c-command condition. One way of excluding this derivation is to simply assume that subjects cannot be scrambled (cf. Saito 1985). Observing that subjects can indeed be scrambled, however, Ko (2007) proposes an alternative account which employs F&P's Linearization Preservation. Let us consider the schematic derivation in (19) below.

(19) a. *Scrambling of Obj → Spell-out of* v*P*
[$_{vP}$ Obj_i [$_{NP}$ Subj NQ] [$_{VP}$ t_i …]] Ordering Table: **Obj<Subj<NQ**

b. *Scrambling of Subj → Spell-out of CP*
*[$_{CP}$ … $Subj_j$ … [$_{vP}$ Obj_i [$_{NP}$ t_j NQ] [$_{VP}$ t_i …]]]
Ordering Table: Obj<Subj<NQ
Subj<Obj<NQ

In (19a), the object undergoes scrambling to the edge of *v*P. By hypothesis, *v*P is the Spell-out Domain, so that the relative orderings of the constituents including those on the edge of *v*P are fixed and sent to the Ordering Table. When the derivation proceeds to the step in (19b), where the subject moves up and the CP is Spelled-out, the Ordering Table gets the ordering statement that contradicts with the previously stored information. Hence, the surface order in which the object intervenes between a subject and a subject related NQ is ruled out. Notice that what is crucial here is that the elements on the edge of *v*P are

also subject to the linearization procedure, so that the relative order between the subject and the object is established at the Spell-out of *v*P. Otherwise, the Subj<Obj order established at the step in (19b) does not induce any contradiction.

Let us now turn to Abels' (2003) argument for Anti-locality. He first argues that Anti-locality is a corollary of Last Resort, which requires movement to take place only if necessary, and the assumption that Head-Complement relation is the closest one for feature-checking. That is, since all the features on a head X can be checked against its complement YP in that relation, the YP need not, hence must not, move to Spec, XP to create a new relation for feature-checking, as in (20).

(20) $[_{XP}$ ___ X^0 YP]

Then, Abels (2003) argues that Anti-locality nicely explains the Stranding Generalization, which states that a complement of a phase head cannot be moved stranding the phase head behind, if it is combined with the peculiar property of phase heads that extraction from the domain of a phase head requires movement through its edge. Let us consider the Icelandic examples in (21) below (based on Abels 2003:10).

(21) a. Hver$_i$ heldur þú að t_i hafi lesið þessa bók?
who think you that has read this book
'Who$_i$ do you think that t_i has read this book?'

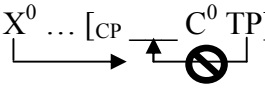
b. Jón heldur að María sé að lesa
Jon thinks that Maria is to read
'Jon thinks that Maria is reading'

c. ?$[_{CP}$ að María sé að lesa]$_i$ heldur Jón t_i
that Maria is to read thinks Jon
'[That Maria is reading]$_i$, Jon thinks t_i'

d. *$[_{TP}$ María sé að lesa]$_i$ heldur Jón að t_i
Maria is to read thinks Jon that
'[Maria is reading]$_i$, Jon thinks that t_i'

Abels (2003) observes the complementizer *að* 'that' allows extraction from its domain, as in (21a). He also observes that the complement CP can be topicalized as in (21b-c). What is crucial is that the TP cannot be topicalized, stranding the complementizer, as in (21d). As he notes, the ungrammaticality of (21d) cannot be attributed to any interpretation of the *that*-trace effect, since this language does not show the effect, as (21a) illustrates. His explanation goes as follows. Suppose that a head X tries to attract TP, as in (22).

(22) [… X^0 … $[_{CP}$ ___ C^0 TP]]



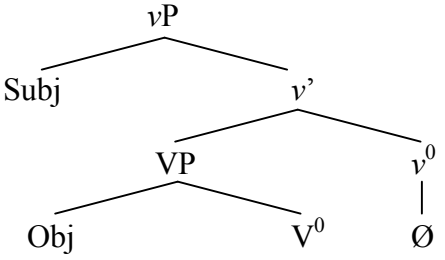
In order to be attracted by the X, the TP must first move to the edge of CP, because CP is a phase so that the X cannot access to the domain of C. This movement of TP, however,

is totally impossible due to Anti-locality. In this way, Abels (2003) explains why complements of a phase head are frozen in place.

Note that although F&P's system allows the head X in (22) to access the TP within the domain of C, Abels' (2003) explanation of the Stranding Generalization can be carried over to their framework. That is, because the language is head-initial, and the complement TP cannot move to the edge of CP due to Anti-locality, the complementizer *að* 'that' necessarily precedes the contents of TP when the CP is Spelled-out. As a result, topicalization of TP stranding the complementizer always induces an ordering contradiction, hence the derivation crashes at PF.

With this much as a background, I show that the PBC effect also can be captured by F&P's Linearization Preservation. First, let us consider the structure in (23).[8]

(23) *Configurational possibility 1 at Spell-out of* v*P: No movement*

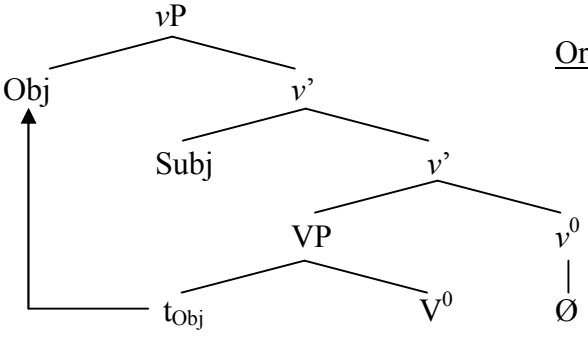


Ordering Table: **Subj<Obj<V^0**

In this structure, no movement has taken place. Hence, when Spell-out applies to *v*P, the Subj<Obj<V^0 order is established. What is important for our purpose is that both the subject and the object precede the verb. Note that any derivation which has (23) as its part must preserve this ordering.

Suppose next that the object undergoes movement to the edge of *v*P before Spell-out, as illustrated in (24).

(24) *Configurational possibility 2 at Spell-out of* v*P: Movement of Obj*



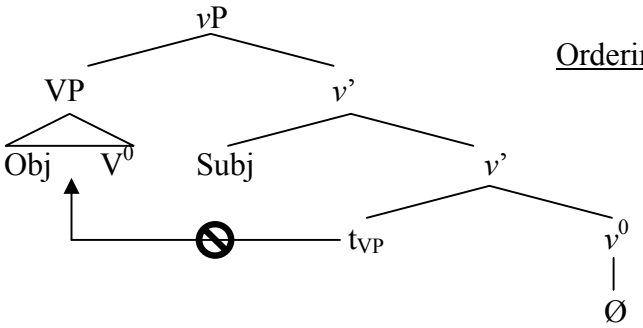
Ordering Table: **Obj<Subj<V^0**

[8] Following Abels' (2003) hypothesis that Anti-locality prohibits head-movement, I assume that V^0 does not move to v^0. But this is not crucial for the analysis in the text. I also assume that v^0 is null, as indicated by Ø. Thus, it is excluded from ordering statements.

Then, the ordering statement in which the object precedes the subject is added to the Ordering Table when *v*P is Spelled-out. This enables us to have the surface OSV order. Notice that the predicate cannot precede its arguments in a later Spell-out point in the derivation since this will necessarily induce an ordering contradiction.

Now, let us consider the structure in (25) below.

(25) *Configurational possibility 3 at Spell-out of* v*P: Movement of VP*

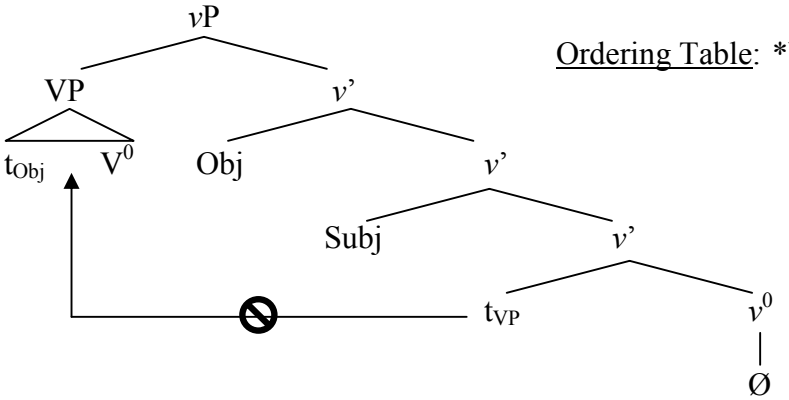


Ordering Table: ***Obj<V^0<Subj**

In this structure, the VP has undergone movement of the edge of *v*P before Spell-out, and as a result, the verb precedes the subject. If this movement is possible, the ordering statement in which the subject follows the verb can be established. However, this VP-movement is an instance of Complement-to-Spec movement. Hence, this movement is impossible due to Anti-locality. Consequently, such an ordering cannot be established.

The final configuration to be examined is (26) below. In this structure, the object has been scrambled first, and then the VP has been moved, resulting in the order in which the verb precedes the other *v*P-internal elements.

(26) *Configurational possibility 4 at Spell-out of* v*P: Movement of Obj and VP*



Ordering Table: ***V^0<Obj<Subj**

This structure, however, also violates Anti-locality. Therefore, the ordering where the verb precedes the other elements within *v*P cannot be established.

(27) below summarizes the results of the discussion so far.

(27) *(Im)possible ordering statements established at the Spell-out of* v*P*

a. Subj<Obj<V^0 (= (23))
b. Obj<Subj<V^0 (= (24))
c. *Obj<V^0<Subj (= (25))
d. *V^0<Obj<Subj (= (26))

Among the four ordering statements, only (27a-b) are possible. This means that in Japanese, V^0 cannot precede any *v*P-internal element at the point where *v*P is Spelled-out.[9] Given Linearization Preservation, the fixed orderings have to be preserved. Then, we can explain the PBC effect on Japanese scrambling. (28) are the relevant examples, repeated from (12).

(28) a. *[$_{CP}$ Hanako-ga t_i iru to]$_j$ [$_{PP}$ Sooru-ni]$_i$ Taroo-ga t_j omotteiru (koto)
Hanako-nom is that Seoul-in Taroo-nom think fact
'[That Hanako lives t_i]$_j$, [in Seoul]$_i$, Taroo thinks t_j'

b. *[PRO t_i iku koto]-ga$_j$ [$_{PP}$ Sooru-made]$_i$ Taroo-ni t_j meizir-areta (koto)
go fact-nom Seoul-to Taroo-to ordered-was fact
'[To go t_i]$_j$, to Seoul$_i$, was ordered Taroo t_j'

Crucially, both of them should include the following two steps in their derivations:[10]

(29) a. *Spell-out of the embedded* v*P*
[$_{v}$P … Obj … V] Ordering Table: **Obj<V**

b. *Spell-out of the matrix CP*
[$_{CP}$ [$_{XP}$ … [$_{v}$P … t_i … V] …]$_j$ … Obj$_i$ … [$_{TP}$ … t_j … V] …]
Ordering Table: Obj<V
V<Obj

Irrespective of scrambling of the object within the embedded *v*P, the relative order of the object and the embedded verb should be fixed with the Obj<V order, as in (29a). In order to derive the surface order in (28), however, it is necessary to establish the V<Obj order

[9] The same conclusion holds when the verb has three arguments if the indirect argument is base-generated in Spec, VP (cf. Larson 1988). Things become a little complicated if we assume that there is an independent functional head like Appl(icative) that introduces the indirect object (see Marantz 1993 and Pylkkänen 2002, among others; see also Miyagawa and Tsujioka 2004 for Japanese). The problem is that if ApplP is located between v^0 and V^0, the VP-movement to the edge of *v*P cannot be ruled out by Anti-locality. As far as I can see, there are at least two possible solutions to this problem. The first one is to assume that V^0 always undergoes head-movement up to v^0. If this is the case, VP-movement never brings the verb in front of other *v*P-internal elements even if it is possible. Note that although this option is not compatible with Anti-locality (see footnote 8 above), it enables us to achieve the effects of Anti-locality for the examples discussed in the text. The other solution is to assume that the ApplP also constitutes a Spell-out Domain in this language. This option forces the VP to move through the edge of ApplP to derive the intended surface order, but it is impossible due to Anti-locality. Takita (2008) suggests this possibility based on interaction of scrambling and quantifier scope (see McGinnis 2001 for an independent proposal that ApplP, in addition to *v*P, constitutes a phase in some languages). I will leave this issue for future research.

[10] XP in (29b) stands for the embedded CP in (28a) and the control infinitival in (28b). The categorial status of the latter is irrelevant here.

at the Spell-out of the matrix CP, as in (29b). Hence, the derivation cannot avoid an ordering contradiction, so that (28a-b) are ruled out.

Summarizing so far, I argued that the PBC-effect on Japanese scrambling can be explained as a consequence of the theory of Cyclic Linearization advocated by F&P. The proposed analysis provides additional evidence for Ko's (2007) hypothesis that *v*P constitutes a Spell-out Domain in languages like Japanese, and as it provides an explanation for the examples that motivated Saito's (2003) derivational PBC, it allows its elimination from the grammar.

4. Conclusion

In this paper, I proposed a novel explanation of the Proper Binding Condition effect on Japanese scrambling in terms of linearization at PF. Specifically, I argued that Fox and Pesetsky's (2003, 2005) Linearization Preservation, which requires that linear orderings established by Spell-out must be preserved at the end of each cycle, provides a straightforward solution, conjoined with the following three independently motivated assumptions: Ko's (2007) hypothesis that the relevant domains for linearization in Japanese include *v*P, head-finality of Japanese, and Abel's (2003) Anti-locality. Based on these assumptions, I illustrated that derivations of the examples that have been explained by the PBC cannot avoid establishing contradicting linear orderings, hence they necessarily induce a PF-crash.

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