CHAPTER THREE

‘BARRIERS’ IN COORDINATE STRUCTURES

3.0 Introduction

The theory of coordination that we have constructed takes as its main plank the assumption that coordinators are subcategorized for a single argument $X$, $X$ any category, which it governs but does not properly govern. This assumption entailed two consequences of theoretical import. Firstly, we were able to assimilate coordination to the schema of X-bar syntax. Secondly, we were able to eliminate Ross’s Coordinate Structure Constraint (CSC), an observational generalization which in any case we do not hope to find in UG, by an appeal to two fundamental notions, namely the Empty Category Principle (ECP) and the Condition on Extraction Domains (CED), which are arguably in UG. In what follows we will show that following Chomsky (1966b) the notion of 'barriers' alone would suffice to account for all cases of CSC violations, since in the Barriers framework ECP and CED have been assimilated into this notion. The intuitive idea developed in Barriers is that 'certain categories in certain configurations are barriers to government and to movement'. Extractions from coordinate constructions being instances of 'Move $\alpha C$', it is natural to expect that CSC violations can be accounted for in terms of barriers. Also, we will show that the analysis that we are pursuing here has more
explanatory power than earlier analyses of coordination. Specifically, we will compare our analysis with Williams' (1978) analysis in terms of simultaneous factorization, Gazdar's (1981) analysis using slash notation in the GPSG framework, Pesetsky's (1982) analysis in terms of the Path Containment Condition (PCC) and Goodall's (1987) analysis based on the notion of union of phrase markers. We will show that our analysis is an improvement on these proposals not only as regards descriptive adequacy, but on the count of generality, since it assumes that coordinate constructions are like any other constructions, and do not demand complication of the theory for accommodating the properties of coordination per se.

3.1 The CSC facts

Consider again Ross's CSC, reproduced here in (1):

(1) In a coordinate structure no conjunct may be moved, nor may any element contained in a conjunct be moved out of that conjunct.

The first clause of the CSC prevents extraction of the whole conjunct and the second clause prevents extraction of an element contained in a conjunct. By now we are familiar with these two types of extractions. However,
for convenience of exposition, we reproduce illustrative examples in (2) and (3):

(2) *who₁ did Bill hit [Mary and e₁]

(3) *the lute which₁ Henry [plays e₁ and sings madrigals]

While (2) can be ruled out by some version of Chomsky's A/A condition, the A/A Condition does not say anything about (3) where the extraction is that of an element contained in a conjunct. In proposing the CSC, as stated in (1), Ross believed that its first clause subsumed the A/A Condition.

We have already seen how the CSC is supposed to work. We also examined Pesetsky's alternative to the CSC and also made a tentative proposal of our own. Before we proceed, we need to bring into the discussion two systematic exceptions to the CSC, namely extractions from asymmetric conjuncts and across-the-board extractions from conjuncts.

3.1.1 Extraction from Asymmetric Conjuncts

Grosu (1973) gives a number of examples arguing that cases that do and do not fall under the A/A Condition cannot be sheltered together under the common roof of the CSC. Ross himself had observed that when a conjunction is asymmetric, the CSC may be violated. See (4):
(4)  a. I [VP [VP went to the store] and [bought some whiskey]]

b. the whiskey which I [VP [VP went to the store] and [VP bought e_i]]

c. the store that I [VP [VP went to e_i] and [VP bought some whiskey]]

Grosu pointed out that such constructions still obey the A/A Condition.

(5)  a. John is looking forward to [NP [NP going to the store] and [NP buying some whiskey]]

b. It is [NP [NP going to the store] and [NP buying some whiskey]] that John is looking forward to e_i

c. *It is [NP going to the store] that John is looking forward to [NP [NP e_i] and [NP buying some whiskey]]

d. *It is [NP buying some whiskey] that John is looking forward to [NP [NP going to the store] and [NP e_i]]
These examples pose a problem for our analysis. The challenge is to account for the contrast between (3) on the one hand and (4b) and (4c) on the other. Despite the fact that these constructions have analogous structures, extraction is prohibited in (3) but allowed in (4b-c). Assuming that cleft formation is a rule of syntax which involves Move $\propto$, paradigm (5) considered alongside (2) and (3) does not appear to be problematic. This is so because if (5c-d) involve movement, they will be violations of ECP. Now we have the following state of things:

(i) (4b-c) are clear cases of wh-movement. So we expect them to be violations of CED, but they are fine.

(ii) (5c-d), if they are base generated, and involve no movement, we may expect them to be fine, but they are starred.

(iii) But of course, if (5c-d) involve movement, we have an explanation for their ungrammaticality.

(iv) Therefore our real problem is only (4b-c).

3.1.2 Across-the-Board Extractions from Conjunctions

There is another set of examples which too suggests that our analysis in terms of CED cannot be extended to all cases of coordination. Consider the following examples
discussed in Goodall (1987).

(6) a. which man - ran the race and - won the prize?
    b. which film did the critics hate - and the audience love - ?
    c. how loudly is Mary screaming - and John moaning - ?

The CSC prohibits movement out of a conjunct, but in each of these cases movement has taken place out of both conjuncts. Assuming that the CSC really exists, the acceptability of the above examples becomes curious. Ross himself had pointed out that certain rules apply "across-the-board" in the sense that they 'move a constituent out of all the conjuncts of a coordinate structure'. Later, Williams (1977), (1978), developed and formalized Ross's (1967) principle of "across-the-board" (ATB) rule application supporting the hypothesis that 'if a rule applies into a coordinate structure, then it must affect all conjuncts of that structure.' Thus paradigm (6) consists of examples which are referred to as ATB examples. They yield an explanation in terms of the hypothesis of ATB rule-application. In (6a), the extraction is from the subject-position of the conjoined sentences. In (6b) extraction is from the object position and in (6c) what is extracted is an adjunct. All these examples are in agreement with the "parallelism"
requirement – a characteristic property of ATB constructions – noted in Chomsky (1981). In this connexion notice that earlier, Williams (1978) had invoked some sort of "parallelism" requirement on multiple gaps in coordinate structures in order to account for the "subject-object asymmetry" exhibited by ATB constructions. See the paradigm given below:

(7) a. John who Bill saw e and Mary likes e.
   b. John who e saw Bill and e likes Tom.
   c. *John who Bill saw e and e likes Tom.
   d. ?John who Bill likes e and we hope e will win.

Obviously, our account of CSC in terms of ECP-CED fails to account for these examples of ATB-movement.

3.1.3 Right Node Raising

There is yet another instance of ATB extraction from coordinate constructions which is customarily analyzed as Right Node Raising (RNR). As early as 1967, Ross had observed that there is an important class of rules to which CSC does not apply. The rule of Conjunction Reduction (CR) proposed in Ross (1967) is one such rule. Ross suggested that CR 'Chomsky-adjoins to the right or left of the coordinate node a copy of some constituent which occurs in all conjuncts, on a right or left branch, respectively, and then deletes the original nodes'.
This is what happens in the derivation of (8a) from (8b).

(8) a. Sally might be, and everyone believes Shiela definitely is, pregnant

b. Sally might be pregnant, and everyone believes Shiela definitely is pregnant.

Ross showed that this rule must work "across-the-board"; 'the element adjoined to the coordinate node must occur in each conjunct.' Since CR affected the right-most constituent (generally), it was later known as Right Node Raising. Since Postal (1974), this term has gained much popularity. See the following examples discussed in Postal (1974).

(9) a. Jack may be ___ and Tony certainly is ___ a werewolf.

b. Tom said he would ___ and Bill actually did ___ eat a raw egg plant.

c. Tony should have ___ and Peter probably would have ___ called Grace.

d. Terry used to be ___ and George still is ___ very suspicious.
The two gaps in each of the above examples are to be interpreted in terms of the RN Raised constituent. Now, there has been a controversy as to whether there is any transformation involved in deriving RNR constructions. (We will take up this issue in some detail at a later point in this chapter.) Assuming that RNR is an instance of extraction from coordinate structures, our analysis does not have any explanation for the grammaticality of the examples in (9).

3.2 Earlier Analyses

Before going further, let us see how the examples in (4), (5) and (6) are dealt with in earlier analyses. We begin with Williams (1978).

3.2.1 Williams' (1978) Analysis

Williams (1978) proposes a special notation for conjoined structures, in which 'conjuncts in coordinate structures are written on top of each other, and ... factor lines that split coordinate structures (are) drawn so as to split all conjuncts of that structure.' Take an example like (10). Williams' ATB derivation would generate (10) from (11) by a single application of wh-movement, putting who in the complementizer and simultaneously deleting both the underlying who's as in (12).
(10) who John saw and Bill hit

(11) COMP [ [ John saw who]s and [ Bill hit who]s ]s

(12) COMP [ [ John saw t]s and [ Bill hit t ]]s

As already stated, for 'simultaneous factorization', the two sentences will be placed as shown in (13) where one conjunct is on top of the other.

(13) COMP [ [ John saw whos] ]
    and
    [ [ Bill hit whos] ]s

(13) will be factored for the application of wh-movement as in (14);

(14) COMP [ [ John saw whos] ]
    and
    [ [ Bill hit whos] ]s

Application of wh-movement places a single copy of who in COMP and deletes factor 3, giving (15):
The term affected by wh-movement are (1) and (3). Williams's proposal provides variants of the definitions of "well-formed labeled bracketing" and "factor" that allow structures like (15). Notice that Williams capitalizes crucially on his stipulation that "if one conjunct is split by a factor line, all must be split." Also, he proposes extensions of the principles of Recoverability of Deletions (ROD) and the "is a" relation. These extensions are purported to cover cases of the CSC and the ATB exceptions to it.

(15) COMP

\[
\begin{array}{c}
\text{John saw} \\
\text{who}
\end{array} \quad \begin{array}{c}
\emptyset
\end{array}
\end{array}
\begin{array}{c}
\text{and}
\end{array}
\begin{array}{c}
\text{Bill hit}
\end{array} \quad \begin{array}{c}
\emptyset
\end{array}
\end{array}
\begin{array}{c}
s
\end{array}
\]

(16) ROD

\text{if } T \text{ is a term moved or deleted by a transformation,}
\text{and } T \text{ consists of simultaneous factors } F_1 \ldots F_n,
\text{then it must be the case that } F_1 = F_n.

(17) "is a"

\text{If } F \text{ is a factor consisting of simultaneous factors}
\text{ } F_1 \ldots F_n, \text{ then } F \text{ "is a" } X \text{ if } F_1 \text{ "is a" } X \text{ and } \ldots, \ldots
\text{ and } F_n \text{ "is a" } X.
(16) says that only identical factors can be deleted. For example, ROD prevents wh-movement from applying to the following structure.

(18) COMP

\[
\begin{array}{cccc}
\text{[ Bill saw } & \text{wh}_S & \text{ ]} & \text{and } \\
\text{[ Pete ate } & \text{what}_S & \text{ ]} & \text{ ]}
\end{array}
\]

\[
1 \quad 2 \quad 3 \quad 4
\]

In (18) the two factors comprising factor 3 are not identical. Notice that with respect to ROD F is factor 3, \(F_1\) is \(\text{wh}_S\), and \(F_2\) is \(\text{what}_S\). However, as per (17), factor 3 "is a" Wh-term since \(\text{wh}_S\) "is a" Wh-term what \(\text{what}_S\) "is a" WH-term. With the help of these two principles Williams accomplishes the derivation of the CSC of Ross plus the ATB facts. To illustrate, consider a typical example explained by the CSC.

(19) *Who did John see and Bill hit Mary?

(20) COMP

\[
\begin{array}{cc}
\text{[ John saw } & \text{wh}_S \text{ ]} \\
\text{[ Bill hit Mary}_S \text{ ]} & \text{ ]}
\end{array}
\]

\[
S
\]

(20) cannot be factored so as to meet the "is a" requirement for Wh-movement. Consider the two possible ways of factoring (20).
Whether (20) is factored as in (21a) or as in (21b), the same problem arises, namely that the bottom factor of 3 does not satisfy the definition "is a wh-term". Hence (20) cannot be generated.

Williams' proposal comprises a few important claims about coordinate deletions. Oirsouw (1987) observes that these claims do not hold for coordination. We do not intend to reproduce Oirsouw's arguments in support of his objections to Williams' analysis. Nevertheless, we would like to subscribe to one of his objections, namely that Williams does not extend his approach to parallel types of ATB rules like Gapping and RNR. Perhaps we can raise a further
objection to Williams' approach, namely that Williams treats coordinate structures as special types requiring "simultaneous factorization" and therefore it lacks generality.

3.2.2 Gazdar's (1981) Analysis

Gazdar (1981) presents an analysis of coordination in the GPSG framework. Gazdar suggests that the categorial label tells us about the presence of a gap in a coordinated structure, since it contains certain information about gaps. His "slash" notation is designed to encode this kind of information. Using the "slash" notation he maintains that a category X containing no gap is categorially distinct from X/NP; i.e. X containing an NP gap. Gazdar argues that the slash notation allows the CSC to be reduced to a basic principle of coordination, namely that only like constituents can be conjoined. This is precisely what the Law of Coordination of Likes (LCL) proposed in Williams' (1981) implies. The LCL imposes a constraint on what can be conjoined: a constituent labeled X can be conjoined only with other constituents labeled X. Since a constituent containing a gap is categorially distinct from a constituent containing no gap, it follows that S cannot be conjoined with S/NP. VP cannot be conjoined with VP/NP and so on.
Assuming that LCL exists, CSC is derived quite naturally. All cases of CSC violations will be violations of LCL. On the other hand, a constituent with a gap like S/NP can be readily conjoined with another constituent S/NP which is of the same type with the same gap. This is what happens in ATB examples. Illustrative examples of the LCL effect are given below:

(22) *who \_ did Bill hit $[\text{NP NP Mary}]$ and $[\text{NP/NP e}_1]$

(23) *the lute which \_ Henry $[\text{VP VP/NP plays e}_1]$ and $[\text{VP sings madrigals}]$

The possibility of conjoining two categorially similar constituents is illustrated below:

(24) a. ? the man who \_ $[\text{S S Mary loves him}]$ and$[\text{S Sally hates him}]$

$\quad(S \& S)$

b. the man who \_ $[\text{S S/NP Mary loves e}_1]$ and $[\text{S/NP Sally hates e}_1]$

$\quad(S/NP \& S/NP)$

Gazdar's account does not take care of the problem of extraction from asymmetric conjuncts, cf. (4b) and (4c). In (4c), repeated here as (25):
(25) the store that I [VP [VP/NP went to e] and [VP bought some whiskey]]

a VP/NP is conjoined with a VP. Gazdar can perhaps get around the problem by arguing that asymmetric conjunction is not a case of "genuine coordination" and therefore LCL does not apply to it.

At this juncture, it is worth mentioning Chomsky's (1981) objection to the slash category notation, namely that it allows a wild proliferation of categorial labels, without explaining the basic properties of Move $\alpha$. This is a problem at the conceptual level, Pesetsky (1982) notes a further problem, namely that slash categories do not behave like other categories since no verb subcategorizes for NP/NP or PP/NP or for any other category for that matter.

3.2.3 Pesetsky's (1982) Analysis

Pesetsky (1982) addresses both problems, namely extraction from asymmetric conjuncts and ATB extractions. Regarding the former, Pesetsky argues that the conjunction and in (4) is to be interpreted as consecutive, and that it has certain special properties by virtue of which it differs from other instances of the conjunction and. Ordinary conjunction creates a single path between the conjunction
and the conjuncts. This path is the result of the conjunction assigning simultaneously, a single $\theta$-role to a number of conjuncts. In sentences like (4), the right-hand conjunct is interpreted as a consequent of the left-hand conjunct. Pesetsky claims that in such cases, the conjunction assigns different $\theta$-roles to the two conjuncts. This ensures that there will be a separate path from each conjunct to the conjunction, and we will not get CSC effects since the PCC will be satisfied. Thus the paths in (4c) repeated here as (26), will be as in (27).

(26) the store $[[S \text{ that } I [VP_0 [VP_1 \text{ went to } e_1 ] \text{ and } [VP_2 \text{ bought some whiskey } ] ]]]$

(27) i. Between the conjunction and $VP_1$

$[VP_1 VP_0 ]$

ii. Between the conjunction and $VP_2$

$[VP_2 VP_0 ]$

iii. Between $e_1$ and COMP of $S'$

$[VP_1 VP_0 S S']$
Here, only (i) and (iii) overlap; and in this case, (iii) contains (i). And regarding the examples in (5), Pesetsky accounts for them in terms of the A/A condition. We have already noted our dissatisfaction with Pesetsky's analysis (in chapter One).

Let us see how Pesetsky's path theory gets around the problem of subject/object asymmetry in ATB constructions. He attempts to capitalize on the point that ATB gaps and parasitic gaps are instances of multiple gaps which share a common binder. In ATB constructions, he assumes that the INFL's of the conjoined S's are bound by the same COMP resulting in the sharing of a common path by these INFL's (created by the movement of (+Tense) in INFL to COMP). Consider the abstract situation.

(28)
Now consider the sort of extractions in (7). (7) has the structure shown in (29):

(29) John \[S, \text{who} \[S_0 \quad [S_1 \text{Bill} [\text{INFL}' [\text{VP}_1 \text{saw} \text{e}^1]]] \]
and \[[S_2 \text{Mary} [\text{INFL}' [\text{VP}_2 \text{likes} \text{e}^2]]]]

We get the following paths in (29):

(30) Path i: Between the conjunction and conjuncts
\([S_1, S_2, S_0]\)

Path ii: Between INFL\(_1\), INFL\(_2\) and COMP
\((\text{INFL}'_1, S_1, \text{INFL}'_2, S_2, S_0, S')\)

Path iii: Between \(\text{e}^1, \text{e}^2\) and COMP of \(S'\)
\((\text{VP}_1, \text{INFL}'_1, S_1, \text{VP}_2, \text{INFL}'_2, S_2, S_0, S')\)

Path (iii) overlaps with path (ii), but it contains path (ii).
Similarly, path (ii) also obeys the containment condition with respect to path (i). Thus the PCC is satisfied.

Consider the structure of (7b) given as (31) and the paths involved.

(31) John \[S, \text{who} \[S_0 \quad [S_1 \text{e}^1 [\text{INFL}' [\text{VP}_1 \text{saw} \text{Bill}]]] \]
and \[[S_2 \text{e}^2 [\text{INFL}'_2 [\text{VP}_2 \text{likes} \text{Tom}]]]\]
path i: Between the conjunction and the conjuncts
\((S_1, S_2, S_0)\)

path ii: Between INFL\(_1\) and INFL\(_2\), and COMP
\((\text{INFL}_1, S_1, \text{INFL}_2, S_2, S_0, S')\)

path iii: Between \(e^1, e^2\) and COMP
\((S_1, S_2, S_0, S')\)

Again the PCC is satisfied. Paths (i) and (iii) overlap, but path (iii) contains path (i); path (ii) overlaps with and contains both path (i) and path (iii).

Let us now examine the ungrammatical examples in (7c). See its structure in (32) and the paths involved.

(32) *John \([S, \text{who} [S_0 [S_1 \text{Bill} [\text{INFL}_1, [\text{VP}_1 \text{saw} e^1]]]]] \text{and} [S_2 e^2 [\text{INFL}_2, [\text{VP}_2 \text{likes} \text{Mary }]]]]\)

path i: Between the conjunction and the conjuncts:
\((S_1, S_2, S_0)\)

path ii: Between INFL\(_1\), INFL\(_2\), and COMP
\((\text{INFL}_1, S_1, \text{INFL}_2, S_2, S_0, S')\)

path iii: Between \(e^1, e^2\) and COMP
\((\text{VP}_1, \text{INFL}_1, S_1, S_2, S_0, S')\)
Path (ii) and (iii) overlap, but neither contains the other. The PCC is violated.

Finally, consider (7d). Its structure and the paths are given in (33):

(33) John [s, who [S_0 [S_1 Bill [INFL_1 [VP_1 likes e^i_1]]]] and [S_2 we [INFL_2 [VP_2 hope [S_3 e^2_a [S_3 e^2_b will win ]]]]]

path i: Between the conjunction and the conjuncts (S_1, S_2, S_0)

path ii: Between INFL_1, INFL_2, and COMP (INFL_1, S_1, INFL_2, S_2, S_0, S')

path iii: Between e^1, e^2_a, and COMP of matrix S'
(VP_1, INFL_1, S_1, S'_3, VP_2, INFL_2, S_2, S_0, S')

Paths (i) and (ii) overlap, paths (i) and (iii) overlap, and paths (ii) and (iii) overlap. But path (iii) contains (i) and (ii), and (ii) contains (i). Thus the PCC is satisfied. Notice that path (iii) is one node longer than path (ii) in the left conjunct, and two nodes longer than path (i) in the right conjunct. This is of no significance to the
PCC. In Pesetsky's theory, what is important is that the ATB gaps be either all above the highest INFL, or all below the highest INFL. When all the gaps are subjects, they are all above the highest INFL; when they are objects, they are all below it. When one is a matrix subject and the other an object, one is above and one is below and the PCC is violated. Thus Pesetsky derives the subject/object asymmetry noted by Williams.

Pesetsky's analysis of ATB gaps in terms of the PCC seems to be immensely insightful. However, we are not following his PCC analysis of coordination for reasons already mentioned. Presently, we have to seek a different source of explanation for accommodating ATB facts.

3.2.4 Goodall's (1987) Analysis

In Goodall (1987) coordination is represented as a union of phrase markers. In this analysis two trees are "pasted together" one on top of the other, with identical nodes merging together. This treatment of coordination is closely related to the derived conjunction analysis since under both approaches coordination always involves more than one sentence. The difference between the two approaches is that in the derived conjunction analysis the underlying sentences are assumed to be sisters in a phrase marker, whereas in the
union of phrase markers approach they are treated as being superimposed one on the other.

Consider the union of phrase markers given in (35) for the sentences in (34):

(34) a. Jane saw Bill
    b. Alice saw Bill

(35)

\[
\begin{array}{c}
S \\
NP & NP & VP \\
Jane & Alice & V \\
& & saw \\
& NP & Bill
\end{array}
\]

It must be noted that neither the NP \textbf{Jane} nor the NP \textbf{Alice} dominates or precedes the other. This is shown in the linear diagram (36):

(36)

\[
\begin{array}{c}
\text{Jane} \\
\downarrow \\
\text{saw Bill} \\
\text{Alice}
\end{array}
\]

Each instance of a union of phrase markers is marked with its coordination types; i.e. \textbf{and}, \textbf{or}, or \textbf{but}. When the phrase marker is linearised in PF, a phonetic manifestation
of the coordination type is inserted whenever a linear order is imposed between pairs. Thus from (36) we get (37a) or (37b) by conjunction placement of and.

(37) a. Jane and Alice saw Bill  
    b. Alice and Jane saw Bill.

If there are more than two words in the same linear position, the conjunction is inserted either before the last member of this set of words or between any two members. This may be seen in (39) and (40), both derived from (38):

(38) George  
    Martha  
    Mary  
    Tom  
    like icecream

(39) George, Martha, Mary and Tom like icecream.

(40) George and Martha and Mary and Tom like icecream.

Or works just like and; however, but may conjoin only two conjuncts.

Now let us see how Goodall derives the CSC and ATB facts from the system he has developed. Consider first the CSC. In Goodall's system coordinate structures consist of
two or more sentences co-existing in the same phrase marker. These sentences, like any others, must be syntactically well-formed. So they must satisfy the various conditions on syntactic representation which are imposed by the grammar. For instance, consider the component sentences of the structure underlying (41), namely (42):

(41) *What did Mary cook the pie and Jane eat _?  
(42) a. *What did Mary cook the pie?  
    b. What did Jane eat t?

In (42b) the wh-phrase what receives a Θ-role and Case by means of its trace and it is a well-formed sentence. But this is not so in the case of (42a) in which what binds no trace. Consequently, (41) too is ill-formed. All cases of CSC violations can be thus accounted for.

Consider now the ATB examples given in (6). The component sentences involved are as in (43)-(45):

(43) a. which man t ran the race?  
    b. which man t won the prize?  

(44) a. which films did the critics hate t?  
    b. which films did the audience love t?
In (43)-(45) both component sentences are well-formed. In each case the who-phrase is co-indexed with a trace and thus quantifies non-vacuously.

Goodall also invokes the LCL proposed by Williams (1981). See the contrast between (46) and (47):

(46) *the bouncer was [AP muscular] and [NP a guitarist]
(47) the bouncer [VP was muscular] and [VP was a guitarist]

The conjuncts in (47) contain like categories. But this parallelism does not obtain in (46) and hence the contrast.

Though Goodall gives a unified account of CSC, ATB exceptions and Gapping, he treats RNR as a phenomenon distinct from coordination. He treats coordinate structures as a special class in themselves by proposing a three-dimensional configuration for them in the syntax. Our contention is that there is no need to treat coordinate structures as a special class -- a contention we hope to substantiate below.
3.3 **Proposing a Partial Grammar of Coordination**

In what follows we will propose a partial grammar of coordination in the Barriers framework. We will describe the framework first, and then, will provide our account of the CSC facts, ATB facts and RNR facts discussed in the previous section.

### 3.3.1 The Framework

The notion of barriers and the other notions it presupposes are defined by Chomsky (1986a) as follows:

(48) **Definition of 'barriers'**

\[ y \text{ is a barrier for } \beta \text{ iff (a) or (b)} \]

- a. \( y \) immediately dominates \( \delta \), \( \delta \) a BC for \( \beta \)
- b. \( y \) is a BC for \( \beta \), \( y \neq \) IP

(49) **Definition of Blocking Category (BC)**

\( y \) is a BC for \( \beta \) iff \( y \) is not L-marked and \( y \) dominates \( \beta \)

(50) **Definition of L-marking**

\( \alpha \)-marks \( \beta \) iff \( \alpha \) is a lexical governor that \( \theta \)-governs \( \beta \)
(51) **Definition of 0-government**

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

(52) **Definition of government**

$\alpha$ governs $\beta$ iff $\alpha$ m-commands $\beta$, and there is no $y$, $y$ a barrier for $\beta$, such that $y$ excludes $\alpha$.

(53) **Definition of the notion of 'exclusion'**

$\alpha$ excludes $\beta$ iff no segment of $\alpha$ dominates $\beta$.

(54) **Definition of c-command and m-command**

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

(ii) where $y$ is restricted to maximal projections in (i), $\alpha$ m-commands $\beta$.

In other words, a barrier for a node $\alpha$ includes

(i) any maximal projection (except $S$) dominating $\alpha$, unless that maximal projection is L-marked.

(ii) any maximal projection immediately dominating a non-L-marked maximal projection dominating $\alpha$. 
\( \alpha \) governs \( \beta \) if \( \alpha \) m-commands \( \beta \) and no barriers for \( \beta \) exclude \( \alpha \). Movement is optional when it crosses no barriers, and it degrades sharply when crossing more than one barrier. 'Crossing' like 'barrier' is understood in terms of exclusion.²

Going by definition (48), note that an \( X^{\text{max}} y \) is a barrier by inheritance or inherently. \( y \) is a barrier by inheritance if the \( X^{\text{max}} \) it most closely dominates is a BC (see 48a). It is a barrier inherently if it is a BC itself, other than IP (see 48b). An \( X^{\text{max}} \) is a BC if it is not L-marked.

Let us take an illustrative example of how an "ordinary" extraction works. Consider (55)

\[
\begin{align*}
\text{[CP}_1 \quad \text{who}_1 \quad \text{does \ [IP}_1 \quad \text{Mary \ [I}_1 \quad \text{[VP}_1 \quad \text{say \ [CP}_2 \\
\text{\ [IP}_2 \quad \text{Bill \ [I}_2 \quad \text{[VP}_2 \quad \text{loves \ t}_1 \ ]]}]]]]
\end{align*}
\]

In (55) \( VP_2 \) is a potential barrier since it is not L-marked. But adjunction to \( VP \) nullifies its barrierhood. \( IP_2 \) and \( I'_2 \) will not be barriers because the IP system is defective (by stipulation). \( CP_2 \) will not be a barrier since it is L-marked by the matrix verb. Again \( VP_1 \) will not be a barrier owing to the possibility of adjunction. \( IP_1 \) and \( I'_1 \) are not barriers just as \( IP_2 \) and \( I'_2 \) are not. Thus antecedent government is obtained at all levels and an extraction of this kind becomes licit.
3.3.2 'Barriers' in Coordinate Structures

Following these lines, let us examine the barriers in a coordinate structure. Consider an abstract case of coordination.

(56)

\[
\begin{array}{c}
\text{XP}_0 \\
\text{XP}_1 & \text{XP}_2 \\
\text{XP}_3 & \text{XP}_4
\end{array}
\]

Assuming (not crucially for our analysis, we may add) that and L-marks its complement, XP3 and XP4 are not BC's and are not barriers. But XP1 and XP2 must be barriers just like VP's are, since there is no lexical category which is a sister to XP1 or XP2 that can θ-mark it; these are therefore barriers, unless adjunction can nullify them. XP0 is a barrier by inheritance since XP1 and XP2 are not L-marked.

Thus we can say that in a coordinate structure the XP (either X_{\text{max}} or XP) nodes immediately dominating the coordinators and their complements and the node immediately dominating the conjuncts are barriers, unless possibilities of adjunction alter the situation. Let us now consider the nature of adjunction in coordinate structures. We suggest that adjunction in (56) is possible only to XP0, and that adjunction is disallowed even here if this XP0 is a CP.
or NP which is an argument (since the 'Barriers' framework disallows adjunction to these categories if they are arguments). That is, we shall stipulate that \( XP_1 \) and \( XP_2 \) cannot be adjoined to - a stipulation analogous to Chomsky's (1986a) stipulation that wh-phrases cannot adjoin to IP. Keeping these notions in mind let us examine how traditional examples of CSC violations can be accounted for.

3.3.3 The CSC facts

Let us examine (2) first. I has the following structure:

\[
(57) \quad [CP \, who\_1 \, [C, \, did \, [IP \, Bill \, [I, \, [VP \, hit \, [NP_0 \, [NP_1 \, and \, [NP_3 \, Mary]] \, [NP_2 \, and \, [NP_4 \, e_i]]]]]]]]
\]

Since \( NP_0 \) is L-marked by the verb \textit{hit}, it is not a BC and is not a barrier inherently. Similarly, \( NP_4 \) also is not a barrier since it is (by assumption) L-marked by \textit{and}. But \( NP_2 \) will be a barrier inherently. And \( NP_0 \) will be a barrier by inheritance. By hypothesis, \( NP_1 \) cannot be adjoined to. \( NP_0 \) cannot be adjoined to because it is an argument. The next adjunction site is VP. But the movement has now crossed two barriers. This accounts for the ungrammaticality of (2).
Consider now (3). Let us assume that (3) has the following structure.

\[
\begin{align*}
\text{NP} & \quad \text{CP} \\
\text{the lute} & \quad \text{\textit{which}}_1 \\
& \quad \text{C} \\
& \quad \text{C}^* \\
& \quad \text{IP} \\
& \quad \text{Harry} \\
& \quad \text{I}^* \\
& \quad \text{I} \\
& \quad \text{VP}_0 \\
& \quad \text{VP}_1 \quad \text{VP}_2 \\
\text{and} & \quad \text{VP}_3 \quad \text{and} \quad \text{VP}_4 \\
& \quad \text{plays} \quad \text{t}_1 \quad \text{sings} \quad \text{madrigals}
\end{align*}
\]

If lexical government is sufficient for proper government, the object trace in (58) is properly governed. But as discussed in Barriers, proper government is brought about by antecedent government only.

As per our discussion in the preceding section, VP$_0$ and VP$_1$ will be barriers in (58). (VP$_3$ will not be a barrier if it is L-marked by \textit{and}.) Assuming that adjunction to VP$_0$ is possible, we will get the structure (59) after adjunction.
Since in the **Barriers** framework government is defined in terms of exclusion (cf.47), \( V_{P_0} \) ceases to be a barrier. Thus adjunction to \( V_{P_0} \) removes its barrierhood. However, \( V_{P_1} \) (the encircled node) continues to be a barrier; (3) is ruled out as an instance of ECP violation.

What we have shown above is that, in any case of extraction from a coordinate structure, there will always be a place in the chain where antecedent government fails namely the place where the movement crosses the node immediately dominating \([\text{and } X_P]\) and the node immediately dominating the two conjuncts. But this in itself should not necessarily result in an ECP violation of the extracted element is an argument. Consider (60) where an argument from the embedded clause of a VP in a VP-coordination structure is extracted:
(60) *who does John [VP [VP think that Mary loves \( t \) ]
and [VP argue that Susan hates Peter]]

Admitting intermediate adjunctions, the structure of (60) will be something like the following:

(61) CP
    |   \\
who \_ C'
    |   \\
C IP
    |   \\
John I'
    |   \\
I' VP' [1]
    |   \\
ti' VP0
    |   \\
and VP3 and VP4
    |   \\
V CP V CP
    |   \\
think ti C' argue that IP
    |   \\
that IP Mary I'
    |   \\
I VP5
    |   \\
VP VP5
    |   \\
ti V NP
    |   \\
loves ti

Susan hates Peter
Here, **who** is first adjoined to VP₅, then moved into SPEC of the lower CP. If we assume that VP₃ is not a barrier because it is L-marked by **and**, we can ignore it; if it is to be considered a barrier, it can be adjoined to (and so, voided). Since VP₁ cannot be adjoined to (by hypothesis), it is a barrier. We have shown **who** as adjoined next to VP₀ and then moving into SPEC of the matrix CP. In this chain, there is one "offending" trace which is not antecedent-governed, namely t".

But assuming that \( \gamma \)-indexing mechanism of Lasnik and Saito (1984), the original trace t will be \( \gamma \)-indexed at S-structure because it is antecedent -governed by t'. The intermediate traces, including the offending trace t", can be deleted by "Affect alpha". Thus there will be no ECP violation since the original trace is \( \gamma \)-indexed. Thus the ungrammaticality of (60) turns out to be merely due to a Subjacency violation at best (since the extraction crosses one barrier, namely VP₁) and not due to an ECP violation. This, of course, is an undesirable outcome because here we are forced to reduce CSC to Subjacency though we have already claimed that CSC violations are ECP violations. And Subjacency violations are relatively weaker violations whereas (60) is a case of a strong violation.

We wish to suggest a tentative way out of this difficulty. Notice that the configuration \([xp\, xp\, xp]\) in a coordinate structure is more or less like an adjoined
structure cf. \( [x_p \leadsto x_p] \). Based on this parallelism between a coordinate structure and an adjunction structure we would like to maintain that coordinate structures are in fact adjunction structures.

Let us further stipulate that in cases of extraction from an adjunction structure, \( \gamma \)-indexing can take place only at LF - irrespective of whether the original trace is that of an argument or an adjunct. Now this gives us the correct results. None of the intermediate traces can be deleted before LF, in order that the original trace may be \( \gamma \)-indexed. Now the offending trace also survives into LF, and so we have an ECP violation (like in extraction of adjuncts).

Thus it can be seen that adjunction to the topmost node in a coordinate structure does not make extraction from the structure legitimate; all cases of CSC violations follow automatically.

3.3.4 Grosu's facts

In section 2.1.2 we saw that extraction from asymmetric conjuncts as illustrated by examples (4b-c) poses a problem for our analysis. We expect them to be CSC violations since they are clear cases of \( \text{wh} \)-movement from a coordinate structure. But curiously enough, they are not starred.
The examples are reproduced here as (62a-b):

(62) a. the whiskey which I [VP \(_0\) and \(\text{VP}_3\) went to the store]] [VP \(_2\) and \(\text{VP}_4\) bought \(e_1\)]]

b. the store that I [VP \(_0\) [VP \(_1\) and \(\text{VP}_3\) went to \(e_1\)] [VP \(_2\) and \(\text{VP}_4\) bought some whiskey]]]]

Pesetsky's (1982) claim (we may recall) is that and in these examples is different from other instances of and in the sense that it is 'consecutive', and that while the normal conjunction assigns a \(\theta\)-role simultaneously to all of its conjuncts, the 'consecutive' and assigns different \(\theta\)-roles to its conjuncts. But the claim is not very convincing. For one thing it is difficult to distinguish between the two allegedly different \(\theta\)-roles supposed to have been assigned by the 'consecutive' and in (4). In fact, there is nothing in the literature so far to explain away the contrast between (3) and (4). Our analysis in terms of barriers too has nothing to offer in this regard.

Let us examine the problem from a different perspective. Recall that violation of the CSC seems possible when there is extraction from both the conjuncts. This is what we describe as the ATB phenomenon (cf. (6a-c)). Let us
capitalize on the point that ATB examples contain gaps in both the conjuncts. If we could somehow show that there are gaps in both the conjuncts in (62a/b), then these examples also would fall in line with other instances of ATB extraction.

Accordingly, let us explore the possibility that (62a-b) have the structure shown in (63a-b).

(63) a. the whiskey which I \[vp_1 \text{ went to the store } e_1 \] and \[vp_2 \text{ bought } e_2 \]

b. the store that I \[vp_1 \text{ went to } e_1 \] and \[vp_2 \text{ bought some whiskey } e_2 \]

The question is: What would correspond to \(e_1\) in (63a), or \(e_2\) in (63b)? Suppose we say that \(e_2\) in (63b) is the gap of a place adverbial such as where; and that \(e_1\) in (63a) is the gap of a "purpose" adverbial, such as for which; let us now test for these possibilities. The following contrast supports our claim regarding (63b).

(64) a. the store that I went to and bought some whiskey

b. *the store that I went to and bought some whiskey there.

If there is only one gap, namely \(e_1\), in (64b) - as the standard analysis claims -, it is difficult to explain why
a place adverbial like there is inadmissible in the second conjunct. But our analysis explains this. If the locative adverbial is overtly present, there can't be a trace there, and so the ATB effect won't show up.

Similarly, for (63a), note the following contrast.

\[(65)\quad a. \text{the whiskey which I went to the store and bought} \]
\[b. \text{*the whiskey which I went to the store for it and bought.}\]

If the for NP is overtly present, the sentence is out; suggesting that it is a gap in that position (giving rise to an ATB effect) that made (63a) possible.\(^3\)

To sum up, instances of extraction from asymmetric conjuncts (the so-called "Grosu's facts") can be treated on a par with ATB examples.

3.3.5 ATB facts

Now our task is to account for the ATB phenomenon. We would like to address ourselves to a few questions: Should we consider ATB constructions as a separate class altogether or are there any other constructions structurally analogous to them? Does the phenomenon exist at all? Can't we derive ATB exceptions to the CSC from the independent principles and theories of UG?
As we have already mentioned in the beginning of this chapter, the CSC in its present shape is not a thing we would expect to find in UG. Assuming that it really exists, it appears all the more curious why an additional CSC violation makes the coordinate structure acceptable. Also we have been trying to project our disagreement with earlier analyses proposed in Williams, Gazdar or Goodall (to mention a few), since these analyses stipulate something special about coordinate structures. Treating coordinate constructions as a separate class and proposing an independent theory of coordination to account for its curious properties appear counterintuitive since in the modular approach of grammar that we are assuming, the independent operation and interaction of principles and theories ought to be able to yield the kind of phenomenon that we are looking at.

In what follows we will show that there is no ATB phenomenon as such, which by definition treats the coordinate structure as a special class in itself. We would rather assume that the sort of constructions conventionally described as constituting the ATB phenomenon share the properties of other multiple gap constructions like the 'parasitic gap' constructions and the RNR constructions.
3.3.5.1 The typology of gaps

At this juncture it would be a permissible digression to examine the general properties of gaps. Chomsky (1982) proposes the following classification of gaps:

\begin{enumerate}
\item gaps with antecedents that lack an independent $\theta$-role
  \begin{enumerate}
  \item and are locally $A$-bound
  \item and are locally $\bar{A}$-bound
  \end{enumerate}
\item gaps with antecedents that have an independent $\theta$-role
\item gaps having no antecedents.
\end{enumerate}

The gaps in (66a) are traces formed by Move $\omega$. These are either anaphors or variables, depending on whether they are locally $A$-bound or $\bar{A}$-bound. Thus the gaps of (66a(i)) are anaphors and the gaps of (66a(ii)) are variables. Anaphors are subject to Principle A of the Binding Theory and variables are subject to Principle C. The gaps of (66b) and (66c), having either an antecedent with an independent $\theta$-role or no antecedent, are PRO. PRO is a pronominal anaphor subject to Principles A and B of the Binding Theory simultaneously, hence ungoverned.
3.3.5.2  \textbf{ATB gaps and Parasitic gaps}

Let us look at the ATB gaps once again specifically with respect to the typology of empty categories. What class of EC's do ATB gaps belong to? In other words, are they anaphors or variables? In the earlier analyses we discussed they are treated as traces bound by an \( \tilde{A} \)-binder. We will examine the question in detail at a later point. Let us now address ourselves to the following question: How are ATB gaps licensed?

Assuming that ATB gaps are parasitic gaps (thanks to Pesetsky's generalization), let us examine whether the descriptive statements given in (67) (from Chomsky (1982)), which describe parasitic gaps hold good with respect to ATB gaps.

(67) In the construction (A), where order is irrelevant and we assume \( \alpha \), \( t \), \( e \) to be coindexed, the parasitic gap \( e \) is licensed if and only if (B).

(A) \( \ldots \alpha \ldots t \ldots e \)

(B) i. \( \alpha \) c-commands \( t \) and \( e \)
   ii. \( t \) does not c-command \( e \) or conversely.
   iii. \( \alpha \) does not head the chains (\( \alpha \), \( t \)) and (\( \alpha \), \( e \))
   iv. \( e \) is governed (\( \not\! \text{PRO} \)) and heads a chain with a \( \emptyset \)-role.
Consider our earlier ATB examples repeated here as (68):

(68) a. John who sub 1 Bill saw e 1 and Mary likes e 2
    b. John who sub 1 e 1 saw Bill and e 2 likes Tom
    c. *John who sub 1 Bill saw e 1 and e 2 likes Mary
    d. Mary who sub 1 Bill likes e 1 and we hope e 2 will win

In (68) either e 1 or e 2 must be parasitic in each of the examples. To fit the schema of (67a), let us arbitrarily assume that in (68a), e 1 is a trace created by the movement of who sub 1 and that therefore is a variable. Condition (i) in (67B) is satisfied since who c-commands both e 1 and e 2. By virtue of the fact that in a coordinate structure the two conjuncts are in a sisterhood relationship, no element in any one of the conjuncts can c-command an element in the other conjunct and therefore condition (ii) also is satisfied. Conditions (iii) and (iv) are also satisfied: who does not head both the chains (who, e 1 ) and (who e 2 ). e 2 is in a governed position and hence not PRO and it heads a chain with a θ-role.

ATB gaps are conventionally assumed to be distinguishable from parasitic gaps in terms of subjacency. It has been claimed in Engdahl (1981) and also in Chomsky (1982) that all gaps in ATB constructions obey subjacency whereas in parasitic gap constructions only the real gap is expected.
to be sensitive to subjacency. Engdahl further observes that it makes no sense to ask which gaps are parasitic and which are created by movement in ATB constructions since all gaps are necessary to grammaticality and hence obligatory.

How parasitic gaps are licensed has been a topic for debate of theoretical interest eversince Taraldsen (1981) opened the issue for discussion. Chomsky (1986a) observes that a basic property of parasitic gaps is that they are typically licensed by a wh-phrase (or other operator-bound) trace in object position, but not in subject position. See the illustrative examples in (69):

(69)  a. What did you file t [ before reading e]
   b. What did you file t [ before you read e]
   c. *Who [ t met you [ before you recognized e]]

However, a parasitic gap is licensed subject to the fulfilment of a sort of anti-c-command requirement. That is, a subject gap can license a parasitic gap which it does not c-command. See the following examples given in Chomsky (1986a) due to Longobardi, who observes that (70b) is better than (70a):

(70)  a. *a man who [ t looks old [ whenever I met e]]
   b. a man who [ whenever I met e] [ t looks old]
The anti-c-command requirement is met when the subject gap is more deeply embedded.

(71) a. which papers did John decide to tell his secretary [ t were unavoidable[before reading e]]

b. which papers did John decide [before reading e] to tell his secretary [t' [t were unavoidable]]

c. *which papers [ t were unavoidable [before you discovered e]]

Differing from earlier approaches to parasitic gap constructions which assumed that the gaps in a parasitic gap construction are bound by a common binder, Chomsky (1986a) argues that a parasitic gap construction involves at least two chains, a chain formed by the movement of an empty operator and another chain formed by the movement of the overt operator. The parasitic gap construction yields its interpretation by compounding the two chains into a single chain. To put this in more concrete terms, we get a structure like (72) for (69a).

(72) what did you file t [before [O[reading t]]]

In (72) (what, t) is the chain of the real gap and (0, t) is the chain of the parasitic gap. The operation of chain composition is stated as follows:
If \( C = (\alpha_1, \ldots, \alpha_n) \) is the chain of the real gap and \( C' = (\beta_1, \ldots, \beta_m) \) is the chain of the parasitic gap, then "the composed chain" \((C, C') = (\alpha_1, \alpha_n, \beta_1, \beta_m)\) is the chain associated with the parasitic gap construction and yields its interpretation.

Thus, in (72), \( C = (\text{what}, t) \) and \( C' = (0, t) \). The composed chain \((C, C') = (\text{what}, t, 0, t)\) is formed subject to a S-structure condition of 0-subjacency.

In (73), for chain composition to take place \( \beta_1 \) must be subjacent to \( \alpha_n \). Chomsky at a later point shows that the subjacency relevant for chain composition is 0-subjacency. Subjacency is stated as follows:

\[(74) \quad \text{If} \quad (\alpha_i, \alpha_{i+1}) \quad \text{is a link of a chain, then} \quad \alpha_{i+1} \quad \text{is subjacent to} \quad \alpha_i.\]

"Subjacent" here is to be understood as "1-subjacent". This notion is made clear by the definition of "n-subjacency" given in (75):

\[(75) \quad \beta \quad \text{is n-subjacent to} \quad \alpha \quad \text{iff there are fewer than} \quad n+1 \quad \text{barriers for} \quad \beta \quad \text{that excludes} \quad \alpha.\]

It follows from (75) that there should be fewer than \( 0+1 \) barriers for \( \beta \) that excludes \( \alpha \). In other words, there should not be any barrier such that it includes \( \beta \) but excludes \( \alpha \).
The intuitive sense is that in a composed chain \((C, C')\) each link of \(C\) and \(C'\) should satisfy the weak 1-subjacency condition in (74), as in any chain. Also, the two chains must be linked under a strong 0-subjacency condition.

Let us try to extend (73) to ATB facts. (68a) could conceivably have the following structure, admitting intermediate adjunctions:

(76)
We arbitrarily take the gap in the left conjunct to be the trace of who. Who first adjoins to VP₁, thereby voiding that barrier. We can assume that I' (an intermediate projection) and IP₃ (which is L-marked by and) are not barriers. But IP₁ (which is not L-marked) is a barrier and so is IP₀ (by inheritance). IP₁ cannot be adjoined to (as per our earlier hypothesis); IP₀ also cannot be adjoined to, because wh-phrases (quite generally) cannot adjoin to IP (as per a stipulation of Chomsky 1986a:32). So, who moves into SPEC, CP, crossing two barriers, resulting in a Subjacency violation.

In the right conjunct, the empty operator adjoins to VP₂. I' and IP₄ are not barriers (for reasons already given). IP₂ and IP₀ are barriers, and adjunction to them is not possible. If ₀ stays adjoined to VP₂ as shown in (76), we may ask: is chain composition possible? The empty operator must be ₀-subjacent to t₁. If IP₂ is a barrier which includes the empty operator and excludes t₁, then the answer is in the negative. (On the other hand, if there is some way of considering IP₀ and IP₂ as two "segments" of an adjunction-like structure, then this structure does not exclude t₁, and chain-composition may be possible.)
We have yet another (and a more fundamental) problem: How do the operators come out of the coordinate structure without violating Subjacency? When the two chains in the structure are examined independently, we see that both of them are ill-formed because of typical Subjacency effects. How come that the two chains when linked under the 0-subjacency condition produce a well-formed composed chain? Either our analysis of ATB gaps in terms of chain composition is to be rejected, or we have to find a better analysis for accommodating both ATB gaps and parasitic gaps. Another way of looking at the problem is to maintain that ATB gaps and parasitic gaps are different phenomena, but of course this line of thinking will be at the cost of generality.

3.3.5.3 Chomsky's analysis of parasitic gaps: The Problems

In this section we will show that Chomsky's (1986 a) analysis of parasitic gaps is not without problems. To begin with consider the contrast between (77a) and (77b) noted in Taraldsen (1981) and Kayne (1984).

(77) a. *a person [g, who [g [NP close friends [pp of e\_1 ]] [INFL: [VP admire me ]]]]
(77a) is a Subject Condition violation which can be accounted for in terms of the ECP. However, the sentence is better when a second gap is added. If (77a) is an ECP violation, then (77b) too should be an ECP violation. Let us see how Chomsky's (1986) analysis can get around this problem. See the structure of (77a) given in (78):

Consider first movement from within the PP adjunct. PP will not be a barrier after adjunction to PP. NP₁ will be a barrier since it is not L-marked. IP, though not a barrier
inherently, inherits barrierhood from NP₁. (Recall that adjunction of a wh-phrase to IP is not allowed in the Barriers framework.) Thus the extraction in (77a) is made crossing two barriers namely, NP₁ and IP (nodes shown as encircled in the tree). Hence the ungrammaticality of (77a), as expected.

The movement of the object NP does not create any additional problems. This should be so, else, extraction of the object NP would not be possible (cf. who did Mary hit e₁). Since this is the licensing gap the gap in the PP adjunct must be parasitic. Thus we get the following structure for (77b):

(79)
The empty operator moves and adjoins to the PP. It cannot move further since adjunction to NP or IP is not allowed. Who moves to the specifier position of CP through the VP-adjunction site. For chain composition to take place, the final term of the licensing chain should be O-subjacent to the head term of the parasitic chain. In other words \( e_2 \) should be O-subjacent to the empty operator \( O \). That is to say, there should not be any barrier which includes \( O \) but excludes \( e_2 \). In (79) \( e_2 \) is separated from \( O \) by a barrier, namely NP node of the Subject NP. Thus O-subjacency is not obtained. Obviously, the chain composition mechanism is to be supplemented with some kind of stipulation to account for data of this kind.

The analysis of parasitic gaps in terms of chain composition also fails to account for the paradigm (80), given in Chomsky (1982):

(80)  
\[
\begin{align*}
  a. & \ a \text{ man whom everyone who meets } e \text{ knows someone who likes } e \\
  b. & \ *a \text{ man whom everyone who meets him knows someone who likes } e \\
  c. & \ *a \text{ man whom everyone who meets } e \text{ knows someone who likes him}
\end{align*}
\]

The grammaticality of (78a) appears to be of a curious nature since it violates the Complex Noun Phrase Condition (CNPC)
as well as the Subject Condition. Notice that in the parasitic gap constructions we have examined so far, one of the gaps is due to a legitimate movement. It is the chain formed by this movement that licenses the other chain which is formed by an illicit movement. In fact it has been pointed out in this respect that such constructions differ from the ATB constructions since in the latter both the gaps are created by illicit extraction. But then, (80a) is different from normal parasitic gap constructions and is more or less akin to ATB constructions. See the structure of (80a) given in (81):

(81)

```
\[ NP \leadsto NP \rightarrow CP_1 \rightarrow C' \rightarrow IP_1 \rightarrow NP_1 \rightarrow CP_2 \rightarrow I \rightarrow VP \]
\[ \text{everyone who} \_1 \rightarrow C' \rightarrow V \rightarrow NP_3 \rightarrow CP_3 \rightarrow C' \rightarrow I' \rightarrow VP_2 \rightarrow V \rightarrow NP \rightarrow e_1 \rightarrow I' \rightarrow VP_3 \rightarrow V \rightarrow NP \rightarrow e_2 \rightarrow e_j \]
```
Suppose that $e^1_j$ is the trace left by the null operator and $e^2_j$ the trace of the overt operator. Then, $NP_1$ and $CP_2$ will be barriers for the null operator and $CP_3$ will be a barrier for the overt operator. In fact there is no way to nullify the barrierhood of $NP_1$ and $CP_2$ in the case of $e^1_j$ and $CP_3$ in the case of $e^2_j$ regardless of the question which of the two empty categories under consideration is that of the null operator or that of the overt operator.

3.3.6 Parasitic Gaps, ATB Gaps and RNR

Let us look at parasitic gap constructions and ATB constructions from a different point of view. We found that the chain composition analysis fails to account for parasitic gaps involving violation of island constraints. The same problem was confronted in the case of ATB construction which violated the CSC.

We assume that an operation other than chain composition is involved in parasitic gap constructions and ATB constructions. We claim that this operation is akin to RNR. In other words parasitic gap constructions and ATB constructions are derived from RNR. We propose that RNR involves a simple rule of copying followed by the deletion of identical material in syntactically parallel positions. A pre-requisite for the copying rule to apply is the occurrence of identical material
in syntactically parallel positions. The material which appears consecutively has some kind of marker on it suggesting its relative importance which triggers copying.

The copying rule proposed here is an adaptation of Postal's (1974) analysis wherein it is proposed that 'given certain paired sequences of identical constituents in disjoint clauses, RNR places a copy of the sequence on the right, by Chomsky-adjunction, and deletes all original occurrences.' Postal shows that schematically (82) is derived from (83):

(82) Jack may be, and Tony certainly is, a werewolf.

(83) i.

```
  S₁
 / \  \\
S₂  and  S₃
```

Jack may be [a werewolf]  Tony certainly is [a werewolf]

ii.

```
  S₀
 / \  \\
S₁  NP
 |   |
S  and  a werewolf
|   |
X [a werewolf]  Y [a werewolf]
```

∅  ∅
Let us see how parasitic gap constructions and ATB constructions can be analysed in terms of RNR. To begin with we will examine adjunct parasitic gaps. We claim that examples marked as (a) in (84-86) are derived from those marked as (b):

(84) a. \([CP \text{ which papers} \_i [IP I [VP \text{ filed } e\_i]]] [PP \text{ without reading } e\_i]]\]

b. I filed \(e\_i\) without reading \(e\_i\) [many papers] \(_i\)

(85) a. the grave \([CP [\text{ on which}] \_i [IP \text{ they} [VP \text{ placed } [NP \text{ stones} [PP e\_i ]]]] [PP \text{ before } [CP [IP we [VP \text{ placed } [NP \text{ flowers} [PP e\_i]]]]]]]]]

b. they placed stones \(e\_i\) before we placed flowers \(e\_i\) [PP on the grave] \(_i\)

(86) a. the girl \([CP [\text{ for whom}] \_i [IP I [VP \text{ bought } [NP \text{ perfumes} [PP e\_i]]]] [PP \text{ before } [CP [IP you [VP \text{ bought } [NP \text{ flowers} [PP e\_i]]]]]]]]]

b. I bought perfumes \(e\_i\) before you bought flowers \(e\_i\) [PP for the girl] \(_i\)

In the (b) examples in (84-86), the underlined material has been RNRaised. The (a) examples are derived from them by wh-movement.
Consider now the subject parasitic gaps. We claim that they too are derived from RNR constructions. See the examples below:

(87) a. [NP a man [CP [to whom]i [IP [IP to give an inch e₁] [VP is to give a mile e₁]]]]
b. to give an inch [pp e₁], is to give a mile [pp e₁] [pp the man i]

(88) a. [NP the man [CP that i [IP everyone [CP who i [VP gives [NP presents to [NP e₁]]]]] [VP likes [NP e₁]]]]
b. everyone who gives presents to e₁ likes e₁ [NP the man i]

(89) a. [NP John [CP whom i [IP [NP [IP PRO [VP to know e₁]]] [VP is [NP [IP PRO [VP to like e₁]]]]]]
b. to whom e₁, is to like e₁ [NP John i]
Here again the underlined material has been RN\textsuperscript{R}aised and then wh-movement has taken place to yield the (a) examples in (87-89).

ATB constructions are also derived from RNR constructions. Consider the following examples:

(90) John who Bill saw and Mary likes

(91) John who saw Bill and likes Tom

The structure of (90) is given in (92a) which is derived from (92b). (92b) is a RNR construction. (91) will be generated by conjoined VP's as can be seen in (93):

(92) a. $[\text{NP } \text{John} [\text{CP who} [\text{IP} [\text{IP and} [\text{IP Bill saw } e_1]]]]]

b. $\text{Bill saw } e_1, \text{ and Mary likes } e_1, \text{ John}_1$

(93) $[\text{NP } \text{John} [\text{CP who} [\text{IP } t [\text{VP}_0 [\text{VP}_1 \text{ and} [\text{VP}_2 \text{ saw Bill }]]]]]

[\text{VP}_3 \text{ and} [\text{VP}_4 \text{ likes Tom }]]]]]]$

3.3.6.1 RNR: The issues and solutions

RNR constructions involve three major issues. These are:

i) Does RNR obey Island Constraints?

ii) Is the RN\textsuperscript{R}aised string a constituent?

iii) What is the nature of the parallelism requirement for RNR?
The first question implicitly has to do with the controversial issue, namely: does RNR involve Move C? Ross (1967) assumed RNR to be a transformation rule which he formulated as Conjunction Reduction. The transformational approach has been maintained in a number of later works such as Tai (1969), Grosu (1976), Hankamer (1972), Postal (1974), Maling (1972), to mention a few. Gazdar (1981) has arguments against the transformational account of RNR. Levine (1985) has argued that RNR is a non-raising rule. Oirsouw (1987) proposes a deletion account of RNR. Erteschik-shir (1987) has attempted to account for RNR facts in terms of Williams' (1978) "simultaneous factorization" in the ATB format.

Wexler and Culicover (1980) argues that 'RNR is a deletion transformation that applies to the right branches in left conjuncts, that is immediately before the conjunction.' According to them there is no true movement in the RNR construction and in support of this claim they produce examples like the following:

(94) Mary buys, and Bill knows a person who sells, pictures of Freud.

(95) Mary knows a man who buys, and Bill knows a man who sells, pictures of Freud.
(94) and (95) show that RNR violates Island Constraints. In
(94) the RNR material originates in a relative clause in
one conjunct; in (95) both conjuncts contain relative clauses
from which the RNR material has originated. If the judgements
as to the grammaticality of (94) and (95) holds true, then
we have reason to believe that RNR is not an instance of
Move $\infty$.

The "in situ" behaviour of the RNR constituent in the
sense that the raised constituent in effect is simultaneously
present in all of its associated conjuncts has been investi-
gated in a few works such as Wexler and Culicover (1980),
instance Levine (1985) assumes that the RNR constituent behaves
as though it is still positioned in each of the conjuncts.
In support of this view he invokes the "pronominalization
constraint" proposed in Reinhart (1981) and shows that the
RNR element is sensitive to this constraint since 'it is
present in some sense in the phrase structure sites from
which it appears to have been displaced.' Some of his
examples are given below:

(96) a. *(I know that) she$_1$ said ___ and I happen to
agree ___ that Mary$_1$ needs a new car.

b. (I know that) Mary$_1$ said ___ and I happen to
agree ___ that she$_1$ needs a new car.
(97)  a. *She₁ disliked, and I hated, that picture of Mary₁
     b. Mary₁ disliked, and I hated, that picture of her₁

(98) Though he₁ was polite, Mary knew ___ and though he₁ seemed generous, Tom suspected ___ that John₁ was operating from dubious motives.

Levine argues that, given Reinhart's story of pronominal reference,⁴ a pronoun anywhere in either conjunct can be coreferential with any NP in the Raised Node since the c-command domain of the pronoun in either conjunct does not include the Raised node. But this prediction does not hold in examples (96-98). In (96-97) the (a) examples are starred because the pronoun would c-command the NP in in the Raised constituent if the latter filled its gap in the conjunct(s). (98) is good because even if the Raised constituent filled the gap, the pronoun would not c-command the NP.

In response to Levine's observation we want to point out that the "in situ" behaviour of the RNR material is not a special problem for our analysis. See the example (99):

(99) Himself₁ I think John₁ hates t₁
Given Chomsky's base-generation "in situ" of Topics, *himself* is not c-commanded by John. Yet it behaves as if it is in the position of its trace as far as the binding theory goes.

Another controversial issue is whether the RNRaised material is a constituent or not. Postal (1974) uses RNR as a test for constituency. Hankamer (1972) suggests that only if not all constituents may undergo RNR. Bresnan (1973, 1976) argues that RNR is a sufficient but not a necessary test for constituency. Abbot (1976) and Grosu (1976) have arguments refuting Postal's claim. Again, Erteschik-shir (1987) treats the RNR item as a constituent. Let us consider some of the examples discussed in Abbot (1976) cf. (100-103):

(100) Smith loaned, and his widow later donated, a valuable manuscript to the library.

(101) I borrowed, and my sister stole, large sums of money from the Chase Manhattan Bank.

(102) Leslie played, and Mary sang, some C&W songs at George's party.

(103) Mary baked, and George frosted, 20 cakes in less than an hour.

Abbot notes that sentences like (100-103) are inconsistent with any claim that RNR produces structures in which all material to the right of the conjoined portions form a single constituency.
Comparing certain acceptable and unacceptable examples, Abbot hypothesizes that the relative ungrammaticality of some RNR sentences is not so much a result of constituent structure, but is caused instead, by factors that make processing difficult. The unacceptability of certain RNR sentences may be due to the fact that they are stylistically clumsy and syntactically inappropriate examples. For instance, 'if a material which is relatively unimportant or 'light' is raised, the output might become clumsy or inappropriate.

Based on the examples discussed in Abbot (1976) we assume that RNRed material need not form a single constituent.

We have already pointed out that there is a parallelism requirement for RNR to apply. The copying rule applies only if there is identical material in syntactically parallel positions in two or more clauses which are linked in a natural way. The RNR material lies in the right periphery of the clauses (in English). The occurrence of identical material in two or more clauses simply does not guarantee copying; such material should be in syntactically parallel positions. See (104):

(104) *Mary buys ___ and ___ are beautiful, pictures of Freud.

The subject/object asymmetry of ATB examples also illustrate this point (cf. 105):
It may appear that our analysis of ATB constructions in terms of RNR faces a problem with ATB constructions involving subject gaps in embedded clauses such as (106):  

(106) Who does John believe ___ loves Mary and Peter believe ___ loves Jane?  

In our analysis (106) must be derived from its RNR source in (107):  

(107) *John believes ___ loves Mary and Peter believes ___ loves Jane, Bill  

But here, though we get ATB extraction, RNR is not possible.  

This problem can be tackled by stipulating that RNR is a bi-directional copying rule allowing identical material to be copied to the right or to the left of the string depending on the position in which it originates. Thus subject material will be copied on to the left and VP material will be copied on to the right. Accordingly, the RNR source of (106) will be as in (108):
We get a similar situation in constructions involving incomplete VP deletion, discussed in Jayaseelan (1986). Jayaseelan invokes the following principle for adjunction:

(109) The direction of adjunction (by Heavy NP Shift) mimics the direction of government.

Based on the above principle he argues that the constituent from the VP is right-adjointed to \( S \), and the subject is left-adjointed to \( S \). Thus, (110) will have its underlying structure as in (111), which is the input to deletion.

(110) John loves Mary, and Bill Jane.

(111) \[ S \text{John}_1 [S \text{t}_1 \text{loves t}_j \text{Mary}_j], \text{and} \]

\[ S \text{Bill}_k [S \text{t}_k \text{loves t}_l \text{Jane}_l] \]

The innermost \( S \) of the second conjunct is deleted under identity with the innermost \( S \) of the first conjunct.

This suggests that what is relevant for copying is the directionality of government and not the position of the RNR material in a string. Thus material in the subject position will be copied on to the left and material in the
object position will be copied on to the right (cf. Malayalam facts given in Chapter 4).

We conclude this chapter by noting that the directionality principle in the copying (in RNR), which we have just adduced, readily accounts for the parallelism requirement in ATB extractions. Cf.

(112) John who ___ loves Mary and ___ hates Bill.
(113) John who Mary loves ___ and Bill hates ___
(114) *John who ___ loves Mary and Bill hates ___
(115) *John who Mary loves ___ and ___ hates Bill.

The last two sentences will not have an RNR source since the subject NP must be RN-Raised to the left of the conjuncts and the object NP must be RN-Raised to the right of the conjuncts.

...
NOTES

1. However, we differ in judgement as regards the acceptability of (7d).

2. In the case of government, but not in the case of movement, a Minimality Condition also applies. This in effect says that a closer governor prevents a more remote governor from governing an element. Since we are only concerned with movement, we shall not be making use of the Minimality Condition.

3. There is a small wrinkle here, namely the (apparently irrecoverable) deletion of for in for which. The problem (however) does not seem to be only ours. Thus (e.g.), in Epstein (1984), it is persuasively argued that the PRO subject of the embedded clause in (1a) gets its so-called "arbitrary" reading because it is controlled by a pro with the interpretation of a universal quantifier in an underlying structure like (1b):

(i) a. It is difficult to leave.
   
   b. It is difficult for pro [PRO to leave]

The for here is apparently never realized lexically because its complement is lexically null.

4. There is some evidence which suggests that all A'-bound empty categories need not be variables, cf. Kayne (1982), but we leave this aside for the moment.
5. Reinhart (1981) defines the concepts c-command and domain as follows:

i. A node A c-commands a node B iff the branching node $\alpha_I$ most immediately dominating A either dominates B or is immediately dominated by a node $\alpha_C$, which dominates $\beta$, and $\alpha_C$ is of the same category type as $\alpha_I$.

ii. The domain of a node A consists of all and only the nodes c-commanded by A.

iii. A given NP cannot be interpreted as coreferential with a distinct non-pronoun in its c-commanding domain.

6. Abbot proposes a derivation for examples like these (cf. 103) that would allow RNR to apply only to a constituent. In (103), the final sentence adverb starts out attached to the conjunction as a whole, as shown in (1).

(1)
Abbot shows that example (103) (as shown in (i)) provides an argument for such a derivation of the adverb to the sentence as a whole more accurately than a structure in which duplicate adverbs are attached, one to each conjunct. The sense of (103) is that the bakings and frostings were accomplished in less than an hour. Moreover, she holds that this form of derivation allows the possibility of constituenthood of stranded sequences in RNR sentences. The claim made in Abbot (1976) precisely, is that the final constituent of any clause may be raised.