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1. Introduction

Chomsky (1992) proposes to eliminate D-structure and S-structure altogether. Within this minimalist model, a phrase structure is built in a bottom-up fashion, and movement applies as the phrase structure is constructed. For example, in (1), the *wh*-phrase *what* moves to the embedded CP SPEC, before the embedded CP is combined with the matrix verb *wonder* to form the matrix V'.

(1) John wonders [_{CP}what_i [_{IP} Mary bought _{t_i}]]

In this paper, we discuss two 'adjunction paradoxes' that arose in the investigation of Japanese scrambling, and argue that they constitute supporting evidence for this conception of phrase structure building.

The two 'adjunction paradoxes' that we are concerned with involve operations of the following forms:

(2)a. ... [_{XP} YP [_{XP} ... *t* ...
|_____|

b. YP ... [_{XP} *t*' [_{XP} ... *t* ...
|_____| |_____|

In (2a), YP simply adjoins to XP. In (2b), on the other hand, YP moves out of XP through the XP-adjoined position. In the following section, we discuss a case where XP=IP, and (2a) but not (2b) is allowed. In Section 3, we turn to a case where the 'paradox' occurs in the opposite direction, i.e., (2b) is allowed but (2a) is not. The relevant data involve long adjunction to VP. Finally, in Section 4, we argue on the basis of our analysis that adjunction, like substitution, is subject to strict cycle, or more precisely, to Chomsky's (1992) extension requirement.

2. Movement within and out of Relative Clauses

2.1. The IP Hypothesis

The first adjunction paradox arises when we consider scrambling within and out of relative clauses.¹ It has been argued extensively that Japanese relative clauses, and prenominal sentential modifiers in general, are not of the category CP, but of the category IP. (See, for example, Saito 1985, Sakai 1990, Murasugi 1990, 1991, and Tateishi 1991.) One direct piece of evidence for this hypothesis is that an overt complementizer can never appear in prenominal sentential modifiers. This is shown in (3a-b).

(3)a. [[Mary-ga John-ni *e_i* watasita] (*to/no)] hon;
-nom -to handed book
(the book Mary handed to John)

b. [[John-ga sono hon -o nusunda] (*to/no)] syooko
-nom that book-acc stole evidence
(the evidence that John stole that book)

These examples show that an overt complementizer *to* or *no* cannot appear in a relative clause or a pure sentential modifier. This is expected if the prenominal sentential modifiers are of the category IP.

The fact in (3b) is particularly significant, since the complementizer *that* is obligatory in English pure complex NPs, as shown below in (3c-d).

* The material in this paper was presented at the University of Connecticut and Cornell University. We would like to thank Zeljko Boskovic, Chris Collins, Susan Fischer, Howard Lasnik, Roger Martin, and Daiko Takahashi for helpful comments.

¹ The material in this section is discussed in more detail but in a different form in Murasugi (1993).

- (3)c. the claim [**(that)* [Mary handed the book to John]]
 d. the evidence [**(that)* [John stole the book]]

Kayne (1981) and Stowell (1981) propose to derive this fact from the ECP. Their hypothesis is that when an overt complementizer is absent, there is an empty C and this empty category is subject to the ECP. Since the position of C is not properly governed in (3c-d), these examples, without *that*, are ruled out by the ECP. Given this analysis, the sentential modifier in (3b) cannot be a CP, since it is grammatical without an overt complementizer. If it were a CP, the empty C should be in violation of the ECP. (3b), thus, provide strong evidence that prenominal sentential modifiers in Japanese are IPs.

The IP hypothesis introduced above is consistent with the extraction facts discussed in the literature. As noted by Haig (1976) and Harada (1977), among others, Japanese scrambling obeys the complex NP constraint. The examples in (4) confirm their observation.

- (4)a. ??John-ni_j [_{IP}Bill-ga [_{NP}[_{IP}Mary-ga t_j e_i watasita] hon_i]-o nusunda]
 -to -nom -nom handed book-acc stole
 (Lit. To John, Bill stole the book Mary handed)
- b. ?sono hon -o_j [_{IP}Bill-ga [_{NP}[_{IP}John-ga t_j nusunda] syooko] -o
 that book-acc -nom -nom stole evidence-acc
 mituketa]
 found
 (Lit. That book, Bill found the evidence that John stole)

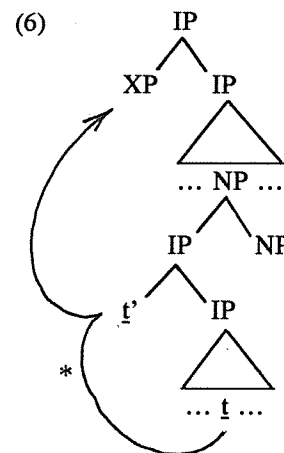
These examples are only marginal, but are clearly worse than those in (5), which are perfect.²

- (5)a. John-ni_j [_{IP}Bill-ga [_{CP}Mary-ga t_j sono hon-o watasita to]
 -to -nom -nom that book-acc handed that
 omotteiru]
 think
 (To John, Bill thinks that Mary handed that book)

² The island effects are, for some reason, generally weak with scrambling. See Kikuchi (1987) for discussion of comparative deletion in Japanese where the effects show up more clearly.

- b. sono hon-o_j [_{IP}Bill-ga [_{CP}John-ga t_j nusunda to] omotteiru]
 that book-acc -nom -nom stole that think
 (That book, Bill thinks that John stole)

The island effect observed above follows from the theory of Subjacency proposed in Chomsky (1986) and developed in subsequent works. The relative clause IP and the pure sentential modifier IP are not L-marked, and hence, are barriers for movement. If the movement crosses the barrier IP directly, it violates Subjacency. If, on the other hand, the movement can proceed via adjunction to the barrier IP, then the effect of the barrier can be nullified. The case of the relative clause is illustrated in (6).



However, the prenominal sentential modifiers in (4) are adjuncts, and by assumption, adjunction to adjuncts is prohibited. Hence, the effect of those barriers cannot be circumvented by adjunction. Thus, we correctly predict that the examples in (4) are Subjacency violations.

2.2. The First Adjunction Paradox

So far, we have shown that prenominal sentential modifiers are IPs in Japanese, and further, that the extraction facts are consistent with this hypothesis. However, an interesting problem arises when we consider scrambling within the sentential modifiers. As shown in (7)-(8), a phrase can be scrambled and be adjoined to those prenominal IP modifiers.

- (7)a. [_{IP}John-ni_j [_{IP}Mary-ga t_j e_i watasita]] hon_i
 -to -nom handed book
 (the book Mary handed to John)

- b. [_{IP}sono hon -o_j [_{IP}John-ga t_j nusunda]] syooko
 that book-acc -nom stole evidence
 (the evidence that John stole that book)

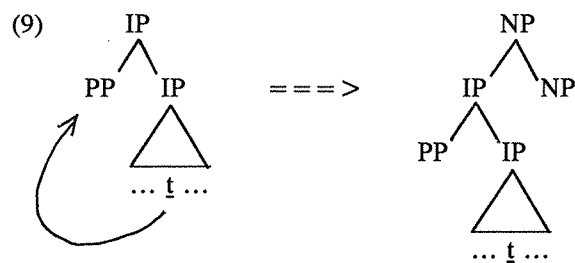
- (8)a. [_{IP}John-ni_j [_{IP}Bill-ga [_{CP}Mary-ga t_j e_i watasita] to] omotteiru] hon_i
 -to -nom -nom handed that think book
 (the book Bill thinks Mary handed to John)

- b. [_{IP}sono hon -o_j [_{IP}Bill-ga [_{CP}John-ga t_j nusunda to] omotteiru] zizitu
 that book-acc -nom -nom stole that think fact
 (the fact that Bill thinks that John stole that book)

Here we have an apparent paradox. In the account for (4), we assumed crucially that adjunction to prenominal IP modifiers is not possible. But (7)-(8) show that scrambling can overtly adjoin phrases to those IPs.

What the discussion so far indicates, more precisely, is that adjunction to those IPs is possible if the movement terminates there, but not if the adjoined phrase moves on to a higher position. That is, relative clauses and pure sentential modifiers are possible targets for adjunction if they are the final landing sites, but not if they are intermediate landing sites. But why should this be so?

The minimalist model provides a direct solution to this problem. Recall that according to this model, movement can apply as the phrase structure is constructed. Thus, the movement in (7a), for example, can apply before the relative clause is combined with the relative head. This derivation is illustrated in (9).



The PP *John-ni* is first adjoined to the relative clause IP, and then, the

relative clause IP is combined with the relative head *hon*.³

Note here that the IP in (9) is an adjunct in relation to the relative head. Hence, it is reasonable to suppose that it gets adjunct status only when it is combined with the relative head. Then, if the relevant constraint prohibits adjunction to adjuncts, nothing prevents the adjunction of PP to IP in (9). Once the IP is combined with the head NP, it becomes an adjunct. But at this point, no movement takes place and hence no principle is violated. Thus, the grammaticality of (7)-(8) is correctly accounted for.

This analysis of (7)-(8) does not affect the previous account for (4a-b). In (4a), for example, a PP is scrambled out of the complex NP. Hence, the movement can take place only after the relative clause IP is combined with the relative head. But then, the relative clause IP already has adjunct status, and adjunction to this IP is prohibited. The effect of this IP as a barrier, consequently, cannot be circumvented by adjunction. Thus, it follows from the minimalist approach that the adjunction in (2a), but not that in (2b), is allowed when XP is an adjunct.

3. VP as Final and Intermediate Adjunction Sites

3.1. VP-adjunction as 'A-movement'

The second paradox arises with adjunction to VP. As shown in (10), both IP and VP are possible adjunction sites for scrambling.

- (10)a. [_{IP}John-ga [_{VP}Mary-ni sono hon -o watasita]]
 -nom -to that book-acc handed
 (John handed that book to Mary)
- b. [_{IP}sono hon-o_i [_{IP}John-ga [_{VP}Mary-ni t_i watasita]]]
- c. [_{IP}John-ga [_{VP}sono hon-o_i [_{VP}Mary-ni t_i watasita]]]

³ This derivation is virtually identical to what Lebeaux (1988) proposes to account for examples like (i) and (ii).

(i) [_{NP}which book [_{CP}that John_i read]] did he_i like

(ii) *_{NP}which picture of John_i] did he_i like

He hypothesizes that relative clauses, and adjuncts in general, are inserted into the phrase structure after D-structure. Thus, in (i), the relative clause CP can be adjoined to the wh-phrase *which book*, after the wh-phrase moves to CP SPEC. Then, the pronoun *he* binds *John* at D-structure in (ii), but this binding need not obtain at any level in the case of (i).

However, as noted in Saito (1985), a difference between IP-adjunction and VP-adjunction emerges when we consider long-distance scrambling. (11b) and (12b) show that long-distance IP adjunction is fine. But (11c) and (12c) indicate that long-distance VP-adjunction results in marginality.

- (11)a. [_{IP}John-ga [_{VP}Bill-ni [_{CP}Mary-ga sono hon -o motteiru to] itta]]
 -nom -to -nom that book-acc have that said
 (John said to Bill that Mary has that book)
- b. [_{VP}sono hon-o_i [_{IP}John-ga [_{VP}Bill-ni [_{CP}Mary-ga t_i motteiru to] itta]]]
- c.??[_{IP}John-ga [_{VP}sono hon-o_i [_{VP}Bill-ni [_{CP}Mary-ga t_i motteiru to] itta]]]
- (12)a. [_{IP}John-ga [_{VP}Bill-ni [_{CP}Mary-ga sono mati-ni sundeiru to] itta]]
 -nom -to -nom that town-in reside that said
 (John said to Bill that Mary lives in that town)
- b. [_{VP}sono mati-ni_i [_{IP}John-ga [_{VP}Bill-ni [_{CP}Mary-ga t_i sundeiru to] itta]]]
- c.??[_{IP}John-ga [_{VP}sono mati-ni_i [_{VP}Bill-ni [_{CP}Mary-ga t_i sundeiru to] itta]]]

A similar contrast obtains with wh-movement and heavy NP shift in English: as is well known, wh-movement allows long-distance movement out of an embedded clause, but heavy NP shift does not.

- (13)a. what_i do you think that John bought t_i
- b. *I have expected [that I would find t_i] since 1939 [_{NP}the treasure said to have been buried on that island]_i (Ross 1967, Postal 1974)

What (11c) and (12c) show, then, is that VP-adjunction scrambling is subject to the 'right roof constraint', despite the fact that it is leftward movement. Put differently, if heavy NP shift also involves VP-adjunction, then the 'clause-boundedness' is not necessarily a characteristic of rightward movement, but it is a property of VP-adjunction.

The parallelism between VP-adjunction scrambling and heavy NP shift in fact goes further. It is noted in Saito (1985) that what results in marginality is more precisely long-distance VP-adjunction scrambling out of a finite clause. Long-distance VP-adjunction is allowed in a control structure, as shown in (14).

- (14) [_{IP}John-ga [_{VP}sono hon -o_i [_{VP}Bill-ni [PRO t_i mottekuru yooni] itta]]]
 -nom that book-acc -to bring to said
 (John told Bill to bring that book)

The same is true of heavy NP shift as noted in Postal (1974). His example in (15) shows that long-distance heavy NP shift is allowed out of a non-finite clause.

- (15) I have expected [PRO to find t_i] since 1939 [_{NP}the treasure said to have been buried on that island]_i

Then, how should the locality effect on VP-adjunction scrambling be accounted for? The most plausible hypothesis, at this point, seems to be that VP-adjunction is A-movement.⁴ It was noted in Mahajan (1989) that scrambling in Hindi is in general ambiguous between A and A' movement, but long-distance A-scrambling out of a finite clause is impossible. Japanese scrambling exhibits the same pattern, as noted in Tada (1990) and Saito (1992), among others. Let us consider the following examples:

- (16)a.?*[[otagai_i -no sensei]-ga karera_i-o hihansita]
 each other-gen teacher-nom they -acc criticized
 (Lit. Each other's teachers criticized them)
- b. ?karera-o_i [[otagai_i -no sensei]-ga t_i hihansita]
 they -acc each other-gen teacher-nom criticized
- (17)a. *[[otagai_i -no sensei]-ga [Hanako-ga karera_i-o hihansita to]
 each other-gen teacher-nom -nom they -acc criticized that
 itta]
 said
 (Lit. Each other's teachers said that Hanako criticized them)
- b. *karera-o_i [[otagai_i -no sensei]-ga [Hanako-ga t_i hihansita
 they -acc each other-gen teacher-nom -nom criticized
 to] itta]
 that said

⁴ This hypothesis was initially proposed in Tada (1990) for examples of short VP-adjunction scrambling like (10c), and was adopted for cases of long-distance VP-adjunction scrambling and heavy NP shift in Tada and Saito (1991). In what follows, we develop the account suggested in the latter work.

(16b) shows that a phrase preposed by clause-internal scrambling can serve as an A-binder for an anaphor. (17c), on the other hand, indicates that a phrase preposed out of a finite embedded clause cannot. A-scrambling, thus, seems clause-bound.

However, Mahajan (1989) notes also that long-distance A-scrambling is possible in a control structure in Hindi. Nemoto (1991) shows that here again, Japanese patterns like Hindi. Relevant examples are presented in (18).

- (18)a. *[John-ga [[otagai_i -no sensei]-ni [PRO karera_i-o homeru
-nom each other-gen teacher-to they -acc praise
yooni] tanonda]]
to asked
(Lit. John asked each other's teachers to praise them)
- b. ?karera-o_i [John-ga [[otagai_i -no sensei]-ni [PRO t_i homeru
they -acc -nom each other-gen teacher-to praise
yooni] tanonda]]
to asked
- c. ?[John-ga [karera-o_i [[otagai_i -no sensei]-ni [PRO t_i homeru
-nom they -acc each other-gen teacher-to praise
yooni] tanonda]]
to asked

The examples in (18) indicate that long scrambling out of a non-finite clause can be A-movement whether it is IP-adjunction (18b) or VP-adjunction (18c). Thus, clause-internal scrambling and long-distance scrambling out of a non-finite clause can be A-movement, but not long-distance scrambling out of a finite clause. VP-adjunction scrambling, then, seems to show exactly the same locality effect as A-scrambling. This, of course, suggests that the VP-adjoined position is an A-position.⁵

⁵ Given the parallelism between VP-adjunction scrambling and heavy NP shift, we expect the latter to show the properties of A-movement with respect to binding. The relevant facts seem far from clear. But Daiko Takahashi (p.c.) points out that examples such as the following suggest that the prediction is in fact borne out:

- (i)a. *Mary wanted [PRO to meet [_{NP}the men who had been accused of the crime]_i
until each other's_i trials
- b. ?Mary wanted [PRO to meet t_i] until each other's_i trials [_{NP}the men who had
been accused of the crime]_i

Given this hypothesis on the VP-adjoined position, the ill-formedness of (11c) and (12c) is not surprising. Since by assumption scrambling is an adjunction operation, the economy condition 'Minimize Chain Links' (in the sense of Chomsky and Lasnik 1991) forces the scrambled phrase to move through every possible adjunction site. In particular, the scrambled phrases in (11c) and (12c) must adjoin to the embedded CP (or C' in Fukui and Speas's 1986 theory) on the way to the VP-adjoined position. This movement is illustrated in (19).

- (19) ... [_{VP} XP_i [_{VP} ... [_{CP} t_i' [_{CP} ... t_i ...

If we assume, as seems reasonable, that any position within a C projection, including the CP/C'-adjoined position, is necessarily an A'-position, the chain in (19) is an improper chain of the form A-A'-A. Hence, (11c) and (12c) are ruled out as instances of improper movement. (See Takahashi 1992 and Fukui 1993 for relevant discussion on improper movement.)

The difference between (11c)/(12c) and (14) can be attributed to the presence/absence of a C projection in the embedded clause. Since Chomsky (1981), it has been widely assumed that the distribution of PRO is captured by the PRO theorem, which states that PRO occurs only in ungoverned positions. Hence, in a control structure such as (20), it has been assumed that a CP node is present in the embedded clause preventing the government of PRO by the matrix verb.

- (20) John tried [_{CP} [_{IP} PRO to win the race]]

On the other hand, it is suggested in Chomsky and Lasnik (1991) that PRO is assigned 'null Case' by non-finite INFL. Extending this proposal, Martin (1992) argues that the distribution of PRO can be explained by that of null Case, and hence, that the PRO theorem is superfluous. Further, Boskovic (1993) argues that control complements in fact lack the C projection. Thus, *try* in (20) takes an IP complement. Given this hypothesis, it seems only reasonable to assume that there is no C projection in the embedded clause of (14). We suggest that this is why VP-adjunction can take place in this example without forming an improper chain.⁶

⁶ We assume that PRO in the embedded subject position does not induce relativized minimality effect on the VP-adjunction scrambling in (14), because the movement is adjunction, not substitution to IP SPEC. (See R.K. Lee 1992, Abe 1993, and Takano 1994 for relevant discussion.) It should also be noted that we are assuming that the IP-adjoined position is ambiguous between A-position and A'-position, basically along the lines suggested

3.2. The Second Adjunction Paradox

As shown above, the hypothesis that the VP-adjoined position is an A-position allows us to account for the locality of VP-adjunction scrambling. But this hypothesis gives rise to the second adjunction paradox.

It was proposed in Chomsky (1986) that A'-movement, in general, can proceed via adjunction, in particular, VP-adjunction. Since then, evidence has been presented that this is in fact the case. (See Takahashi in prep. for detailed discussion on this point.) If we combine this hypothesis with Chomsky and Lasnik's principle 'Minimize Chain Links', it follows that A'-movement must proceed through every possible adjunction site, including the VP-adjoined position. A long-distance wh-movement, then, must take place as illustrated in (21).

(21) $[_{CP} \text{what}_i \text{ do } [_{IP} \text{you } [_{VP} \text{think } [_{CP} \text{that } [_{IP} \text{John } [_{VP} \text{bought } t_i]]]]]]]$
 |_____| |_____| |_____| |_____| |_____| |_____|

The long-distance A'-scrambling in (22) must proceed in a similar way.

(22) $[_{IP} \text{sono hon-}o_j \text{ } [_{IP} \text{Bill-ga } [_{VP} \text{ } [_{CP} \text{ } [_{IP} \text{John-ga } [_{VP} t_j \text{ nusunda}]] \text{ to}]] \text{ that book-acc -nom -nom stole that omotteiru}]]]$
 think
 (That book, Bill thinks that John stole)

The proposed NP *sono hon-o* adjoins to the embedded VP, the embedded IP, the embedded CP (or C'), and the matrix VP, before it finally adjoins to the matrix IP.

The paradox arises when we compare the derivations of (11c) and (22). If we ignore the last step in the derivation of (22), it is exactly like that of (11c), that is, a long-distance VP-adjunction out of a finite clause. The two derivations are illustrated in (23).

(23) (11c) ----- $[_{IP} \dots [_{VP} \text{NP}_i \text{ } [_{VP} \dots [_{CP} \dots t_i]]]]]$
_____		_____
_____		_____
_____		_____

in Webelhuth (1989), Tada (1990), and Saito (1992). We will discuss the A/A' properties of adjoined positions in more general terms later in this paper.

(22) --- $[_{IP} \text{NP}_i \text{ } [_{IP} \dots [_{VP} t_i'] \text{ } [_{VP} \dots [_{CP} \dots t_i]]]]]$
 |_____| |_____|

We concluded above that (11c) is not grammatical because the VP-adjoined position is an A-position, and A-movement out of a CP is prohibited. But then, why is long-distance VP-adjunction allowed in (22)? The same problem arises when we compare the derivation of (21) and that of the heavy NP shift example in (13b).⁷

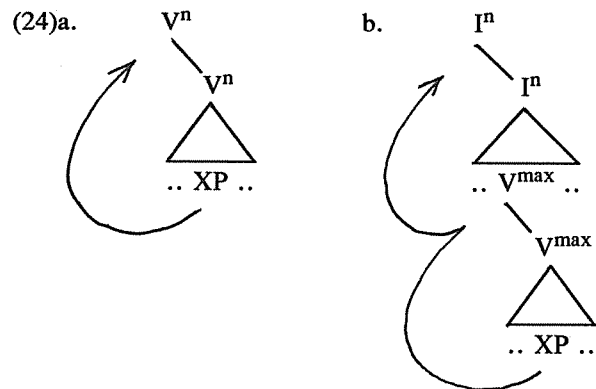
The well-formedness of the derivation of (22) indicates that the long-distance VP-adjunction in this example can be A'-movement. The contrast between (11c) and (22), then, implies that the VP-adjoined position is an A-position as a final landing site, but is an A'-position as an intermediate landing site. If this is the correct generalization, the paradox noted above reduces to the problem of why the VP-adjoined position has this peculiar property.

Here, we would like to argue that the minimalist approach, when combined with a functional definition of 'maximal projection' suggested by Fukui (1986), among others, provides a straightforward answer to this problem. Fukui (1986) argues that the definition of X^{max} does not coincide with that of X'' , and further, that the former should be defined roughly as the highest projection of X. (See also Muysken 1982, Speas 1990, and the references cited there.) Let us assume, basically following this idea, that a phrase is construed as a maximal projection when (i) SPEC-head agreement takes place in the phrase, and (ii) the phrase is embedded as a complement, specifier, or adjunct. In the case of a V-projection, (i) is irrelevant, since SPEC-head agreement is limited to functional categories. Thus, a V-projection is maximal only when it is embedded, e.g. as a complement of I.

Let us now return to the contrast between (11c) and (22). Suppose, following the minimalist conception of phrase structure building, that scrambling applies as the phrase structure is constructed. Then, the VP-adjunction scrambling in (11c) takes place before the matrix VP is combined

⁷ Based on a similar problem, Fukui (1993) concludes that wh-movement does not go through the VP-adjoined position, and suggests to return to the COMP-to-COMP analysis of Chomsky (1973, 1977). Although this may turn out to be correct, we will not adopt it here mainly because it does not seem compatible with the approach to various phenomena based on 'Minimize Chain Links'. (See Takahashi in prep. for relevant discussion.) In particular, if this economy condition forces the scrambling in (11c) to go through the CP/C'-adjoined position, it is not clear why it does not force VP-adjunction in examples like (22).

with I and embedded under the matrix I'. Hence, as illustrated in (24a), the adjunction is to a non-maximal projection of V. The situation is quite different in the case of the IP-adjunction scrambling in (22). Since the final landing site is the matrix IP, the matrix VP must already be embedded within the I-projection when the scrambling applies. The adjunction to the matrix VP in this case, then, is an adjunction to a maximal projection of V, as illustrated in (24b).



Thus, a clear distinction is drawn between VP-adjunction as the final step and VP-adjunction as an intermediate step in a form-chain operation.

Given this distinction, the contrast between (11c) and (22) is readily accounted for if a position adjoined to a non-maximal projection of V is necessarily an A-position, while a position adjoined to a maximal projection of V can be an A'-position. More generally, we can assume that an adjoined position is ambiguous (or undefined) with respect to A/A', basically along the lines suggested in Webelhuth (1989) and Tada (1990), with the following two exceptions:

- (25)a. An adjunction to a projection of C is A'-movement.
 b. An adjunction to a non-maximal projection of a lexical category is A-movement.

(25b) seems reasonable especially if only the higher V^n in (24a), for example, is construed as a maximal projection when the V-projection is embedded. Then, at that point, the adjoined position will be completely inside the maximal projection of V.

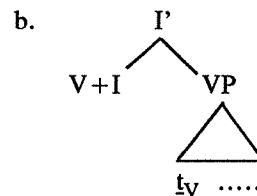
4. An Implication of the Proposed Analysis

We have shown above that the minimalist approach, or more specifically, the hypothesis that movement applies as the phrase structure is constructed, solves two adjunction paradoxes that arose in the investigation of Japanese scrambling. The two adjunction paradoxes, then, constitute supporting evidence for this conception of phrase structure building.

Before we conclude this paper, we would like to discuss one implication of our analysis for the general conception of adjunction. Note first that our analysis of (11c)/(12c) implies that the VP-adjunction scrambling in these examples not only can but must take place before the target VP is embedded under the I-projection. This is so, since if the scrambling can apply after the embedding occurs, then it can be adjunction to the maximal projection of V, exactly as the VP-adjunction in (24b), and hence, it can be A'-movement. But then, our analysis of (11c)/(12c) clearly fails.

This amounts to saying that scrambling, despite the fact that it is an adjunction operation, is subject to strict cycle, or more precisely, the extension requirement of Chomsky (1992). Chomsky (1992) suggests that substitution operations are subject to this requirement, but adjunction operations are not. The main reason for excluding adjunction here concerns head-movement. In the example (26a), the verb *are* is adjoined to INFL, as illustrated in (26b).

(26)a. They are intelligent



Since this adjunction can apply only after I and VP are combined to form I', this movement apparently cannot affect the top-most node of the target structure (I'). But as noted by Chomsky elsewhere (class lectures 1993), it is possible to reformulate the extension requirement so that it applies to head-movement as well: in (26b) V is adjoined to the head of I', and in this sense, the movement affects the I' node. Our analysis of VP-adjunction scrambling, then, supports this hypothesis. If it is correct, all syntactic operations, both substitution and adjunction, are subject to the extension requirement.

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