Extraction from Noun Phrases: Some Concequences 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)   [$_{DP}$...[$_{D'}$ 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. [$_{DP}$...[$_{D'}$ D [$_{IP}$...[$_{I'}$ I NP]]]]
    b. [$_{CP}$...[$_{C'}$ C [$_{IP}$...[$_{I'}$ 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 opeation 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-∅   vendég-e-m
       the I-nom   guest-poss-1sg   "my guest"
    b. a   te-∅   vendég-e-d
       the thou-nom guest-poss-2sg   "thy guest"
    c. (a) Mari-∅ vendég-e-∅
       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 VI 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 NI 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-∅ [$_{I'}$ 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. [DP [IP the enemyi [I· 's [NP destruction of the city]]]]]
"the enemy's destruction of the city"
b. [DP [IP John [I· 's [NP desk]]]]
"John's desk"

I assume that both the Agent phrase and the Possessor phrase occur in the Spec(ifier 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) α properly governs β iff α θ-governs β or antecedent-governs β.

Government, θ-government and antecedent-government are defined as follows:

(12) a. α governs β iff α m-commands β and every barrier for β dominates α.

b. α θ-governs β iff α is a zero-level category that θ-marks β, and α, β are sisters.

c. α_i antecedent-governs β_i iff α_i c-commands β_i, and every barrier for β_i dominates α_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 θ-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 man$_i$ seems [there to be killed t$_i$]

If this is an ECP violation, θ -government does not suffice for proper government of an A-bound trace.

Chomsky himself suggests eliminating θ -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 θ -governed by V, satisfying the ECP.[5] However, our ECP cannot account for the contrast, as it stands, since we have eliminated θ -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. α L-marks β iff β is a complement of α and α is a lexical category.

    b. α H-marks β iff β is a complement of α.

Chomsky (1986b) defines BC as follows:

(17) α^{MAX} is a BC for β iff α^{MAX} is not L-marked and dominates β.

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) α^{MAX} is an OC for β iff α^{MAX} is an H-marked BC for β and immediately dominates γ^{MAX}, which is H-marked but not L-marked and does not dominate β.

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).[7]

(19) α^{MAX} is a barrier for β iff (a), (b), (c) or (d):

    (a) α^{MAX} is a non-H-marked BC for β;

    (b) α^{MAX} is an H-marked BC for β and immediately dominates another H-marked BC for β;

    (c) α^{MAX} immediately dominates an OC for β;

(d) α ᴹᴬˣ immediately dominates a barrier defined
by (a), (b) or (c).

In case (19a) α ᴹᴬˣ is a barrier intrinsically while in case
(19b, c, d) α ᴹᴬˣ inherits barrierhood from the immediately
dominated category in some sense.

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

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

In (20), where α and γ are H-marked but not L-marked, α in
(a) is a barrier for β defined by (19b), while α in (b) is
OC but not a barrier for β since OC is not a barrier itself.
In (21), where γ and δ are H-marked but not L-marked, α and
 γ in (a) are barriers for β since the former immediately
dominates the latter, which is a barrier for the same reason
as α in (20a), while α in (b) is a barrier for β since it
immediately dominates an OC for β , or γ .

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$_i$ did you fall asleep [PP during t$_i$]

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

(23) ...[PP t$_i$ ' [PP during t$_i$]]

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 t_i' antecedent-governs t_i.

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) $[\alpha \cdot \beta_i [\alpha \ldots t_i \ldots]]$

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.[8] It follows that in our system), the upper PP in (23) still constitutes a barrier for t_i' after adjunction.

Note that our system of barrier strictly obserbves 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$_i$ did [$_{IP}$ t$_i$' [$_{IP}$ John buy t$_i$]]

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 t$_i$ defined by (19b). If adjunction takes place, the upper IP is an OC but not a barrier for t$_i$'. Hence both the ECP and Subjacency are met in (26).

Next consider *wh*-island cases.

(27) a. *Why$_j$ do you wonder [$_{CP}$ to whom$_i$ [$_{IP}$ John
        [$_{VP}$ gave the book t$_i$] t$_j$]]]
     b.??What$_i$ do you wonder [$_{CP}$ to whom$_j$ [$_{IP}$ t$_i$' [$_{IP}$
        John [$_{VP}$ gave t$_i$ t$_j$]]]]

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 t$_j$ defined by (19c), since it immediately dominates IP, an OC for t$_j$. On the other hand, (27b) is a case of argument movement, which does not require t$_i$' 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 γ 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$_i$ 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$_i$ do [$_{IP}$ t_i' [$_{IP}$ you believe [$_{IP}$ John to have bought t_i]]]

Since the embedded IP is θ -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 Subjcency are met.

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

(30) a.?*Who$_i$ did [$_{IP}$ you leave [$_{PP}$ after speaking to t_i]]

b.?*The man$_i$ 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 Subjacecy violation.

(31) a. He is the person$_i$ who they left [before speaking to t_i]

   b. Who$_i$ was [a picture of t_i] hanging on the wall

In any case, we need further reseach on this issue.[9]

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 theoty of barrier, concerning extraction from DP. Let us begin by considering the paradigm cited at the outset, repeated here as (32).

(32) a. What subject$_i$ did you buy [a book about t_i]

   b. About what subject$_i$ did you buy [a book t_i]

c.?*Which shelf$_i$ did you buy [a book on t$_i$]

d. *On which shelf$_i$ did you buy [a book t$_i$]

We may reasonably understand from (32) that it is possible to extract from DP an element within an argument PP and an arguement 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$_i$ did you witness [the destruction of t$_i$]

b. Of which city$_i$ did you witness [the destruction t$_i$]

(34) a.?*What manner$_i$ did you witness [the destruction of the city in t$_i$]

b. *In what manner$_i$ did you witness [the destruction of the city t$_i$]

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$_i$ did you arrive at t$_i$

b. *What inning$_i$ did the Yankees lose the ball game in t$_i$

c. At which time$_i$ did John arrive t$_i$

d. In what inning$_i$ did the Yankees lose the ball game t$_i$ (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$_j$ do you wonder [to whom$_i$ John gave the book
       t$_i$ t$_j$]

b.??What$_i$ do you wonder [to whom$_j$ 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$_i$ did [$_{IP'}$ t$_i$'' [$_{IP}$ you [$_{VP'}$ arrive
       [$_{PP'}$ t$_i$' [$_{PP}$ at t$_i$]]]]]

b. At which time$_i$ did [$_{IP'}$ t$_i$' [$_{IP}$ John
   [$_{VP}$ arrive t$_i$]]]

Suppose that PP whose head cannot strand is within VP at D-
structure.[11] In (38a), since the moved element is an argument

of P and the initial trace t_i is antecedent-governed by an intermediate trace t_i', 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]

(39) a. Which shelf$_i$ did [$_{IP'}$ t_i''' [$_{IP}$ you [$_{VP}$ buy
         [$_{DP}$ a [$_{IP'}$ t_i'' [$_{IP}$ [$_{NP}$ book [$_{PP'}$ t_i'
         [$_{PP}$ on t_i]]]]]]]]]]

     b. On which shelf$_i$ did [$_{IP'}$ t_i'' [$_{IP}$ you [$_{VP}$ buy
         [$_{DP}$ a [$_{IP'}$ t_i'[$_{IP}$ [$_{NP}$ book t_i]]]]]]]]]

In (39a), the ECP is met: t_i is antecedent governed by t_i'. 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) What$_i$ did you wonder [who$_j$ t_j knew [who$_k$ t_k saw t_i]

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) ...$[_{IP'}$ t_i'''... $[_{VP}$ buy $[_{DP}$ t_i'' a $[_{IP'}$ t_i' ...

DP is no longer a barrier for t_i'' in this case, since it does not dominate an OC for t_i''. 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) *Why$_i$ do you regret [that John resigned t_i]

(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 *wh*-element *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$_i$ did you witness [$_{DP}$ the destruction of the city t$_i$]

    b. *Why$_i$ do you resent [$_{DP}$ John's dismissal of Mary t$_i$]

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

(44) a. Which book$_i$ did you object to [John buying t$_i$]

    b. *Which book$_i$ did you object to [John's buying t$_i$]

                                 (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$_i$ do you like [John singing karaoke t$_i$]

    b. *How$_i$ do you like [John's singing karaoke t$_i$]

(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.[13]   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$_i$ did you see [a picture of t$_i$]
        b.   Who$_i$ do you regret [that John dismissed t$_i$]
        c.   What$_i$ do you wonder [to whom$_j$ John gave t$_i$ t$_j$]

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$_i$ do you wonder [to whom$_j$ to give t$_i$ t$_j$]

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

   (50) a.   Who$_i$ did John destroy [a book about t$_i$]
        b.   Who$_i$ did John edit [a book about t$_i$]
        c.   Who$_i$ did John revise [a book about t$_i$]
        d.   Who$_i$ did John tear up [a picture of t$_i$]
        e.   Who$_i$ did John frame [a picture of t$_i$]
        f.   Who$_i$ did John decorate [a picture of t$_i$]

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$_i$ [that John met [$_{DP}$ the first
person to live in t$_i$]
     b.   This is the house$_i$ [that John was [$_{DP}$ the first
person to live in t$_i$]

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$_i$ [on which I bought
     [$_{DP}$ a book t$_i$]]
     b. This is the shelf$_i$ [on which *Barriers* was
     [$_{DP}$ the first book t$_i$]]

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$_i$ did John hear [$_{DP}$ a rumor [$_{CP}$ that
you had read t$_i$]]

b. Which book$_i$ did John announce [$_{DP}$ a plan [$_{CP}$
(for you) to read t$_i$]]

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 constitues a
barrier. Hence we can accoun 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$_i$ I saw [a picture of [a friend of t$_i$]]

b. Who$_i$ did you hear [a story about [pictures of
t$_i$]]

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$_i$ which the government prescribes
[the hight of [the lettering on [the cover of
t$_i$]]]   (Ross (1967))

b. the city$_i$ that I read [a book about [the
destruction of t$_i$]]

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. Who₁ do you believe [the claim that Mary like t₁]

b. Who₁ 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) Who₁ 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. What₁ did you wonder [to whom₁ to give t₁ t₁]

b. What₁ did you wonder [to whom₁ John gave t₁ t₁]

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.[16]   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 θ -role that is inherent
to the head noun, such as Agent, and the one without such a θ
-role, respectively.   I use these simply as cover terms.

[2] Stowell (1987b) argues that the structual 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) α c-commands β iff α does not dominate β and
        every γ that dominates α dominates β.
    (ii) α m-commands β iff α does not dominate β and
        every γ^{MAX} that dominates α dominates β.

   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
suffice 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$_i$ do you wonder [whether t$_i$'' is believed t$_i$' to have been captured t$_i$]

The offending trace in this case is t$_i$'', 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$_i$ do you think [t$_i$ will win]
    b. *Who$_i$ do you think [that t$_i$ 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$_i$ do you wonder [whether John bought [a book t$_i$]]
    b.??Of which city$_i$ do you wonder [whether John witnessed [the destruction t$_i$]]

[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 Reuland (1983).

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

184

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$_i$ are you certain [that John will dismiss
          t$_i$]

      b. Why$_i$ are you certain [that John will dismiss
          Mary t$_i$]

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

(i) a. the city$_i$ that I witnessed [the enemy's
         destruction of t$_i$]

     b. *the city$_i$ that we heard [your destruction of t$_i$]
                              (where *your*="your account of")
(ii) a. *What$_i$ did John eat [Bill's loaf of t$_i$]

     b. *What$_i$ did Mary drink [John's bottles of t$_i$]

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

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