# Toward Eliminating C-command from Linguistic Theory*

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## 1. Introduction

C-command has been playing a crucial role in modern linguistic theory ever since Reinhart (1976) proposed it as a condition on anaphoric relations. In this paper, I will reconsider the roles of c-command within the Minimalist Program, and argue that c-command has no empirical as well as conceptual motivations in the framework of the Minimalist Program, so that it can, and therefore must, be dispensed with from linguistic theory.

Chomsky (1998) presents the following strongest minimalist thesis as a guiding principle for researches carried out within the Minimalist Program.

(1) The Strongest Minimalist Thesis
Language is an optimal solution to legibility conditions. (Chomsky 1998: 9)

Chomsky further argues that if we adopt the thesis (1) and 'assume that a faculty of language (FL) provides no machinery beyond what is needed to satisfy minimal requirements of legibility and that it functions in as simple a way as possible, then we would like to establish such conclusions as (A)-(D)' (Chomsky 1998: 27).

(2) (A) The only linguistically significant levels are the interface levels.
(B) The *interpretability* condition: LIs (=lexical items––Y.K.) have no features other than those interpreted at the interface, properties of sound and meaning.
(C) The *inclusiveness* condition: No new features are introduced by $C_{HL}$ (=the computational procedure for human language—Y.K.).
(D) Relations that enter into $C_{HL}$ either (i) are imposed by legibility condi-

tions, or (ii) fall out in some natural way from the computational process.

Particularly relevant to the discussion below is the condition (2D). Chomsky suggests that c-command belongs to the relations of the type (Dii), if c-command is defined as a consequence of the computational process as argued in Epstein (1995).

C-command has been commonly taken to be representationally defined as originally proposed in Reinhart (1976). Epstein (1995), however, argues that c-command should be derivationally defined as a consequence of the application of Merge or Move/Attract. Furthermore, he goes on to suggest the possibility of eliminating c-command as a derivative notion. In what follows, I will argue that we can eliminate c-command requirements from some of the syntactic phenomena which have been considered to involve c-command in crucial aspects: the Proper Binding Condition, the Minimal Link Condition, and the Linear Correspondence Axiom. I will also investigate the possibility of dispensing with c-command in Binding Theory. If the argument in this paper is correct, it strongly suggests that c-command does not have any motivation even as a relational notion of the type (2Dii), and it should be eliminated from linguistic theory.

## 2. C-command and the Proper Binding Condition

To start with, let us consider the Proper Binding Condition (PBC). As is well-known, movement exhibits anti-lowering effects.

(3) *Did you tell $t_i$ [$_{CP}$ $who_i$ [$_{TP}$ John did it]]

Since Fiengo (1975, 1977), these effects have been accounted for by the PBC.

(4) The Proper Binding Condition
Traces must be bound.

(5) Binding
$\alpha$ binds $\beta$ iff
(i) $\alpha$ is coindexed with $\beta$, and
(ii) $\alpha$ c-commands $\beta$.

(6) C-command
$\alpha$ *c-commands* $\beta$ iff

(i) neither dominates the other, and
(ii) the first branching node dominating $\alpha$ dominates $\beta$.

In (1), *who* moves downward from the matrix clause to the Spec of the embedded CP, leaving the trace unbound because *who* does not c-command it. In this way, the PBC excludes the downward application of movement.[1]

In what follows, I will show that the PBC violations of this kind can be explained within the Minimalist Program as a consequence of the extension condition on Move/Attract. Chomsky (1995: 189) proposes that the merger of $\alpha$ and the targeted object K by the substitution operation of Merge or Move must extend K.

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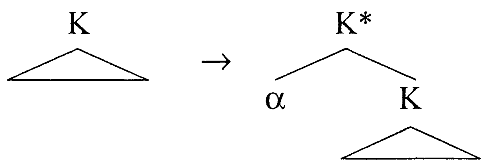


As a consequence of this condition, Chomsky argues, the overt application of Move must raise $\alpha$ within the targeted syntactic object K and the landing site of $\alpha$ must be external to K, extending K to K*, which includes K as a proper subset.

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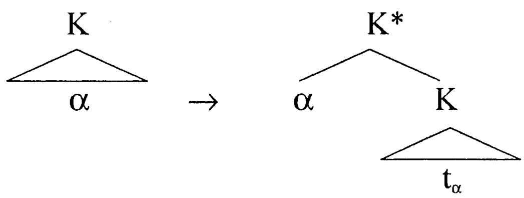



Consider the following illegitimate derivation.

(9) a. [$_{TP}$ seems [$_{TP}$ is certain [$_{TP}$ John to be here]]]
b. [$_{TP}$ John seems [$_{TP}$ is certain [$_{TP}$ t$_{John}$ to be here]]] (Raising of *John*)
c. [$_{TP}$ John seems [$_{TP}$ it is certain [$_{TP}$ t$_{John}$ to be here]]] (Insertion of *it*)

This is a case of Super Raising. In this derivation, the insertion of *it* to the Spec of the intermediate TP does not extend the targeted syntactic object K, that is, the matrix TP. Thus this derivation violates the extension condition.

Consider now the following derivation from (10a) to (10b) (cf. Chomsky 1995:

190).

(10) a. [$_{TP}$ seems [$_{TP}$ John to be honest]]
(=K) (=α)

b. [$_{TP}$ John [$_{T'}$ seems [$_{TP}$ $t_{John}$ to be honest]]]
(=K*) (=K)

This derivation extends K (=the matrix TP) to K* (=the newly projected TP), conforming to the extension condition.

Let us return to (3), repeated here as (11).

(11) *Did you tell $t_i$ [$_{CP}$ $who_i$ [$_{TP}$ John did it]]

(11) has the following structure before the movement of *who*.

(12) [$_{CP}$ C [$_{TP}$ you did tell who [$_{CP}$ C [$_{TP}$ John did it]]]]

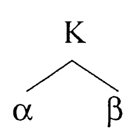
In the derivation of (11), Move targets the matrix CP but moves *who* to the Spec of the embedded CP.

(13) [$_{CP}$ C [$_{TP}$ you did tell $t_{who}$ [$_{CP}$ who C [$_{TP}$ John did it]]]]

This application of Move does not extend the target, that is, the matrix CP, resulting in the violation of the extension condition.

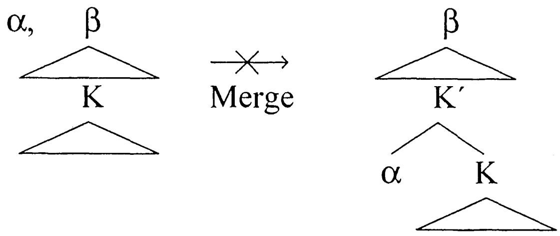
According to Chomsky (1995: 248), the extension condition on Merge is derived from the assumption that Merge applies at the root only. Under this assumption, Merge takes the two syntactic objects α, β, eliminates α and β, and constructs the new syntactic object K={γ,{α, β}}, with label γ.

(14) α, β $\xrightarrow[\text{Merge}]{}$




As a consequence of this assumption, Merge cannot target K which is contained in β (or α), and construct the new object K′={γ,{α, K}}.

(15)



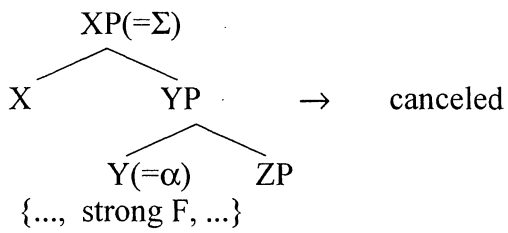

In other words, Merge applies in a strictly cyclic way.

Chomsky (1995:234) further tries to derive the extension condition on Move from the following characterization of strong features.

(16) Characterization of Strong Features
Suppose that the derivation D has formed Σ containing α with a strong feature F. Then, D is canceled if α is in a category not headed by α.

(17) below illustrates the configuration in which the derivation is canceled by (16).

(17)



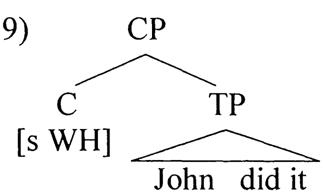

What is crucial to the present discussion is that (16) makes it impossible for Move/Attract to target a non-root projection. In other words, Move/Attract must apply in a strictly cyclic way in order to check a strong feature as soon as possible.

Consider again (1) above, repeated here as (18).

(18) *Did you tell $t_i$ [$_{CP}$ $who_i$ [$_{TP}$ John did it]]

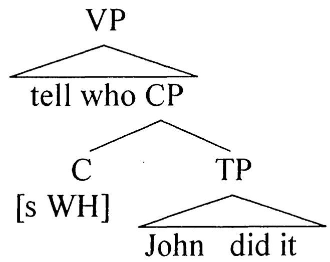
Suppose that the derivation of (18) reaches the following stage.

(19)



The head of CP contains a strong feature [s WH]. Suppose further that (19) is embedded in the matrix VP.

(20)




The derivation is canceled at this point, because the head C which contains a strong feature [s WH] is embedded within the matrix VP, which is not the projection of the C head. As a result, *who* cannot move downward to the Spec of CP, because the derivation cannot proceed any further by Move/Attract or Merge.

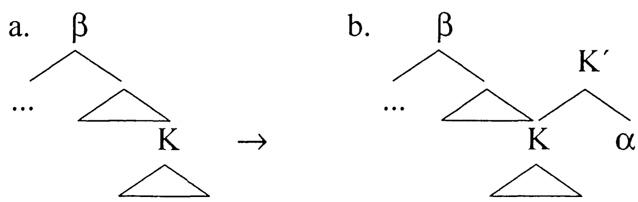
In this way, we can derive the PBC effects in terms of the extension condition, which, in turn, is derived from the characterization of strong features.

Alternatively, the extension condition may be derived from some version of the Single Root Condition.

(21) The Single Root Condition
In every well-formed constituent structure there is exactly one node that dominates every node. (Partee, ter Meulen, and Wall 1993: 439)

As Kitahara (1994, 1995), Bobaljik (1995), and Watanabe (1995) argue, under the natural assumption that we cannot change domination relations which have already been defined at previous stages of the derivation, non-cyclic application of Merge or Move/Attract necessarily creates a syntactic object with multiple roots. For illustration, suppose that, given two syntactic objects $\alpha$, $\beta$, Merge or Move/Attract targets K within $\beta$ in a non-cyclic manner, and creates the new syntactic object K′ by merging $\alpha$ and K. In such a case, the derived syntactic object has two roots as illustrated in (22b).

(22)



The syntactic object in (22b) violates the Single Root Condition, because the derived syntactic object has two roots: β and K′.

In what follows, let us assume the feature-based approach for the sake of concreteness.[2] Notice that in the framework of Chomsky (1995), the anti-lowering effects of Move/Attract cannot be derived completely from the extension condition, because Chomsky assumes that "covert" application of Move/Attract is not subject to the extension condition. If his assumption is correct, we cannot explain the anti-lowering effects of covert movement without recourse to the PBC, the definition of which is crucially dependent on c-command. However, I will argue that we can dispense with this assumption by redefining the characterization of covert movement.

Following Groat and O'Neil (1996), Shima (1998), and others, let us suppose that what is called 'covert' movement is, in fact, applied in the overt component. That is, we have no covert syntactic component, and all syntactic operations are applied in the overt component. What has been considered to be covert movement is covert in that it is not accompanied by phonetic effects. That is, when the moved category leaves the phonological features behind in the trace position, the movement is covert and invisible. In contrast, when the category as a whole with phonological features as well as formal features moves, the movement is overt and visible. Under this approach, we can characterize strength of formal features in terms of requirement of phonetic effects. A formal feature is strong when it requires overt movement, while a formal feature is weak when the checking of it does not require overt movement with phonetic effects.

Given this framework, let us revise (16) as follows.

(23) Generalized Characterization of Attractor Features (GCAF)
Suppose that the derivation D has formed Σ containing a functional head α with an uninterpretable feature F. Then, D is canceled if α is in a category not headed by α.

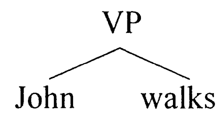
(23) characterizes an uninterpretable feature within a functional category as an attractor, and it requires that an attractor be checked as soon as possible. A strong attractor requires overt checking, while a weak one is checked covertly. In either case, the attractor is checked in the overt component as soon as possible, conforming to (23).

For example, consider (24).

(24) I know [$_{CP}$ that [$_{TP}$ John walks]]

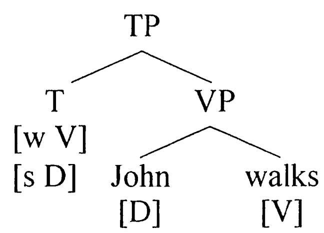
Suppose that the derivation of (24) reaches the following stage of the derivation.

(25)



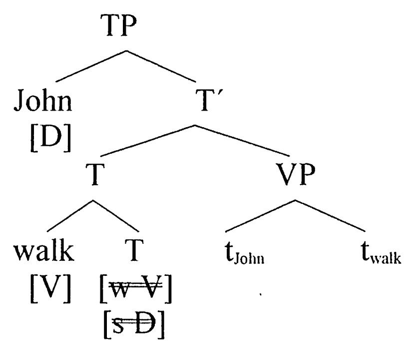

The VP in (25) merges with T, which contains a strong uninterpretable feature [s D] as well as a weak uninterpretable feature [w V].

(26)




According to the GCAF (23), the two uninterpretable features must be checked before T, in which these features are contained, is embedded in CP.

(27)

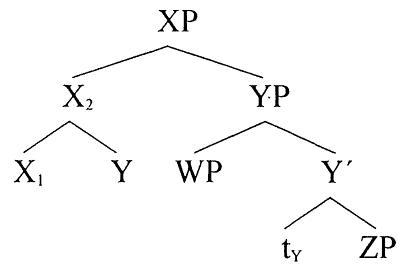



The strong feature [s D] triggers the overt movement of *John*, while the weak feature [w V] triggers the covert movement of *walk*, with the phonological features of *walk* left behind in its trace.

A crucial consequence of (23) for the present discussion is that Move/Attract is always applied in a strictly cyclic manner. This means that we can derive the anti-lowering effect of Move/Attract from (23) in a complete way.[3] In other words, we can explain the anti-lowering effects of Move/Attract without recourse to the PBC, which is defined in terms of c-command.

If we derive the anti-lowering effects of Move/Attract and dispense with the PBC, we can also eliminate a dubious assumption about head-movement. In the framework of Chomsky (1995), head-movement is assumed to be an adjunction operation.

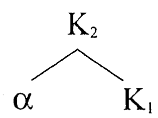
(28)




In (28), a head Y is raised and adjoined to another head X. If we assume the PBC (or any statement equivalent to it), Y must c-command the trace in order to properly bind it. Y, however, does not c-command the trace under the usual definition of domination, because the first node dominating Y, that is, $X_2$, does not dominate the trace.

In the framework of Chomsky (1995), this problem is dealt with by utilizing the notion of segment. Chomsky assumes that if $\alpha$ adjoins to the target K, the adjunction operation does not create a new category, but the two-segment category $[K_2, K_1] = \{<H(K), H(K)>, \{\alpha, K\}\}$.

(29)




For example, in (26) above, the adjunction operation adjoins Y to X, forming the two segment category $[X_2, X_1] = \{<X, X>, \{Y, X\}\}$. Chomsky proposes that domination is defined on terms, and it does not apply to a segment. Thus, the first term dominating Y in (28) is not $X_2$, which is a segment, but XP, and XP dominates the trace. Consequently, Y c-commands the trace.

Our framework, in contrast, does not require such a complication as the category-segment distinction. Under our analysis, head-movement is legitimate as far as it applies in a strictly cyclic way, subject to the generalized characterization of attractor features in (23). In (28), Y raises and adjoins to X in a strictly cyclic manner in order to check some uninterpretable formal feature within X. Thus, this head-movement is legitimate. It does not matter whether Y c-commands the trace or not. This means that we do not need the category-segment distinction, which, in turn, suggests the possibility of eliminating the distinction between substitution and adjunction.

To summarize, we have shown that the Proper Binding effects of Move/Attract can be derived from the GCAF without invoking c-command.

## 3. C-command and the Minimal Link Condition

Let us turn to the Minimal Link Condition (MLC).

(30) The Minimal Link Condition
K attracts $\alpha$ only if there is no $\beta$, $\beta$ closer to K than $\alpha$, such that K attracts $\beta$. (Chomsky 1995: 311)

This condition is designed to account for the Relativized Minimality effects of Move/Attract. The condition incorporates the notion of closeness, which refers crucially to c-command.

(31) Closeness
If $\beta$ c-commands $\alpha$ and $\tau$ is the target of raising, then $\beta$ is *closer to* K than $\alpha$ unless $\beta$ is in the same minimal domain as (a) $\tau$ or (b) $\alpha$.
(Chomsky 1995: 356)

What (30), coupled with (31), states is that some $\beta$ intervening between the attractor K and the atractee $\alpha$ blocks raising of $\alpha$ to K with the landing site $\tau$, which is an adjunction position of a head of K (=H(K)) if the raising is a head-raising, or a Spec of H(K) if the raising is an XP raising.

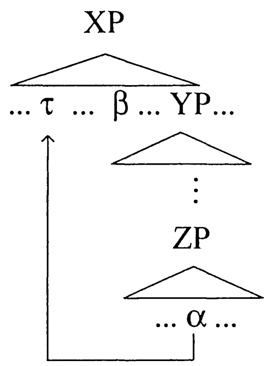
(32) $[_K \ldots [ \ldots \beta \ldots [ \ldots \alpha \ldots ]]]$

There are cases where $\beta$ is a potential landing site and cases where $\beta$ is a potential attractee. Let us call the former cases the Upward MLC, and the latter the Downward MLC. In what follows, I will argue that we can explain cases of the Upward MLC in terms of the generalized characterization of attractor features

(GCAF) (23), and cases of the Downward MLC can be accounted for by the MLC which does not depend on c-command. If this argumentation is correct, it follows that there is no need to refer to c-command in accounting for the MLC effects of Move/Attract.

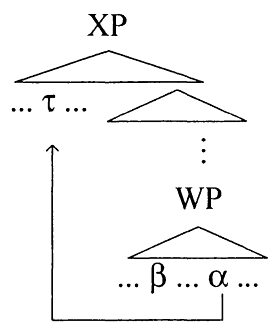
Before proceeding to the discussion of the MLC effects, let us consider the cases to which the *unless* clause in (31) is relevant. This clause states that the intervening potential blocker β does not block raising (i) if β is a potential landing site and is in the same minimal domain as the intended landing site τ as illustrated in (33a), or (ii) if β is a potential attractee and in the same minimal domain as the intended atractee α as illustrated in (33b).

(33) a.




(XP, YP, ZP: minimal domains)

b.

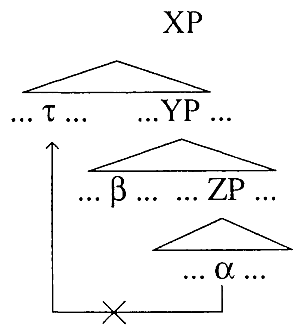



(XP, WP: minimal domains)

In these cases, owing to the *unless* clause in (31), no Relativized Minimality effects result, even if β c-commands α. In other words, it does not matter in these cases whether β c-commands α or not. This means that c-command plays no role in these cases.

Now let us turn to the MLC cases. Let us first consider cases of the Upward MLC. In these cases, β is not in the same minimal domain as τ, and the Relativized Minimality effects are expected.

(34)



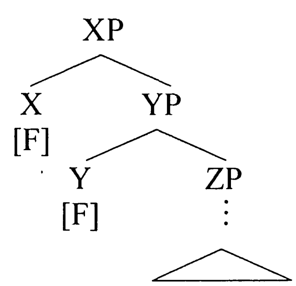

(XP, YP, ZP: minimal domains)

These cases, however, can be explained without recourse to the MLC in our framework. Recall that our analysis claims that every operation of Move/Attract, whether overt or not, must apply in a strictly cyclic manner, subject to the generalized characterization of attractor features, repeated below as (35).

(35) Generalized Characterization of Attractor Features (GCAF)
Suppose that the derivation D has formed Σ containing a functional head α with an uninterpretable feature F. Then, D is canceled if α is in a category not headed by α.

In (34), the attractee α is raised to τ in order to check an attractor feature F within the head of XP. If β is counted as a potential landing site, YP must be the maximal projection of a head which also contains an unchecked F.

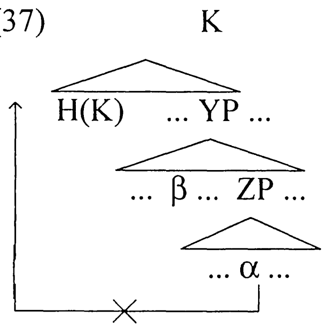
(36)




The derivation is canceled at this point by the GCAF, because the head Y with an uninterpretable feature F is embedded in XP whose head is not Y. Thus we can explain the Upward MLC cases in terms of the GCAF.

Let us turn to cases of the Downward MLC. In these cases, a potential attractee β is not in the same minimal domain as the intended attractee α.

(37)




I claim that the MLC is restricted to these cases, and therefore the notion of closeness is revised as follows.

(38)(=30) The Minimal Link Condition

K attracts α only if there is no β, β closer to K than α, such that K attracts β.

(39) Hierarchical Closeness

If β c-commands α, then β is *closer to* K than α unless β is in the same minimal domain as α.

The *unless* clause in (39) does not include the case (a) of (31), because cases of the Upward MLC are explained independently by the GCAF.

Notice that, in cases of the Downward MLC, β asymmetrically c-commands α because the two are never in a sister relation as illustrated in (37). Given the Linear Correspondence Axiom (LCA), this means that β precedes α. Then, we can restate closeness as follows.

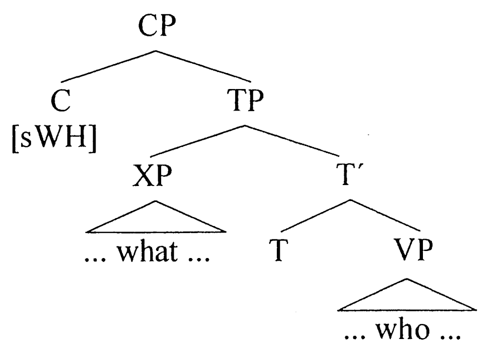
(40) Linear Closeness

A potential attractee β is *closer to* K than a potential attractee α if β precedes α unless β is in the same minimal domain as α.[4]

Suppose that we can derive linear order from some fundamental structural relation other than c-command. Then we can say that (40) does not depend on the notion of c-command. This means that we can dispense with c-command in accounting for the Downward MLC effects. In the next section I will argue that we can formulate the new LCA which does not depend on c-command. For now, let us suppose so.

Our linear closeness (40) is not equivalent to the hierarchical closeness (39) in empirical predictions. We can say that if A asymmetrically c-commands B, then A precedes B, but we cannot say that if A precedes B, then A asymmetrically c-commands B. For example, consider the following configuration.

(41)




In (41), *what* precedes, but does not c-command, *who*. The hierarchical closeness says nothing about the relation between *what* and *who*. Consequently, there are two options to check [sWH] within C. One option is to raise *what*, leading to the Subject Condition violation. The second option is to raise *who*, leading to a convergent derivation. As a result, the hierarchical closeness predicts that the second option raising *who* overtly to the Spec of CP survives.

Our approach also will make the same prediction, if the linear closeness takes island effects into consideration. Suppose that if there is a barrier between the attractor K and β, β does not count as a potential atractee for K. In (41), there is a barrier (or barriers) inducing the Subject Condition effects between the attractor K(=CP) and *what*. Thus *what* does not count as a potential attractee for CP, and the only potential atractee *who* raises to CP, leading to a convergent derivation.

If, however, the linear closeness makes no reference to barriers, we will obtain a totally different prediction. As the linear closeness is insensitive to the existence of barriers, *what* and *who* in (41) are both potential attractees for CP. Thus the MLC forces *what* to raise to CP, which results in the Subject Condition violation. Consequently, no convergent derivation survives.

I leave open which of the two conceptions of the relation between linear closeness and barrier should be adopted as well as how to give the proper formulation to barrier in the Minimalist Program.

In sum, the Upward MLC effects of Move/Attract are explained by the GCAF, and the Downward MLC effects of Move/Attract are accounted for by the revised MLC which is defined in terms of linear closeness instead of c-command-based hierarchical closeness.

## 4. C-command and Linear Order

Kayne (1994) proposes the Linear Correspondence Axiom (LCA). The LCA can be defined informally as follows.

(42) The Linear Correspondence Axiom

For all non-terminal nodes A, B such that A asymmetrically c-commands B, then for all pairs $(a, b)$ such that $a \in$ d(A) and $b \in$ d(B), $a$ precedes $b$.

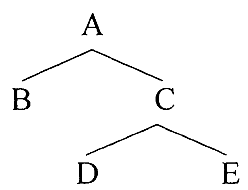
(d(X): the terminal nodes dominated by a non-terminal node X)

(Culicover 1997: 373)

Chomsky (1995) elaborates the LCA and incorporates it into the Bare Phrase Structure Theory, eliminating category-terminal distinction, hence head-terminal distinction and associated constraints on c-command of Kayne's original formulation. See Chomsky (1995: 334-340).

The leading idea of the LCA is that linear order reflects hierarchical ordering, and the asymmetry of linear ordering relation can be derived from the asymmetry of some hierarchical relation. This is a conceptually desirable approach. However, the LCA has one unsatisfactory conceptual aspect in that it contains the stipulative phrase 'asymmetrically' instead of referring simply to 'c-command.' Why do we need to stipulate this restrictive term 'asymmetrically' in order to derive the asymmetry of linear order? This is because c-command is not an inherently asymmetric relation and we can find without difficulty cases where two constituents c-command each other.

(43)




In (43), B and C c-command each other. D and E also are in a mutual c-command relation.

Evidently, it is much more desirable to derive the asymmetry of linear order from some inherently asymmetric relation without recourse to any stipulated restrictive term 'asymmetrically.' Is there some inherently asymmetric relation which is independently motivated? I propose that the most plausible candidate is the notion of projection. Chomsky (1995: 244) suggests that the label $\gamma$ of a syntactic object $\{\gamma, \{\alpha, \beta\}\}$ is one or the other of $\alpha$, $\beta$, but not either the intersection of $\alpha$ and $\beta$, or the union of $\alpha$ and $\beta$. In other words, if we accept this suggestion, it follows that given two syntactic objects $\alpha$, $\beta$, the merger of the two by Merge or Move/Attract necessarily leads to the asymmetric projection of either $\alpha$ or $\beta$.[5]

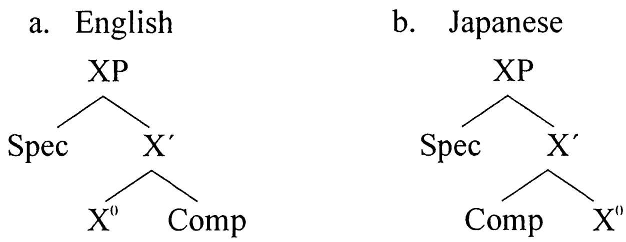
Given this characterization of projection, it is a highly plausible idea that the asymmetry of linear order reflects the inherent asymmetry of the projection of a syntactic object. Let us propose (44) below as a realization of this idea.

(44) The Projection-based LCA
Given two terms $\alpha$, $\beta$ of a syntactic object $\{\gamma, \{\alpha, \beta\}\}$, (i) $\beta$ precedes $\alpha$ if $\alpha$ projects, or (ii) $\alpha$ precedes $\beta$ if $\alpha$ projects.

(45)



In English, the merger of a head $X^0$ and its complement utilizes (45b), and other cases utilize (45a). In Japanese, every merger utilizes (45a). This accounts for the following familiar difference in phrase structure between the two languages.

(46)



I assume tentatively that (45a) is a default option, and (45b) is a marked option which is accessible only to a head.[6]

Let us further suppose that the Projection-based LCA applies when Merge or Move/Attract applies. In other words, word order is determined derivationally in a strictly cyclic manner. This means that the information of word order is available in the syntactic computation. It should be evident that our approach is a sharp contrast to that of Chomsky (1995), who claims that linear ordering is a PF property, and irrelevant in the syntactic computation. Our approach also differs from that of Takano (1996), which shares a number of aspects with our approach but accepts the

PF approach of word order of Chomsky. The idea that word order is determined cyclically may be in accordance with the multiple Spell-out hypothesis of Uriagereka (1997).[7]

One desirable consequence of our approach is that there never occur cases where the ordering between two words cannot be determined. Chomsky notes that his LCA cannot determine word order in a straightforward way in cases exemplified below.

(47) love
love him

In this structure, *love* and *him* c-command each other and no asymmetric relation is obtained. Consequently, his formulation of the LCA cannot determine the ordering between *love* and *him*. Under our approach, *love* precedes *him* because *love* projects.

If this line of approach to word order is correct, it follows that we need not rely on c-command in determining linear order.

Finally let us return to linear closeness (40), repeated here as (48).

(48) Linear Closeness
A potential attractee $\beta$ is *closer to* K than a potential attractee $\alpha$ if $\beta$ precedes $\alpha$ unless $\beta$ is in the same minimal domain as $\alpha$.

This notion is not defined on the basis of c-command, but formulated in terms of linear precedence. As argued in this section, linear order is determined in terms of the inherent asymmetry of projection, unlike the standard LCA approach. This confirms the conclusion tentatively given in section 3 that we need not invoke c-command in accounting for the Downward MLC cases as well as the Upward MLC cases.

## 5. Binding Theory and C-command

Binding theory is another module in which c-command has been involved in a crucial manner. Within the framework of the Minimalist Program, Chomsky and Lasnik (1993) reformulate Binding Conditions as LF interpretive rules as stated in (49) below.

(49) Binding Conditions

A. If $\alpha$ is an anaphor, interpret it as coreferential with a c-commanding phrase in its governing category.

B. If $\alpha$ is a pronoun, interpret it as disjoint from every c-commanding phrase in its governing category.

C. If $\alpha$ is an r-expression, interpret it as disjoint from every c-commanding phrase.

(50) Governing Category

The governing category (GC) for $\alpha$ is the minimal complete functional complex (CFC) that contains $\alpha$ and a governor for $\alpha$ and in which $\alpha$'s binding condition could, in principle, be satisfied.

(51) Complete Functional Complex

A CFC is a projection containing all grammatical functions compatible with its head.

As we can see in the conditions in (49), c-command plays an crucial role in all of them. In what follows, I briefly discuss how we can dispense with c-command in formulating binding conditions.

Firstly, I assume that the fundamental relation in binding theory is not 'coreferential with,' which is a symmetric relation, but 'antecedent of,' which is an asymmetric relation, as proposed in Higginbotham (1983) and developed further in Hornstein (1995). In the standard approach, if in (52) *him* refers to *John*, *him* is interpreted as coreferential with *John*, which is represented by coindexation as illustrated in (53).[8]

(52) John said that Mary criticized him.

(53) John$_i$ said that Mary criticized him$_i$.

In this approach, *him* is coreferential with *John* and, at the same time, *John* is coreferential with *him*.

In contrast, Higginbotham (1983) argues that if *him* refers to *John* in (52), *him* is referentially dependent on *John* as the antecedent, and this asymmetric dependency is represented in terms of *linking* by an arrow from the dependent to the antecedent.

(54) John said that Mary criticized him.

In this approach, *him* is dependent on *John* (or *John* is the antecedent of *him*), while *John* is not dependent on *him* (or *him* is not the antecedent of *John*). I take the fundamental relation in binding theory to be asymmetric referential dependency instead of symmetric coreference of the standard approach.

Secondly, I propose that GC is replaced by the local domain which is defined without reference to 'governor for α.' Let us call this domain *binding category* (BC).

(55) Binding Category
A BC for α is the minimal CFC which contains α and in which α's binding condition could, in principle, be satisfied.

What motivates the inclusion of 'governor of α' in the definition of BC is exceptional behavior of the accusative subjects of the exceptional Case-marking (ECM) constructions as illustrated in (56).

(56) [$_{TP}$ John$_i$ believes [$_{TP}$ {*him$_i$/himself$_i$} to be clever]]

The accusative subjects *him* and *himself*, which function as the subjects of the embedded TP, behave as if they were the objects of the matrix verb *believes*. That is, the binding properties of them are parallel to those of *him* and *himself* in (57) below.

(57) John$_i$ hates {*him$_i$/himself$_i$}.

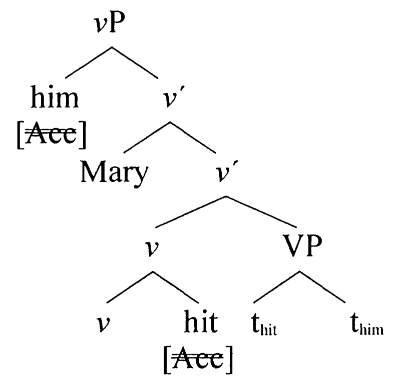
Traditionally, the exceptional binding properties of these embedded subjects are explained by assuming that they are governed by the matrix verb and that the definition of GC includes 'governor for α' as in (50) above. In (56), for example, *him* and *himself* are governed by the matrix verb *believes*, and therefore the GC for these nominals is the matrix TP, which is the minimal CFC containing them and the governor for them.

This traditional explanation is conceptually problematic in that it refers crucially to government, which has lost conceptual as well as empirical motivations within the Minimalist Program. Thus, it is preferable to replace GC in (50) with BC in (55), which makes no reference to government. This move is possible if we adopt the checking theory of abstract Cases.

It is proposed within the Minimalist framework that the accusative Case feature contained in nominals is checked by accusative Case-markers (transitive verbs) and checking is carried out within the checking domain of a relevant Case-marker. For example, the accusative Case feature of *him* in (58) is checked within the domain of *v*, to which the accusative Case-marker *hit* is adjoined.

(58) Mary hit him.

(59)




I assume that *him* raises covertly in the way described in section 2 so that the phonological features of *him* are realized by the trace. Consequently, we obtain the observed word order 'hit-him.'

If we extend this proposal to the ECM constructions, *him* and *himself* in (56) also raise covertly (or overtly, if Lasnik 1995 is correct) to the matrix clause to check the accusative Case.

(60) $[_{TP}$ John $[_{vP}$ $\alpha$ believes $[_{TP}$ $t_\alpha$ to be clever]]] ($\alpha$=him or himself)

In the matrix TP, *him* and *himself* are bound by *John*, resulting in the grammaticality pattern parallel to that of (57). The reason that the relevant GC (or BC in our terms) for them is the matrix TP is not because they are governed by the matrix verb, but because they raise to the matrix clause in order to check the accusative Case.

If this approach is correct, we do not need refer to government in order to explain the exceptional behavior of ECM subjects. Let us adopt this approach and replace GC in (50) with BC in (55).

With these two points in mind, let us propose the following binding conditions.

(61) Revised Binding Conditions

A. If $\alpha$ is an anaphor, interpret it as dependent on a phrase in the minimal domain of the head of its BC.[9]

B. If $\alpha$ is a pronoun, interpret it as independent of every phrase in its BC.

C. If $\alpha$ is an r-expression, interpret it as independent of every phrase.

Let us first consider the following sentence.

(62) *[$_{TP}$ John criticized him]

The BC for *him* is the matrix TP, because it is the minimal CFC which contains *him*.[10] *Him* is linked to the antecedent *John* in TP, violating the revised Binding Condition B. If the direction of linking is reversed, the linking violates the revised Binding Condition C.

(63) *[$_{TP}$ John criticized him]

The revised Binding Condition C prohibits r-expressions such as *John* from being dependent on other nominals.

Consider next the following sentence.

(64) [$_{TP}$ John said [$_{CP}$ that [$_{TP}$ Mary criticized him]]]

*Him* is linked to the antecedent *John*, but *John* is outside the BC for *him*, that is, the embedded TP. This linking is allowed by the revised Binding Conditions.

In contrast, the following linking is prohibited.

(65) *[$_{TP}$ He said [$_{CP}$ that [$_{TP}$ Mary criticized John]]]

In (65), *he* is linked to *John*, which is in the BC for *he*, that is, the matrix TP, violating the revised Binding Condition B. Furthermore, if the direction of linking is reversed, the linking violates the revised Binding Condition C.

(66) *$[_{TP}$ He said $[_{CP}$ that $[_{TP}$ Mary criticized John]]]

Let us turn to the sentence below.

(67) $[_{TP}$ $[_{DP}$ His $[_{NP}$ boss]] criticized John]

In (67), the BC for *his* is DP, because it is the minimal CFC which contains *his*. Hence, *his* can be linked to *John*, which is not contained in DP. A parallel explanation holds true for the sentence below.

(68) $[_{TP}$ $[_{PP}$ After $[_{TP}$ he entered the room]]$[_{TP}$ John sat down]]

The BC for *he* is the TP embedded in the adjunct PP, which is the minimal CFC containing *he*. *He* can be linked to *John*, which is outside this TP.

So far, we have taken the BC for object nominals to be TP (see note 10).

(69) $[_{TP}$ Subject T $[_{vP}$ V Object]]

Precisely speaking, however, the BC for an object within *v*P is not TP. Recall that the object itself raises covertly from VP to *v*P. The trace of the subject is also contained in *v*P. This means that *v*P is the minimal CFC for the object. Consequently, the BC for the object is *v*P.

(70) $[_{TP}$ Subject T $[_{vP}$ Object $[_{v'}$ $t_{Subject}$ *v*-V $[_{VP}$ $t_V$ $t_{Object}$]]]]

With this precise conception of the BC for object nominals, let us reconsider (62) above, repeated here as (71) with the relevant details added.

(71) *$[_{TP}$ John T $[_{vP}$ him $[_{v'}$ $t_{John}$ *v*-criticized $[_{VP}$ $t_{criticized}$ $t_{him}$]]]]

This representation seems to pose a problem for our analysis, because the antecedent *John* is outside *v*P, the BC for *him*. However, when we interpret *him* as dependent on *John*, it is natural to interpret *him* as dependent on the trace of *John* as well. As a descriptive generalization, let us assume the following interpretive rule.

(72) If a phrase $\alpha$ is interpreted as dependent on a phrase $\beta$ which is a member of a chain CH, interpret $\alpha$ as dependent on other members of CH.

Given (72), *him* in (71) is interpreted as dependent on the trace of *John*, violating the revised Binding Condition B.

Notice that an interpretive rule corresponding to (72) is necessary even if we adopt the standard Binding Conditions in (49). As mentioned in note 8, within the Minimalist framework, the Inclusiveness Condition (2C) prohibits the use of indices. For example, in the standard approach, the following LF representation will be derived instead of (71).

(73) $[_{TP}$ John T $[_{vP}$ $t_{John}$ *v*-criticized-FF(him) $[_{VP}$ $t_{criticized}$ $t_{him}$]]]

The Binding Condition B will force us to interpret *him* (or some relevant feature in FF (him)) as disjoint from the trace of *John*. Notice, however, that we can interpret *him* as coreferential with *John* in the Spec of TP, because this interpretation, as it is, does not violate the Binding Conditions in (49). This is because *John* is outside the GC for *him*, which is *v*P under the VP-internal subject hypothesis. Obviously, the two interpretations must be ruled out as incompatible with each other by some constraint corresponding to (72).

Now consider the sentence (74a), with *him* linked to *John* as in (74b).

(74) a. John's boss criticized him.
b. $[_{TP}$ $[_{DP}$ John's $[_{NP}$ boss]] T $[_{vP}$ him $t_{DP}$ *v*-criticized $[_{VP}$ ...]]]

In (74b), *him* is linked to *John*, which is outside the BC for *him*. In contrast to (71), *John* is not a member of the chain formed by the raising of the subject DP. As a consequence, the interpretive rule (72) is inoperative in this case, and the linking in (74b) does not violate the revised Binding Conditions.

Now let us examine the revised Binding Condition A. Consider first the linking represented in (75b).

(75) a. John criticized himself.
b. $[_{TP}$ John T $[_{vP}$ himself $t_{John}$ *v*-criticized $[_{VP}$ ...]]]

In (75b), the BC for *himself* is *v*P, and the minimal domain of *v* is { himself, $t_{John}$, VP, criticized}. *Himself* is linked to the trace of *John* in this minimal domain, satisfying the revised Binding Condition A.

Let us now turn to the ill-formed example in (76).

(76) a.*John said that Mary criticized himself.
b.*$[_{TP}$ John said [that $[_{TP}$ Mary $[_{vP}$ himself $t_{Mary}$ *v*-criticized $[_{VP}$ ...]]]]]

In (76b), the BC for *himself* is the embedded *v*P, and the minimal domain of *v* is {himself, $t_{Mary}$, VP, criticized}. *Himself* is linked to *John*, which is not contained in the minimal domain of *v*. As a result, the linking in (76b) violates the revised Binding Condition A.

Finally, consider the following case.

(77) a. *Himself criticized John.
b. *$[_{TP}$ himself T $[_{vP}$ John $[_{v'}$ $t_{himself}$ *v*-criticized $[_{VP}$ ...]]]

In (77b), the BC for *himself* is TP, and the minimal domain of T is {himself, *v*P}. Although *himself* is linked to *John*, *John* is not included in the minimal domain of T, violating the revised Binding Condition A. Notice that the revised Binding Condition A does not apply to the trace of *himself*, because the revised Binding Conditions (as well as the standard Binding Conditions in (49), as far as I know) take only the head of a chain as the target of interpretation. The interpretive rule

(72) does not apply to the trace of *himself*, either, because the trace is not a member of the chain of the intended antecedent, but a member of the chain of the dependent *himself*.

Thus, we have come across the generalization roughly stated as follows.

(78) The antecedent of linking relation may be any member of a chain, but the dependent of linking relation is restricted to the head of a chain.

The fact that there exists asymmetry of this kind between the antecedent and the dependent in liking relation may provide additional support for the hypothesis that binding phenomena should be captured in terms of asymmetric relations.

In sum, we have shown that the Binding Conditions can be reformulated without recourse to c-command, in terms of asymmetric binding relations, binding categories defined without government, and domains of heads.

## 6. Conclusion

In this paper we have considered the possibility of dispensing with c-command in linguistic theory, and argued that we need not rely on c-command in accounting for anti-lowering effects and the Upward and Downward MLC effects of Move/Attract, which are main structure-building phenomena in which c-command has been argued to be crucially involved. We have also proposed that linear order is determined in terms of the inherent asymmetric property of projection. Furthermore, we have shown that binding phenomena can be accounted for without referring to c-command. If we adopt the strongest minimalist thesis in (1), these results strongly suggest that c-command should be eliminated from linguistic theory.

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## Notes

1) Saito (1989) accounts for the strong deviance of (ib) in contrast to (ia) by the PBC.

(i) a. ??Who$_i$ do you wonder [which picture of $t_i$]$_j$ John likes $t_j$? (Saito 1989: 187)
    b. *[Which picture of $t_i$]$_j$ do you wonder who$_i$ John likes $t_j$? (ibid.)

Saito argues that (ib) is excluded as a violation of the PBC, because *who* does not c-command $t_i$. However, the unacceptability of (ib) can be accounted for by the Minimal Link Condition. See Shima (1998). Lasnik and Saito (1992) also claim that the PBC accounts for sentences exemplified in (ii) as well.

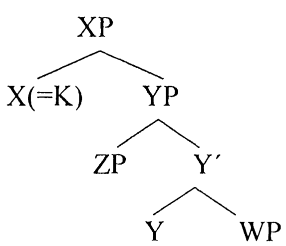
(ii) a. *[How likely $t_i$ to be a riot] is there$_i$? (Lasnik and Saito 1992: 141)
     b. *[How likely $t_i$ to be taken of John] is advantage$_i$? (ibid.)

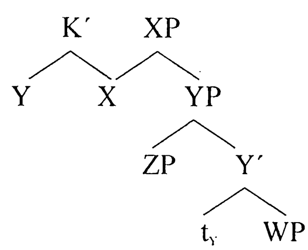
As Nakamura (1993) points out, this claim is untenable, because the VP containing the trace of a passivized object can move over the derived subject by VP-Preposing.

(iii) [$_{VP}$ killed $t_i$ by John], Mary$_i$ was. (Nakamura 1993: 129)

Examples like (iii) indicate that the PBC cannot be a valid generalization as it is. In consideration of these, I assume that the PBC is only valid in excluding lowering movement.

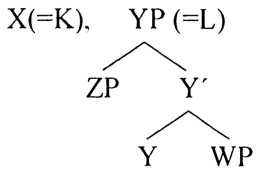
2) The two approaches are not equivalent in a number of respects. One of those differences is that the second approach based on the Single Root Condition will prohibit head-to-head raising, at least in the standard formulation of head-to-head raising.

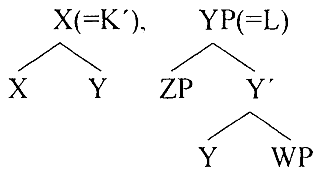
(i)


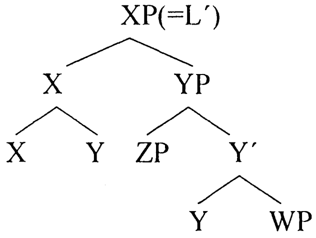

(ii)



The derived syntactic object in (ii) has two roots, XP and K′, violating the Single Root Condition.

While there are many unclear points about head-to-head raising such as the segment-category distinction, the definition of domination, and so on, a possible way to permit head-to-head raising under the second approach is to adopt the analysis proposed by Takano (1996). Takano proposes that a head X can merge with a copy of another head Y as illustrated in (iv) before X merges with YP in (v).

(iii)



(iv)



(v)



Under this approach, the domination relations established during the derivation from (iii) to (v) undergo no modification, irrespective of what kind of definition is given to domination in the case of adjunction. Essentially the same analysis is proposed in Bobaljik (1995). Alternatively, we might be able to dispense with head movement, adopting the framework of distributed morphology. For some relevant discussion, see Frampton and Gutmann (1998a, b).

Another point to notice is that the first approach refers crucially to the presence of attracting formal features, while the second approach is more restrictive in that it imposes strict cyclicity on every merger operation irrespective of the presence/absence of attracting formal features, which, I believe, is a more desirable consequence. The first approach, however, will gain the same restrictiveness if we assume that every merging operation involves feature checking. For example, let us assume that a head H merges with the complement to check some feature related to the complement selection of H. For relevant discussion, see Chomsky (1998).

3) A possible exceptional case might be XP adjunction by Move/Attract, because such a case would involve no relevant attractor feature. However, Chomsky (1995) suggests that XP adjunction by Move/Attract is eliminated from the syntactic theory. I follow this suggestion and assume that XP adjunction by Move/Attract does not exist.

4) The definition of linear closeness might be parametrized as in (i) below.

(i) Parametrized Linear Closeness

A potential attractee $\beta$ is closer to K than a potential attractee $\alpha$ if $\beta$ {(a) precedes / (b) follows} $\alpha$ unless $\beta$ is in the same minimal domain as $\alpha$.

Head-initial languages such as English adopt the value (a), while head-final languages such as Japanese might adopt the value (b). This parametrization might have interesting consequences for a number of phenomena such as anti-superiority effects of multiple wh-questions in Japanese (cf. Saito 1982 , Watanabe 1992), multiple specifier constructions (cf. Ogawa 1996), and so on. I leave these issues for future research.

5) For an opposite view, see Cann (1996).

6) I put aside a number of problems such as relative clauses in DP, postverbal adjuncts in VP, and so on. For recent discussion of head-parameter in the Minimalist Program, see Saito and Fukui (1998).

7) Brody (1997) also claims that what is primitive is not c-command but linear order. He, however, does not intend to eliminate c-command but tries to define c-command in terms of linear order.

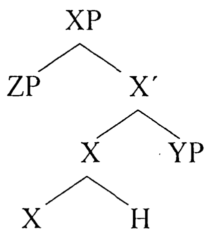
8) In fact, within the Minimalist framework, the use of indices is also prohibited by the Inclusiveness Condition (2C) (Chomsky 1995: 228).

9) The domain of a head is defined as follows.

(i) The Domain of a Head

The domain of a head $\alpha$ is the set of nodes contained in Max($\alpha$) that are distinct from and do not contain $\alpha$, where Max($\alpha$) is the least full-category maximal projection dominating $\alpha$. (Chomsky 1995: 178)

For example, the domain of X in (ii) is {YP, ZP, H} and whatever these categories dominate.

(ii) 


The minimal domain of a head $\alpha$ is the smallest subset K of the domain S of $\alpha$ such that for any $\gamma \in$ S, some $\beta \in$ K reflexively dominates $\gamma$ (Chomsky 1995: 178). For example, the minimal domain of X in (ii) is {YP, ZP, H}.

10) Strictly speaking, the minimal CFC which contains *him* will be *v*P under the VP-internal subject hypothesis.

(i) $[_{TP}$ John T $[_{vP}$ him $[_{v'}$ $t_{John}$ *v*-criticized $[_{VP}$ $t_{criticized}$ $t_{him}]]]]$

However, the essential parts of the explanation presented here will not be affected, because *v*P contains the trace of the subject, and the trace is bound by the subject in the Spec of TP. For the moment, let us put aside the complication caused by the adoption of the VP-internal subject hypothesis and assume informally that the minimal CFC for the object is TP. We will return later to this problem.

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