The DP Analysis and Barriers*

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I Introduction

Though GB theory can account for a wide variety of linguistic phenomena, a number of basic facts still remain unexplained. One controversial issue is the structure of noun phrases. After the influential work of Chomsky (1970), the study of noun phrases received little attention in the literature for almost ten years. However, a number of recent studies have opened new ways to investigate noun phrases. These include Fukui (1986, 1988, 1991), Fukui and Speas (1986), Abney (1987), Takano (1988, 1989, 1990), Stowell (1989), Saito (1991), Tonoike (1991), and Culicover and Rochemont (1992). These studies show that the past ten years have seen an explosive development in the study of the structure of noun phrases.

It has generally been assumed that noun phrases are assigned a structure like (1):

(1) $[_{NP}$ D $[_{N'}$ N ...]]   (NP Analysis)

Given this structure, D (determiner) is a sister of N', that is, it occupies the Specifier position of NP (the NP Spec).   Thus, noun phrases are treated as NPs, whose heads are Ns.

In Abney (1987), on the other hand, a new structure of noun phrases has been proposed, as in (2):

(2) $[_{DP}$ ... $[_{D'}$ D $[_{NP}$ ... $[_{N'}$ N ...]]]]   (DP Analysis)

Given this structure, noun phrases consist of two maximal projections (DP and NP), with the heads (Ds) selecting NPs as their complements.   Thus, noun phrases have DPs rather than NPs as their outermost maximal projections.

The DP Analysis assigns examples (3a-b) structures such as (4a-b), respectively:

(3) a. a / the book

   b. Mary's book

(4) a. $[_{DP} [_{D'} $ a/the $ [_{NP} $ book$]]]$

   b. $[_{DP} $ Mary$_i [_{D'} $'s (AGR) $[_{NP} t_i [_{N'} $ book$]]]]$

In (4a), articles or determiners are base-generated in the D position.   In (4b), *AGR*, which is realized as *'s*, appears in the D position and assigns genitive Case to *Mary*$_i$ in the DP Spec as an instance of Spec-head agreement.   Thus, a genitive noun phrase must move to the DP Spec to receive genitive Case.[1]

   Though noun phrases are analyzed as either NPs or DPs,[2] in this paper, I will support the DP Analysis on the basis of conceptual and empirical evidence.   Then I will advance an alternative barrier theory and consider *wh*-movement from noun phrases.

II   Some Consequences of the DP Analysis

   Abney (1987) shows that the DP Analysis has at least five advantages over the NP Analysis.   First, functional categories such as C, I, and D are treated in a unified way under X-bar theory.   For example, only Spec positions of functional categories are available landing sites for movement with respect to substitution.   Second, there are two distinct positions for X^0-and X^{max}-categories in DP, which meets the X-bar theoretic requirement. Third, an Agent PRO can appear in the NP Spec within DP.[3]   Let us consider examples (5a -b) and their structures (6a-b).

(5) a. the enemy's destruction of the city

   b. the destruction of the city

(6) a. $[_{DP} $ the enemy$_i [_{D'} $ AGR $[_{NP} t_i [_{N'} $ destruction of the city$]]]]$

   b. $[_{DP} [_{D'} $ the $[_{NP} $ PRO $[_{N'} $ destruction of the city$]]]]$

In (6a), *the enemy*$_i$ is assigned an Agent θ-role by the derived nominal *destruction* at its trace position.   Since the same is true in (6b), PRO must exist in the NP Spec to receive this θ-role.   If the structure of (5b) is analyzed as an NP, PRO cannot appear in the NP Spec, where *the* has already appeared.   Fourth, there are a number of languages in which noun phrases show overt agreement between prenominal noun phrases and their nominal heads. Let us consider the following Hungarian example.

(7) én-ek-em a vendég-e-m

   I-dat-1sg the guest-poss-1sg

   "my guest" (Szabolcsi 1983-84:91)

In (7), a single noun *vendég-* agrees with its prenominal noun phrase, sharing its person and number with AGR. In this example, the co-occurrence of prenominal noun phrases and determiners can be accounted for by the DP Analysis, since they occupy distinct positions in DP (the DP Spec and the D position). This cross-linguistic example indicates that there is an empty AGR assigning genitive Case to a genitive noun phrase in English. Fifth, pronouns can be treated as DPs. If pronouns are nouns, we cannot provide a convincing account of the fact that they cannot be modified by determiners, possessors and quantifiers, as shown in (8):

(8) *[the/my/each] he

Furthermore, like determiners, pronouns have grammatical features of noun phrases such as person, number, and gender. These considerations indicate that pronouns are also functional categories. Thus, the similarities between determiners and pronouns can be captured by the DP Analysis.

   The discussion in this section provides conceptual supports and empirical evidence in favor of the DP Analysis.

III DP and Barriers

   Since Chomsky (1986), it is widely accepted that the notion of barrier has a special role in constraining movement. In this paper, I adopt the barrier in terms of H-marking, as shown in the following:

(9) Barrier[4]

    γ is a barrier for β iff

    a. γ is a maximal projection,

    b. γ dominates β, and

    c. γ is not H-marked

(10) H-marking[5]

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

The definitions given in (9)-(10) show that IP, VP, and NP within DP can never become barriers since they are H-marked by C, I, and D, respectively.

    Essentially following Lasnik and Saito (1992), I define the Subjacency Condition as in (11):[6]

(11) Subjacency Condition

    β is subjacent to α iff there is no barrier for β that excludes α

The Subjacency Condition in (11) states that each movement must satisfy 0-subjacency: crossing one barrier yields an unacceptable structure.   Here, it is assumed that the DP Spec functions as an escape hatch for Subjacency.

    Following Rizzi (1990:87), I adopt the version of the ECP in (12):

(12) ECP

    A nonpronominal empty category must be properly head-governed

(Proper head government means government within the immediate projection of the head.)

    With this much as background, let us consider *wh*-movement from noun phrases. The DP Analysis assigns examples (13a-d) structures such as (14a-d), respectively:

(13) a. which city$_i$ did you witness the destruction of t$_i$

    b. of which city$_i$ did you witness the destruction t$_i$

    c. *which city$_i$ did you meet the man from t$_i$

    d. *from which city$_i$ did you meet the man t$_i$ (Chomsky 1986:80)

(14) a. [$_{CP}$ which city$_i$ did [$_{IP}$ you witness [$_{DP}$ t'$_i$ [$_{D'}$ the [$_{NP}$ destruction [$_{PP}$ of t$_i$]]]]]]

    b. [$_{CP}$ of which city$_i$ did [$_{IP}$ you witness [$_{DP}$ t'$_i$ [$_{D'}$ the [$_{NP}$ destruction t$_i$]]]]]

    c. [$_{CP}$ which city$_i$ did [$_{IP}$ you meet [$_{DP}$ t'$_i$ [$_{D'}$ the [$_{NP}$ man [$_{PP}$ from t$_i$]]]]]]

                                                    #   (# = barrier)

d. [$_{CP}$ from which city$_i$ did [$_{IP}$ you meet [$_{DP}$ t'$_i$ [$_{D'}$ the [$_{NP}$ man t$_i$]]]]]

In (14a), t_i is properly head-governed by the preposition *of*. This satisfies the ECP. The movement from t_i to *which city$_i$* satisfies the Subjacency Condition. There are no barriers since the PP, the NP, and the DP are H-marked by N, D, and V, respectively. Thus, (14a) is predicted to be well-formed, yielding the grammatical (13a). In (14b), there is no ECP violation since t_i is properly head-governed by the noun *destruction*. A Subjacency violation does not arise either, since the movement does not cross any barriers. Thus, the well-formedness of (14b) can be explained, yielding the grammatical (13b). In (14c), the trace is properly head-governed, satisfying the ECP. The first movement violates the Subjacency Condition since one barrier (the PP) is crossed. Since the adjunct PP is not H-marked, it becomes a barrier.[7] This accounts for the ungrammaticality of (13c). In (14d), though each movement satisfies 0-subjacency, there is an ECP violation, because t_i, which appears in Adjunct position, is not properly head-governed. Thus, (14d) yields the ungrammatical (13d). The point to note here is that (13d) is worse than (13c). The former contains an ECP violation and the latter contains a Subjacency violation, so that their difference in ungrammaticality can be accounted for. It follows from these considerations that the DP Analysis can account for the argument-adjunct asymmetry with respect to extraction from noun phrases, whereas Chomsky's theory (1986) cannot.[8]

With respect to specificity phenomena, let us consider examples (15a-c), which are assigned structures such as (16a-c), respectively, under the DP Analysis:

(15) a. who$_i$ did John see pictures of t$_i$

    b. who$_i$ did John see a picture of t$_i$

    c. *who$_i$ did John see Mary's picture of t$_i$

(16) a. [$_{CP}$ who$_i$ did [$_{IP}$ John see [$_{DP}$ t'$_i$ [$_{D'}$ [$_{NP}$ pictures [$_{PP}$ of t$_i$]]]]]]

    b. [$_{CP}$ who$_i$ did [$_{IP}$ John see [$_{DP}$ t'$_i$ [$_{D'}$ a [$_{NP}$ picture [$_{PP}$ of t$_i$]]]]]]

    c. [$_{CP}$ who$_i$ did [$_{IP}$ John see [$_{DP}$ Mary$_j$ [$_{D'}$ AGR [$_{NP}$ t$_j$ [$_{N'}$ picture [$_{PP}$ of t$_i$]]]]]]]

In (16a-b), t_i is properly head-governed by the preposition *of*, satisfying the ECP. The *wh*-movement crosses no barrier, satisfying the Subjacency Condition. This yields the

grammatical (15a-b). In (16c), an ECP violation does not arise because of the proper head government of t_i and t_j by *of* and *AGR*, respectively. Since the NP and the DP are both H-marked, they are not barriers, so that both *wh-* and NP-movement satisfy the Subjacency Condition. Thus, (16c) is predicted to be well-formed. This prediction, however, is not empirically borne out. To avoid this wrong prediction, I attribute the ungrammaticality of (15c) to a violation of the following economy condition.

(17) Shortest Movement Condition (SMC)[9]

   If α is the first potential landing site for β, β cannot skip this position

The SMC is the most fundamental principle which constrains derivations and preserves economy of derivation. In (16c), *who$_i$* moves from its original position to the matrix CP Spec in one step. It must skip the DP Spec, which is the first potential landing site for it, because *Mary* has already occupied this position. As a result, this is not the shortest movement, violating the SMC. This account enables us to assume that a maximal projection whose Spec or head cannot serve as a landing site for a moved element can become a barrier for it. According to this assumption, example (15c) is in fact assigned a structure like (18):

(18) [$_{CP}$ who$_i$ did [$_{IP}$ John see [$_{DP}$ Mary$_j$ [$_{D'}$ AGR [$_{NP}$ t$_j$ [$_{N'}$ picture [$_{PP}$ of t$_i$]]]]]]]
                        #

In (18), the DP becomes a barrier since *who$_i$* cannot move to the DP Spec, which is the first potential landing site for it. Thus, one barrier is crossed and a Subjacency violation results. This predicts that example (15c) is ungrammatical.

   The assumption that an SMC violation constitutes a barrier is also available to other cases of specificity phenomena. Let us consider examples (19a-b) and their structures (20a -b).

(19) a. *what$_i$ did John see whose picture of t$_i$

   b. *what$_i$ did John see which picture of t$_i$

(20) a. [$_{CP}$ what$_i$ did [$_{IP}$ John see [$_{DP}$ who$_j$ [$_{D'}$ AGR [$_{NP}$ t$_j$ [$_{N'}$ picture of t$_i$]]]]]]]

                                     #

   b. [$_{CP}$ what$_i$ did [$_{IP}$ John see [$_{DP}$ which [$_{NP}$ picture of t$_i$]]]]]

                                     #

In (20a-b), the movement of what$_i$ violates the SMC, skipping the DP Spec. This means that the DP becomes a barrier, which causes a Subjacency violation. Thus, (20a-b) are predicted to be ill-formed. This yields the ungrammatical (19a-b). It should be noted here that the ungrammaticality of examples (15c) and (19a-b) cannot be predicted by the NP Analysis. Since the NP Spec does not serve as a potential landing site for a moved element, the *wh*-movement in these examples does not cross any barriers, satisfying the Subjacency Condition. Thus, these examples are predicted to be grammatical. This is surely not the correct result.

   Explanation of extraction along these lines suggests that the SMC should be incorporated into the definition of barrier in (9). This suggestion requires a revision of the notion of barrier as follows:

(21) Barrier

    γ is a barrier for β iff γ is a maximal projection, γ dominates β, and (a) or (b):

    a. γ is not H-marked,

    b. the Spec or head of γ cannot serve as a landing site for β

   One of the consequences of the DP Analysis and the proposed barrier theory is the proper treatment of extraction from gerunds. Let us consider examples (22a-c).

(22) a. what$_i$ did John remember Mary singing t$_i$ (Acc-ing)

    b. what$_i$ did John remember PRO singing t$_i$ (PRO-ing)

    c. *what$_i$ did John remember Mary's singing t$_i$ (Poss-ing)

Essentially following Tonoike (1991), I assume that Acc-ing gerunds are IPs, whereas PRO-ing and Poss-ing gerunds are DPs, which consist of three maximal projections (DP, IP, and VP). According to this assumption, examples (22a-c) are assigned structures (23a-c),

respectively:

(23) a. [$_{CP}$ what$_i$ did [$_{IP}$ John remember [$_{IP}$ Mary [$_{VP}$ singing t$_i$]]]]

    b. [$_{CP}$ what$_i$ did [$_{IP}$ John remember [$_{DP}$ t'$_i$ [$_{IP}$ PRO [$_{VP}$ singing t$_i$]]]]]

    c. [$_{CP}$ what$_i$ did [$_{IP}$ John remember [$_{DP}$ Mary$_j$ [$_{D'}$ AGR [$_{IP}$ t$_j$ [$_{VP}$ singing t$_i$]]]]]]

                                    #

In (23a), the trace is properly head-governed by the verb, satisfying the ECP. Since the embedded IP and the embedded VP are both H-marked, they are not barriers. This satisfies the Subjacency Condition. Thus, (23a) is predicted to be well-formed, yielding the grammatical (22a). In (23b), neither ECP nor Subjacency violation arises, because the verb properly head-governs the trace and the movement of *what$_i$* does not cross any barriers. Thus, (23b) yields the grammatical (22b). In (23c), though the ECP is satisfied, a Subjacency violation arises since one barrier (the DP) is crossed. The DP, whose Spec cannot serve as a landing site for *what$_i$*, becomes a barrier. Thus, (23c) is predicted to b e ill-formed, yielding the ungrammatical (22c). It follows that the contrast in grammaticality between (22a) and (22c) and between (22b) and (22c) can be accounted for by the DP Analysis and the proposed barrier theory.

    Another consequence is that SMC barriers can apply in cases of the *Wh*-island Condition and the Topic Island Condition. Let us consider examples (24a-b) and their structures (25a -b).

(24) a. *to whom$_i$ do you wonder what$_j$ John gave t$_j$ t$_i$

    b. *about the news$_i$ I said that John$_j$ I had told t$_j$ t$_i$ (Nakamura 1994:160)

(25) a. [$_{CP}$ to whom$_i$ do [$_{IP}$ you wonder [$_{CP}$ what$_j$ [$_{IP}$ John gave t$_j$ t$_i$]]]]

                         #

    b. [$_{TopP}$ about the news$_i$ [$_{IP}$ I said that [$_{TopP}$ John$_j$ [$_{IP}$ I had told t$_j$ t$_i$]]]]

                                #

Following Nakamura (1994), I assume that a topicalized phrase moves to the Spec of its own topic phrase (TopP), as shown in (25b). In (25a-b), both traces (*t$_i$* and *t$_j$*) are properly head-

governed by the verb, satisfying the ECP. Since the embedded CP Spec in (25a) and the embedded TopP Spec in (25b) cannot be the first potential landing sites for who_i and *about the news*$_i$, respectively, they become barriers. Thus, each movement crosses one barrier, and a Subjacency violation results, which accounts for the ungrammaticality of examples (24a-b).

Our discussion in this section shows that the DP Analysis, together with the barrier theory defined in (10)-(12) and (21), can account for a variety of movement phenomena, though there remain a few problems to be solved.[10]

IV Conclusion

To summarize, I have supported the assumption that noun phrases are headed by Ds. Then I have proposed to add SMC barriers to the definition of barrier in (9). It has been shown that the suggested barrier approach accounts for the argument-adjunct asymmetry with respect to extraction from noun phrases under the DP Analysis. In particular, it accounts for cases of specificity phenomena and extraction from gerunds under the DP Analysis. Furthermore, it accounts for cases of the *Wh*-island Condition and Topic Island Condition.

The foregoing discussion indicates that the structure of noun phrases and barrier theory should be revised along the lines suggested in this paper.

Notes

*This paper is an extensively revised version of parts of Kajiwara (1993). I would like to record my gratitude to Kunihiro Iwakura, whose criticisms and suggestions contributed substantially to the final version of this paper. I am also indebted to Carol Rinnert and Christopher Schreiner for their help in judging puzzling data. My special thanks are due to Peter Skaer for acting as an informant and for suggesting stylistic improvements. Needless to say, responsibility for the present contents is entirely my own.

1. This assumption accounts for the fact that genitive noun phrases and determiners are in complementary distribution in English, as in (i):
(i) *John's the/that/some book   (Abney 1987:270)

2. Even in Chomsky and Lasnik (1991) and Chomsky (1992), it is an open question which maximal projection noun phrases are assigned at the outermost level, NP or DP.

3. This assumption is motivated by the PRO Theorem, as in (i):

(i) PRO is ungoverned   (Chomsky 1981:191)

PRO can appear in the NP Spec, if we assume that government relation holds in only one direction (left to right in English).   See also Abney (1987), Stowell (1989), and Giorgi and Longobardi (1991) for relevant discussion.

4. In Kajiwara (1994), I call this type of barrier a functional barrier.   Since the term functional is ambiguous, I will not use this term in this paper.

5. The notion of H-marking, whose definition I take from Nakajima (1987) and Takano (1988), was first proposed by Chomsky.

6. The definition in (7) differs from Lasnik and Saito's (1992) in that the latter states that a moved element can cross one barrier as long as its landing site is within the maximal projection immediately dominating the barrier.

7. Since the adjunct PP is a nonargument, *which city*$_i$ can adjoin to it to void its barrierhood if we adopt Chomsky's (1986:6) principle of adjunction, as in (i):

(i) Adjunction is possible only to a maximal projection (hence, X") that is a nonargument

According to this principle, example (13c) is assigned a structure like (ii):

(ii) [$_{CP}$ which city$_i$ did [$_{IP}$ you meet [$_{DP}$ t"$_i$ [$_{D'}$ the [$_{NP}$ man [$_{PP}$ t'$_i$ [$_{PP}$ from t$_i$]]]]]]]

In (ii), each movement does not cross any barriers, satisfying the Subjacency Condition. Thus, (ii) is incorrectly predicted to be well-formed.   To avoid this wrong prediction, I do not adopt this principle in this paper.

8. Chomsky (1986:80-81) adopts the Minimality Condition to show that (13d) causes a stronger violation than (13c) does.   See Culicover and Rochemont (1992:498), who argue that his assumption fails to account for the degraded status of (13d).

9. Chomsky and Lasnik (1991:58) first state this economy condition, as in (i):

(i) Minimize chain links

See also Chomsky (1989, 1992) and Jonas and Bobaljik (1993) for relevant discussion.

10. The following examples are problematic;

(i) a. *who$_i$ did John see the picture of t$_i$

   b. *who$_i$ did John see that picture of t$_i$

Since neither ECP nor Subjacency violation arises in (ia-b), they are predicted to be grammatical.   This prediction, however, is not empirically borne out.   Though the ungrammaticality of these examples remains unexplained, I will leave these problems open in this paper.

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