| Table of Contents (节略表)
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tsukuba English Studies Vol. 7 No. 159-186 Aug. 1988</td>
</tr>
</tbody>
</table>

- Extraction from Noun Phrases: Some Consequences of the DP Hypothesis and the Theory of Barrier

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Extraction from Noun Phrases: Some Consequences of the DP Hypothesis and the Theory of Barrier

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0. Introduction

This paper concerns issues on extraction from noun phrases in English, whose typical examples are given in (1) and (2).

(1) a. What subject did you buy a book about?
   b. About what subject did you buy a book?

(2) a. Which shelf did you buy a book on?
   b. On which shelf did you buy a book?

In what follows, I will argue that the contrast between (1) and (2) can be accounted for if a structure of noun phrases and a system of barrier to be discussed are introduced into the theory of grammar.

In the first section, I will introduce a structure of noun phrases proposed in Tonoike (1988), which is exactly parallel to the structure of clauses in the sense of Chomsky (1986b). In the second section, I will propose a system of "barrier" rather different from the one proposed in Chomsky (1986b). In the final section, I will demonstrate that the structure of noun phrases and the theory of barrier make it possible to give a unified treatment to extraction from a noun phrase, such as (1) and (2), and extraction from a clause embedded in a factive predicate and one containing a wh-island, and to provide a principled explanation for some related phenomena.

1. The DP Hypothesis

Recently, a new structure of noun phrases has been
proposed: the DP hypothesis (Brame (1982), Fukui (1986), Speas (1986) and Abney (1987), among others). The structure is given in (3).

(3) \([\text{DP} \ldots [\text{D}, \text{D NP}]]\)

Thus the noun phrase is DP (Determiner Phrase) rather than NP, and NP occurs as a complement of D(eterminer) on analogy to VP as a complement of I in IP. The chief motivation for the DP hypothesis is to treat all X-zero categories as heads of their own projections, and to unify the X-bar theoretic treatment of the non-lexical categories C, I and D.

Tonoike (1988) goes further and proposes a structure of DP exactly parallel to that of CP in the sense of Chomsky (1986b), which I will assume throughout this paper:

(4) a. \([\text{DP} \ldots [\text{D}, \text{D IP} \ldots [\text{I}, \text{I NP }]]]\)

b. \([\text{CP} \ldots [\text{C}, \text{C IP} \ldots [\text{I}, \text{I VP }]]]\)

According to his proposal, NP occurs as the complement of I just like VP, and D takes IP as the complement just like C. To justify (4a), he mentions the single/plural agreement between D and NP, assuming the operation of N-raising to I similar to V-raising to I:

(5) a. \{this/that\} book
b. \{these/those\} books
c. \{this/that\} books
d. \{these/those\} book

This is similar to the agreement between C and I in a clause:

(6) a. We'd prefer [for John to leave]
b. We believe [that John will leave]
c. \#We'd prefer [for John will leave]
d. \#We believe [that John to leave]
Although Tonoike does not mention other facts than this, we can see another piece of evidence for the structure (4a). Abney (1987) notes that there are numerous languages in which the noun phrase (whether derived or not) has a property of the nominal head agreeing with its subject, citing examples from Yup'ik, which is a Central Alaskan Eskimo language, Tzutujil, which is Mayan, Hungarian and Turkish. The relevant paradigm in Hungarian, for example, is (6), which is originally from Szabolcsi (1984).

(7) a. az én-Ø vendég-e-m
    the I-nom guest-poss-1sg "my guest"
b. a te-Ø vendég-e-d
    the thou-nom guest-poss-2sg "thy guest"
c. (a) Mari-Ø vendég-e-Ø
    the Mari-nom guest-poss-3sg "Mary's guest"

Chomsky (1986b) assumes that in order to generate John is tall, V (=be) moves from its D-structure position to the head position I of IP, amalgamating with I:

(8) a. [CP [IP John [I' I [VP be tall]]]] (D-structure)
b. [CP [IP John [I' is [VP t tall]]]] (S-structure)

He argues that since I is lexically identified as an affix, movement of V to I forming V_i is permissible and that indeed it is obligatory, since otherwise the affix would lack a bearer.

Let us assume that movement of N to I forming N_i occurs in (6). The D-structure and S-structure representations of (6a), for example, are as in (9).

(9) a. [DP [d' az [IP én [I' I [NP vendég ]]]]]
    (D-structure)
b. [DP [d' az [IP én-Ø [I' vendég-e-m [NP t]]]]]
    (S-structure)
Assume also that the noun phrase in English has the structure (4a), though no visible agreement occurs between the nominal head and its subject.

Then relevant structures of English examples are as in (10), for example.

(10) a. \([\text{DP} [\text{IP the enemy} \, [\text{IP 's [NP destruction of the city]]}]]\]
   "the enemy's destruction of the city"

b. \([\text{DP} [\text{IP John} \, [\text{IP 's [NP desk]]}]]\]
   "John's desk"

I assume that both the Agent phrase and the Possessor phrase occur in the Specifier position of IP, and that INFL assigns them Cases, realizing as 's.¹

What about the Spec of DP? We might assume that it is the position for the subject of the predicate in a small clause construction, adopting Stowell's (1983), (1987b) analysis. Stowell assumes that every maximal projection has a specifier position, which can be occupied by the subject of a small clause.² While he argues that the Spec of a category is always present whether it is occupied or not, we might naturally argue that it is missing unless an element occurs in it: that the Spec of DP, VP, AP and PP is not present except in a small clause construction. If we do not adopt Stowell's analysis of a small clause construction, we might assume either that the Spec of DP, like that of VP, AP and PP, is always missing, or that no element occurs in it though it is always present. We will return to this point in the next section.

2. The Theory of Barrier

Chomsky (1986b) is an exciting attempt to explore a possibility to give a unified approach to the theories of government and bounding. Crucial in his work is the notion of
"barrier." His intuitive idea is that certain categories in certain configurations are barriers to government and to movement. According to his work, one barrier suffices to block government, whereas more than one barrier inhibits movement in a graded manner.

In this section, I will propose a system of barrier, essentially along the line of Chomsky (1986b), but rather different in some respects.

Let us begin with the ECP. The ECP requires that a nonpronominal empty category must be properly governed. According to Chomsky (1986b), proper government is defined as follows:

(11) $\alpha$ properly governs $\beta$ iff $\alpha \theta$-governs $\beta$ or antecedent-governs $\beta$.

Government, $\theta$-government and antecedent-government are defined as follows:

(12) a. $\alpha$ governs $\beta$ iff $\alpha$ m-commands $\beta$ and every barrier for $\beta$ dominates $\alpha$.

b. $\alpha \theta$-governs $\beta$ iff $\alpha$ is a zero-level category that $\theta$-marks $\beta$, and $\alpha$, $\beta$ are sisters.

c. $\alpha$ antecedent-governs $\beta$ iiff $\alpha$ c-commands $\beta$ i, and every barrier for $\beta$ i dominates $\alpha$ i.3

Setting aside the definition of barrier, let us consider (11). It has been claimed that it is conceptually undesirable to define the ECP disjunctively, since $\theta$-government and antecedent government are different in nature: the former expresses a relation between a zero-level category and a maximal projection while the latter expresses a relation between two maximal projections. Moreover, as Chomsky notes, proper government, as it stands, gives a wrong prediction about (13).
(13) *a mani seems [there to be killed ti]

If this is an ECP violation, \( \theta \)-government does not suffice for proper government of an A-bound trace.

Chomsky himself suggests eliminating \( \theta \)-government from the definition of proper government, and treating the ECP simply as a "chain phenomenon," which would explain why it does not hold for the empty categories pro and PRO.\(^4\) Now let us define the ECP, along this spirit, as follows:

(14) Each link of a chain must be in antecedent-government relation.

If we adopt the ECP in (14), some problems concerning the argument/adjunct asymmetry arise. Let us see a case of LF-movement as an instance. As is well known, an argument can be a \( wh \)-in situ, while an adjunct cannot.

(15) a. Who sang what
    b. *Who sang the song how

Such a contrast as this has been accounted for as follows: \( wh \)-phrase fronted at LF occupies a position in which it does not antecedent-govern its trace, and therefore the trace that \( how \) left behind does not satisfy the ECP, while the trace that \( what \) left behind is \( \theta \)-governed by \( V \), satisfying the ECP.\(^5\) However, our ECP cannot account for the contrast, as it stands, since we have eliminated \( \theta \)-government from its definition.

Now, from a different point of view, we might distinguish argument traces from adjunct traces, with respect to checking of antecedent-government relation. This is essentially along the line of Chomsky (1987). Here we stipulate that checking of antecedent-government relation takes place at LF for all links except for links of A'-chains of arguments: for A'-chains of arguments, only the tail link is checked.\(^6\)
Let us turn to the definition of barrier. In Chomsky (1986b), barrier is defined in terms of "blocking category" (BC), which is defined in terms of "L-marking." The definition of barrier that I will present is in terms of "obstructing category" (OC) as well as BC, which in turn is defined in terms of "H-marking" as well as L-marking. We construe L-marking and H-marking as follows:

(16) a. \( \alpha \) L-marks \( \beta \) iff \( \beta \) is a complement of \( \alpha \) and 
    \( \alpha \) is a lexical category.

b. \( \alpha \) H-marks \( \beta \) iff \( \beta \) is a complement of \( \alpha \).

Chomsky (1986b) defines BC as follows:

(17) \( \alpha^{\text{MAX}} \) is a BC for \( \beta \) iff \( \alpha^{\text{MAX}} \) is not L-marked and 
    dominates \( \beta \).

Since L-marking constitutes a subset of H-marking, there are two types of BC, H-marked BC and non-H-marked BC. H-marked BC constitutes OC, as defined in (18).

(18) \( \alpha^{\text{MAX}} \) is an OC for \( \beta \) iff \( \alpha^{\text{MAX}} \) is an H-marked BC 
    for \( \beta \) and immediately dominates \( \gamma^{\text{MAX}} \), which is 
    H-marked but not L-marked and does not dominate \( \beta \).

Intuitively, if there are two maximal categories that are H-marked but not L-marked, such that one immediately dominates the other, the upper category constitutes an OC for an element dominated by that category but not by the lower one.

We define barrier in terms of BC and OC as in (19).

(19) \( \alpha^{\text{MAX}} \) is a barrier for \( \beta \) iff (a), (b), (c) or (d):
    (a) \( \alpha^{\text{MAX}} \) is a non-H-marked BC for \( \beta \);
    (b) \( \alpha^{\text{MAX}} \) is an H-marked BC for \( \beta \) and immediately 
        dominates another H-marked BC for \( \beta \);
    (c) \( \alpha^{\text{MAX}} \) immediately dominates an OC for \( \beta \);
(d) $a^\text{MAX}$ immediately dominates a barrier defined by (a), (b) or (c).

In case (19a) $a^\text{MAX}$ is a barrier intrinsically while in case (19b, c, d) $a^\text{MAX}$ inherits barrierhood from the immediately dominated category in some sense.

To illustrate the point, let us see (20) and (21).

(20) a. $[\alpha \ldots [\gamma \ldots \beta \ldots]]$
   b. $[\alpha \beta [\gamma \ldots]]$

(21) a. $[\alpha \ldots [\gamma \ldots [\delta \ldots \beta \ldots]]]$
   b. $[\alpha \ldots [\gamma \beta [\delta \ldots]]]$

In (20), where $\alpha$ and $\gamma$ are H-marked but not L-marked, $\alpha$ in (a) is a barrier for $\beta$ defined by (19b), while $\alpha$ in (b) is OC but not a barrier for $\beta$ since OC is not a barrier itself.

In (21), where $\gamma$ and $\delta$ are H-marked but not L-marked, $\alpha$ and $\gamma$ in (a) are barriers for $\beta$ since the former immediately dominates the latter, which is a barrier for the same reason as $\alpha$ in (20a), while $\alpha$ in (b) is a barrier for $\beta$ since it immediately dominates an OC for $\beta$, or $\gamma$.

We argued above that the ECP is a condition on chain. Then there arises a problem concerning extraction from an adjunct PP, such as (22).

(22) Which concert did you fall asleep [PP during $t_1$]

Here PP is a barrier defined by (19a). If the moved element crossed the PP, it would not antecedent-govern $t_1$, and (22) would be an ECP violation. If we invoke PP-adjunction, we obtain a desirable result:

(23) ...[PP $t_1'$ [PP during $t_1$]]

Chomsky (1986b) argues that adjunction structure consists of two segments, as argued in May (1985), and that each segment
does not count as a barrier. Hence in (23), neither PP constitutes a barrier, and ti' antecedent-governs ti.

There arises another problem, however. If adjunction could void barrierhood, (22) would be perfect. It seems that what caused this problem is the assumption that adjunction structure consists of two segments. Now suppose that adjunction creates a new category. More specifically, in (24), α' is a "new occurrence" of α created by adjoining β to α and α' dominates β.

(24) \[ α \cdot β : [α \ldots ti\ldots] \]

Our assumption about adjunction structure is crucially different from Chomsky's (1986b) and Lasnik & Saito's (forthcoming) assumptions in that only α' counts as a maximal projection, rather than both α' and α. It follows that in our system, the upper PP in (23) still constitutes a barrier for ti' after adjunction.

Note that our system of barrier strictly observres the condition on adjunction discussed in Chomsky (1986b):

(25) Adjunction is possible only to a maximal projection that is a nonargument.

Chomsky motivates this condition in terms of θ-theory: the category created by adjunction might be "invisible" to θ-marking since it is not a full category but rather a segment and thus not a recipient of a θ-role. In our terms, it might be said that since adjunction creates a new maximal category, adjunction structure changes a recipient of a θ-role, an illegal situation with respect to the Projection Principle.

Chomsky cannot handle extraction from an adjunct CP or an adjunct PP, since adjunction necessarily voids barrierhood in his system, as we saw above. Our assumption about adjunction structure, on the other hand, makes it possible for us to handle such extraction cases without any difficulty.
Notice also that our system does not treat IP as a special category, unlike Chomsky, who stipulates that IP is a BC but never a barrier and that intermediate adjunction to IP is impossible. Especially, we allow adjunction to IP so long as it is a nonargument. Lasnik & Saito (forthcoming) argues convincingly that a topicalized element adjoins to IP as a landing site in Syntax. Although their argument does not concern intermediate adjunction to IP, it is conceptually desirable to permit any kind of IP-adjunction in Syntax, once the operation of IP-adjunction is permitted in that component.

To illustrate how (19) works empirically, let us see a few examples concerning the ECP and Subjacency. First consider a simple case such as (26).

(26) What did [IP ti' [IP John buy ti]]

VP-adjunction is irrelevant in our system, since whether adjunction takes place or not, VP, which is an H-marked BC, does not constitute a barrier. Crucial instead is IP-adjunction; IP would constitute a barrier for ti defined by (19b). If adjunction takes place, the upper IP is an OC but not a barrier for ti'. Hence both the ECP and Subjacency are met in (26).

Next consider wh-island cases.

(27) a. *Why do you wonder [CP to whom [IP John
[VP gave the book ti] tj]]
    b. ?What do you wonder [CP to whom [IP ti'
     John [VP gave ti tj]]]

We do not consider movement of to whom here. Suppose that why is outside VP at D-structure, as argued in the literature. In (27a), CP is a barrier for tj defined by (19c), since it immediately dominates IP, an OC for tj. On the other hand, (27b) is a case of argument movement, which does not require ti' to be antecedent-governed. Therefore it observes the ECP,
since $t_i$ is antecedent-governed by $t_i'$. CP is a barrier for $t_i'$, since it immediately dominates the upper IP, an OC for $t_i'$ (note that the upper IP immediately dominates VP, which is considered to be $\gamma^{\text{MAX}}$ in (18), since the lower IP does not count as a maximal category); one barrier is crossed in (27b), a weak violation of Subjacency.

Let us consider extraction from a relative clause.

(28)*Which book did [IP $t_i''$ [IP John meet [DP' [DP a child] [CP who [IP $t_i'$ [IP read $t_i$]]]]]]

Here the CP is a non-H-marked BC and a barrier, and the DP', though neither a BC nor an OC, inherits barrierhood from the CP. Thus movement from $t_i'$ to $t_i''$ crosses two barriers, and a strong violation of Subjacency results.

Let us turn to an Exceptional Case-marking construction.

(29) What do [IP $t_i'$ [IP you believe [IP John to have bought $t_i$]]]

Since the embedded IP is $\theta$-marked by believe, adjunction to the category is impossible. However, that IP is not a BC, since it is L-marked; movement from $t_i$ to $t_i'$ crosses no barrier; thus both the ECP and Subjacency are met.

Finally, consider the adjunct condition and the subject condition, such as (30a) and (30b) respectively.

(30) a.*Who did [IP you leave [PP after speaking to $t_i$]]

b.*The man who [IP [DP pictures of $t_i$] are on the table]

In our system, they are merely weak violations: only one barrier, PP in (30a) and DP in (30b), is crossed, since adjunction to IP voids barrierhood by inheritance. This may be problematic, considering the low acceptability found in the
literature. It might be claimed that adjunction to OC creates a different structure from adjunction to BC: the former creates two maximal categories, as Lasnik & Saito (forthcomingh) argue, while the latter creates one maximal category, as claimed above. It follows then that adjunction to IP does not void barrierhood by inheritance; hence the examples in (30) would involve crossing of two barriers: PP, IP in (30a) (supposing that PP is outside VP) and DP, IP in (30b).

It has sometimes been argued that the adjunct condition effect and the subject condition effect might not be so severe violations than a strong Subjacency violation, whose typical example is (28). To take a few examples, Chomsky (1986b) considers (31a) to be fairly acceptable, and Erteschik-Shir (1981) claims (31b) to be less bad than a strong Subjacency violation.

(31) a. He is the person who they left [before speaking to ti]
   b. Whoi was [a picture of ti] hanging on the wall

In any case, we need further research on this issue.\footnote{In any case, we need further research on this issue.}

We have seen that our system of barrier improves in several respects as compared with that of Chomsky (1986b), and that it covers a range of phenomena to be accounted for by the ECP and Subjacency.

3. Argument Extraction and Adjunct Extraction from DP

In this section, we will see several consequences of the DP hypothesis and the theory of barrier, concerning extraction from DP. Let us begin by considering the paradigm cited at the outset, repeated here as (32).

(32) a. What subjecti did you buy [a book about ti]
   b. About what subjecti did you buy [a book ti]
c. *Which shelf did you buy [a book on ti]
d. *On which shelf did you buy [a book ti]

We may reasonably understand from (32) that it is possible to extract from DP an element within an argument PP and an argument PP itself, while it is impossible to extract from DP an element within an adjunct PP and an adjunct PP itself. This is the case whether the DP involved is derived or not:10

(33) a. Which city did you witness [the destruction of ti]
    b. Of which city did you witness [the destruction ti]

(34) a. *What manner did you witness [the destruction of the city in ti]
    b. *In what manner did you witness [the destruction of the city ti]

Interestingly, there is a difference with respect to a possibility of pied-piping between extraction from DP and extraction from VP: pied-piping is blocked in the former case, as shown in (32d) and (34b), while it is permitted in the latter case, as shown in (35).

(35) a. *What time did you arrive at ti
    b. *What inning did the Yankees lose the ball game in ti
    c. At which time did John arrive ti
    d. In what inning did the Yankees lose the ball game ti (Hornstein & Weinberg (1981))

On the other hand, there is a similarity between them with respect to a possibility of wh-in situ:

(36) a. Who bought [a book on which shelf]
b. Who witnessed [the destruction of the city in what manner]

(37) a. Who arrived at what time
b. Which team lost the ball game in what inning

From (36) and (37), we find that (32c), (34a) and (35a, b) are cases of a Subjacency violation, since a wh-phrase in situ undergoes LF-movement like a quantifier and Subjacency is irrelevant for LF-movement, as argued in Huang (1982), Lasnik & Saito (1984), and so on. On the other hand, we may associate the contrast between (32b) and (32d) with the well-known contrast between an argument and an adjunct with respect to extraction from an wh-island, the relevant examples being (27) above.

(27) a. *Why, do you wonder [to whom, John gave the book t_i t_j]
b. ??What, do you wonder [to whom, John gave t_i t_j]

In other words, we may associate the complete ungrammaticality of (32d) with the fact that an adjunct cannot cross a barrier.

It follows from the above observation that extraction of an element within an adjunct PP from DP and VP, and of an adjunct PP itself from DP crosses at least one barrier, while adjunct movement from VP crosses no barrier at all.

Consider movement from within VP first. The relevant S-structure representations of (35a) and (35c) are given in (38a) and (38b) respectively.

(38) a. What time, did [IP, t_i,'] [IF you [VP, arrive [PP, t_i,'] [PP, at, t_i,]]]]
b. At which time, did [IP, t_i,'] [IF, John [VP, arrive, t_i,]]]

Suppose that PP whose head cannot strand is within VP at D-structure. In (38a), since the moved element is an argument
of P and the initial trace ti is antecedent-governed by an intermediate trace ti', the ECP is satisfied. The second step of movement crosses one barrier, however: PP', which is a non-H-marked BC. Therefore (38a) is a weak violation of Subjacency. In (38b), on the other hand, all the traces must be checked for the ECP, since the moved element is an adjunct. The initial trace is antecedent-governed by the intermediate trace, and the intermediate trace is antecedent-governed by the element in the Spec of CP. Since each movement crosses no barrier, both the ECP and Subjacency are satisfied. Thus (38b) is perfect.

Next consider extraction from DP. The relevant S-structure representations of (32c) and (32d) are as follows, respectively.12


In (39a), the ECP is met: ti is antecedent governed by ti'. The second and the third steps of movement cross a barrier, PP' and DP, which inherits barrierhood from an OC, IP'. Although two barriers are not crossed at one step, such "double weak violations" of Subjacency is said to be more degraded than a case of a single weak violation. Chomsky (1986b) suggests that violations are "cumulative," noting a case of "double wh-island violations" such as (40).

(40) Whati did you wonder [whoj ti j knew [whoa ti saw ti]]”

The same holds for examples like (39a); in fact, (32c) and (34a) are more degraded than (35a, b), which are at worst marginal, contrary to the judgments indicated, according to my informants.
In (39b), on the other hand, the intermediate trace $t_i'$ is not antecedent-governed by $t_i''$, since a barrier, DP, intervenes between them. Recall that in the case of adjunct movement, all traces are checked for the ECP at LF. Hence (39b), which is hopelessly bad, is ruled out as an ECP violation.

In the previous section, I argued that there are two possibilities about the Spec of DP: it is missing except in a small clause construction or it is always present whether it is occupied or not. There arises a problem in the latter possibility. Stowell (1987a) argues that the Spec of DP serves as an escape hatch for movement. However, if the Spec of DP could be used as an escape hatch, (39b) would be perfect: the offending trace $t_i'$ would be antecedent-governed by the trace in the Spec of DP, as shown in (41).

\[(41) \ldots \langle \text{IP} \quad t_i'' \rangle \ldots \quad \langle \text{VP} \quad \text{buy} [\langle \text{DP} \quad t_i'' \rangle \quad \text{a} \langle \text{IP} \quad t_i' \rangle \ldots \rangle \quad \text{DP is no longer a barrier for } t_i'' \text{ in this case, since it does not dominate an OC for } t_i'' \rangle. \quad \text{Notice that the situation is similar to the one concerning the Spec of CP subordinate to factive predicates. Extraction of an adjunct from that CP is blocked, as in (42).}

\[(42) *\text{Why} \quad t_i \text{ do you regret [that John resigned} \quad t_i] \quad \\
(\text{Stowell (1987a)})\]

As Toshifusa Oka (personal communication) suggested to me, there may be two possibilities: one is that the Spec of DP and that of CP embedded in a factive predicate have such a feature as [+referential] as a result of the Spec-head agreement and a trace cannot occupy the position because of that feature; the other is that the determiner and the complementizer subordinate to a factive predicate move to the Spec of DP and that of CP, respectively, for scopal reasons at LF, just as the \textit{wh}-element \textit{whether} moves to the Spec of CP at
LF, as Chomsky (1986b) argues, and hence the Spec involved cannot hold a trace at LF.

Whether we assume that the Spec of DP is missing or that it is present but cannot be occupied, it follows that DP is a barrier for an element within it, just like CP embedded in a factive predicate and CP with a wh-phrase in its Spec.

Note that to say that extraction of an adjunct PP itself from DP is impossible is equivalent to Stowell’s (1987a) observation that adjuncts cannot be extracted from DP. Thus the following examples are treated in the same way.

(43) a. *Why did you witness [DP the destruction of the city ti]
   b. *Why do you resent [DP John’s dismissal of Mary ti]

Furthermore, our analysis predicts the well-known, but controversial facts concerning gerunds:

(44) a. Which book did you object to [John buying ti]
   b. *Which book did you object to [John’s buying ti]

(Wilkins (1980))

(44b) can be considered a Subjacency violation, since LF-movement is permitted:

(45) a. Who objected to [John buying which book]
   b. Who objected to [John’s buying which book]

With respect to adjunct extraction, we have the following paradigm.

(46) a. How do you like [John singing karaoke ti]
   b. *How do you like [John’s singing karaoke ti]

(47) a. *Who likes [John singing karaoke how]
   b. *Who likes [John’s singing karaoke how]
If "Accusative-ING" is CP while "Possessive-ING" is DP, these are natural consequences of our analysis: DP constitutes a barrier. Thus (46b) and (47b) are violations of the ECP. In fact, (44b) seems to be better than a strong Subjacency violation, again contrary to the judgment indicated, which implies that our analysis is correct.

If our argument that DP is a barrier for an element within it is correct, extraction of an argument from DP should be of the same status as from CP embedded in a factive predicate and CP with a wh-island. Consider (48).

(48) a. Who saw a picture of t₁?
b. Who do you regret that John dismissed t₁?
c. What do you wonder whom John gave t₁ t₂?

Clearly, (a) is better than (b) and (c). As will be seen below, extraction from a tensed clause is less acceptable than from an infinitival clause. Hence in principle, (48a) should be of the same status as (49).

(49) What do you wonder whom to give t₁ t₂?

Erteschik-Shir (1981) notes that judgments of the following examples vary from speaker to speaker, none of them perfect.

(50) a. Who did John destroy a book about t₁?
b. Who did John edit a book about t₁?
c. Who did John revise a book about t₁?
d. Who did John tear up a picture of t₁?
e. Who did John frame a picture of t₁?
f. Who did John decorate a picture of t₁?

It seems that (48a) is better than (50). Then we may consider that extraction of an argument from DP is a weak violation of Subjacency, hence (48a) and (50) with the same acceptability
as (49), in principle, but that some examples are better than others for some factors, such as lexical choices, which have frequently been claimed to enter into informant judgments.

So far, I have been claiming that DP is a barrier for an element within it. Recall that adjunction is possible only to non-arguments. Then if DP is a non-argument and DP-adjunction is possible, it will void the barrierhood of DP. Our prediction seems to be borne out. Consider (51).

(51) a. ?*This is the house; [that John met [DP the first person to live in t1]]
   b. This is the house; [that John was [DP the first person to live in t1]]

Naoki Fukui (personal communication) points out that (51b) is better than (51a) and that this may have to do with the fact that DP in (51a) is referential while that in (51b) is non-referential. In our terms, the difference between (51a) and (51b) might be related to a possibility of DP-adjunction: the former is an argument while the latter is a predicate, a non-argument.14

Interestingly enough, the contrast also appears in the case of adjunct extraction, as shown in (52).

(52) a. *This is the shelf; [on which I bought [DP a book t1]]
   b. This is the shelf; [on which Barriers was [DP the first book t1]]

It follows from (51) and (52) that DP is not an inherent barrier; that is, it does not always constitute a barrier for an element within it.

If our argument above is correct, problems with a noun-complement case of the Complex NP Constraint of Ross (1967) can be treated analogously. To account for the "intermediate" status of (53), Chomsky (1986b) tentatively assumes that a
category assigned an oblique Case constitutes a barrier.

(53) a. Which book did John hear [DP a rumor [CP that you had read t₁]]
     b. Which book did John announce [DP a plan [CP (for you) to read t₁]]

In Chomsky's terms, CP is a barrier, since it is assigned an oblique Case by the head N. In our terms, on the other hand, CP is not a barrier; rather, it is DP that constitutes a barrier. Hence we can account for (53) without introducing a new device into the system of barrier.¹⁵

Let us go on to consider examples such as (54).

(54) a. the man I saw [a picture of [a friend of t₁]]
     b. Who did you hear [a story about [pictures of t₁]]

These are violations analogous to "double wh-island violations," as seen in (40). The lessened acceptability of (54) seems to reflect Chomsky's suggestion about a cumulative nature of violations. Again, it may be the case that lexical choices enter into informant judgments:

(55) a. the reports which the government prescribes
       [the height of [the lettering on [the cover of t₁]]]
       (Ross 1967))
     b. the city that I read [a book about [the destruction of t₁]]

Clearly, examples in (55) are better than those in (54), although in principle (55b) should have the same status as (54) and (55a) should be the worst.

Before concluding this section, I will suggest a possible treatment of facts such as (56), which were originally pointed out by Ross (1967).
(56) a. Who do you believe [the claim that Mary like t₁]
b. Who do you believe [Susan's claim that Mary likes t₁]

The factual observation seems to be that (a) has the status of a weak Subjacency violation like (53a) and that (b) is less acceptable than (a) but not so severe a violation as a strong Subjacency violation. Fukui & Speas (1985) state that in their system they predict that (56b) should be as bad as (57), which is a strong Subjacency violation, but is actually much better, mentioning that the contrast between (56b) and (57) may be due to the multiple variables in (57).

(57) Who did you see [the woman who likes t₁]

We have noted that extraction from a tensed clause is worse than from an infinitival clause. Chomsky (1986b) argues in this connection that the most embedded tensed IP is an inherent barrier (possibly weak) to movement, not to government, noting the contrast between (58a) and (58b), and a parametric variation among speakers of English and Italian, where the most embedded tensed CP is claimed to be an inherent barrier.

(58) a. What did you wonder [to whom to give t₁ t₂]
b. What did you wonder [to whom John gave t₁ t₂]

Since (58b) involves the crossing of a second barrier beyond CP, it is less acceptable than (58a). We might generalize this argument about an inherent barrier to IP within DP. Let us assume that the most embedded IP "whose head has a Case-marking property" constitutes an inherent barrier in English. Then the contrast in (56a, b) and (58a, b) can be treated analogously: each (b) example involves an inherent barrier, and since that is a weak barrier, each (b) example is worse
than each (a) example but better than a strong violation of Subjacency.\footnote{By the Agent phrase and the Possessor phrase I mean the prenominal genitive phrase with the $\theta$-role that is inherent to the head noun, such as Agent, and the one without such a $\theta$-role, respectively. I use these simply as cover terms.} Note that this argument strongly supports our claim that noun phrases have a structure exactly parallel to that of clauses.

In this section, we have seen several consequences of the DP hypothesis and the theory of barrier. It seems that our line of argument is on the right track so long as these considerations confirm the claims in the previous sections.

4. Summary

This discussion has touched on issues concerning extraction from noun phrases. In the first section, I supported a structure of noun phrases proposed in Tonoike (1988): one consisting of three maximal projections, DP, IP and NP. In the second section, I presented a system of barrier that makes crucial use of L-marking and H-marking. This system improves both conceptually and empirically as compared with Chomsky's (1986b) system. In the final section, I demonstrated that the structure of DP and the system of barrier conspire to make it possible to give a principled explanation to the symmetries and the asymmetries between DP and CP with respect to extraction, and to other issues concerning the same topic.

Notes

* I would like to thank Jun Abe, Toshifusa Oka and Manabu Hashimoto for their helpful comments and suggestions. Thanks also go to Ronald J. Craig and James Ford, whose help as informants has been invaluable. Needless to say, all remaining inadequacies are my own.

1 By the Agent phrase and the Possessor phrase I mean the prenominal genitive phrase with the $\theta$-role that is inherent to the head noun, such as Agent, and the one without such a $\theta$-role, respectively. I use these simply as cover terms.

2 Stowell (1987b) argues that the structural parallel
between the Exceptional Case-marking construction and the small clause construction, as in (i), can be derived formally by defining domains of predication in terms of X-bar theory, as in (ii).

(i) a. [VP V [IP NP [I: to VP]]]
     b. [VP V [AP NP [A: A]]]

(ii) A domain of predication is an XP, such that the X' category dominated by XP is predicated of the Specifier of XP.

Notice in passing that in our projection system of DP, we could derive (iii), which is problematic for Stowell since he assumes that the Possessor phrase occurs in the Spec of DP.

(iii) I consider [DP John [IP my [NP best friend]]]

3 Let us understand with Chomsky (1986b) that c-command and m-command are defined as follows:

(i) \( \alpha \) c-commands \( \beta \) iff \( \alpha \) does not dominate \( \beta \) and every \( \gamma \) that dominates \( \alpha \) dominates \( \beta \).

(ii) \( \alpha \) m-commands \( \beta \) iff \( \alpha \) does not dominate \( \beta \) and every \( \gamma \) \( \text{MAX} \) that dominates \( \alpha \) dominates \( \beta \).

Note that we define government in terms of "domination" rather than in terms of "exclusion", as Chomsky (1986b) does, because we will not assume that adjunction structure consists of two "segments." See below.

4 Kayne (1981), which makes crucial use of the notion "percolation projection," is an original attempt to treat the ECP as a chain phenomenon from a viewpoint different from Chomsky's.

5 Note that Subjacency is irrelevant at LF.

6 Notice that in the case of argument movement, it is not sufficient to say that only the tail link of a chain is checked
for antecedent-government relation; if so, the following example, which involves an A-chain as well as an A'-chain, would be grammatical.

(i) *Who do you wonder [whether t'* is believed t' to have been captured t]

The offending trace in this case is t', which is not in the tail link.

7 Here we do not introduce the minimality condition of Chomsky (1986b) into a system of barrier.

8 In Lasnik & Saito's system, α ' and α in (24) constitute separate categories, and hence both can be barriers.

9 Notice that our system of barrier cannot account for the familiar that-trace effect, as in (i).

(i) a. Who do you think [t will win]
    b. *Who do you think [that t will win]

This contrast might be subsumed under a condition on PF, rather than the ECP, that states that traces must be head-governed, as Aoun et al. (1987) argue. We leave this issue open.

10 Incidentally, an argument PP can move across a wh-island:

(i) a.??About what subject do you wonder [whether John bought [a book t]]
    b.??Of which city do you wonder [whether John witnessed [the destruction t]]

11 According to Oka (1986), PPs are classified into three, which behave differently with respect to VP-preposing, VP-deletion and preposition stranding. For example, he argues that temporal PP belongs to a different class and hence
occupies a different position from PP of accompanyment. For a
detailed discussion, see Oka (1986).

In our system, it makes no difference with respect to the
ECP and Subjacency whether the adjunct PP is within VP or
outside VP.

12 Suppose that the adjunct PP is within NP at D-
structure. Again, it makes no difference whether the adjunct
PP is within VP or outside VP. See note 11.

13 For the argument that an Accusative-ING construction
is CP and INFL assigns the subject an accusative Case, see

14 If we follow Oka's suggestions mentioned above, the
contrast in (51) follows from the fact that DP in (b) is not
referential: the Spec of DP can be used as an escape hatch in
the absence of the feature [+referential] or movement to the
Spec of DP at LF. Whether we take the adjunction approach or
the escape hatch approach, we obtain the same results for our
present purposes.

15 Chomsky argues, following Stowell's (1981)
observation, that CP may be a barrier since the complementizer
cannot be deleted in (i).

(i) John expressed [the feeling [(that) the meeting
should not be held]]

The argument is not convincing, however, because there are
examples where a complementizer can be deleted in the same
environment, such as (ii).

(ii) a. [The fact [ e the earth is round]] doesn't
surprise us at all

b. There was also [the probability [ e Gorbachev
would choose a scapegoat to take the fall for
the fiasco]

Furthermore, Chomsky's assumption that a category
assigned an oblique Case constitutes a barrier is empirically incorrect: extraction from the CP complement of an adjectival head, which Chomsky (1986a) argues is an inherent Case-marker, is perfect, as in (iii).

(iii) a. Who is you certain [that John will dismiss t₁]
b. Why is you certain [that John will dismiss Mary t₁]

16 Pustejovsky (1984) claims that movement across a Possessor phrase is impossible:

(i) a. the city that I witnessed [the enemy’s destruction of t₁]
b. *the city that we heard [your destruction of t₁] (where your=“your account of”)

(ii) a. *What did John eat [Bill’s loaf of t₁]
b. *What did Mary drink [John’s bottles of t₁]

We need further research on this issue. See also Stowell (1987a).

References
---------, 1987. Talk delivered at Kyoto University of Foreign Studies.


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