4 The Syntax of *Wh*-in-Situ

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1 ISLAND VIOLATIONS AND THE PIED-PIPING HYPOTHESIS

It is by now well known that *wh*'s-in-situ fail to exhibit the full range of island effects that characterize syntactic *wh*-movement. This is illustrated by the contrasts here:

(1) a. *What do you remember where we bought t?
    b. Who remembers where we bought what?

(2) a. *Who do you like books that criticize t?
    b. Who likes books that criticize who?

(3) a. *Who do you think that pictures of t are on sale?
    b. Who thinks that pictures of who are on sale?

(4) a. *Who did you get jealous because I spoke to t?
    b. Who got jealous because I spoke to who?

(5) a. *What color hair did you meet [students with t]?
    b. Who met [students with what color hair]?

The (a) sentences illustrate the effects, under overt *wh*-movement, of the Wh Island Condition, the CNPC, the Subject Condition, and the Adjunct Condition. In the corresponding multiple questions in (b), a *wh*-in-situ occurring in an island can be construed with a *wh*-phrase in the matrix COMP outside the island. A similar contrast also obtains with respect to the Coordinate Structure Constraint:

(6) a. *Who did you see John and t?
    b. ?Who saw John and who?

Under the LF movement hypothesis, these contrasts led Huang (1982) to conclude that the bounding conditions, subsumed under Subjacency and the Condition on Extraction Domains (CED), apply only to syntactic instances

of Move α, but do not affect movement in LF, though the ECP does apply at LF (in addition to S-Structure) ruling out examples like those starred in the following:

(7) a. Why did you buy what?
     b. *What did you buy why?

(8) a. Who bought what?
     b. *What did who buy?

(9) a. *Who left why?
     b. *Why did who leave?

The apparent irrelevance of the bounding conditions in LF is further evidenced by the grammaticality of Chinese singular questions akin to the (a) sentences in (1)–(6).

(10) ni xiang-zhidao [shei mai-le   shenme]?
      you wonder   who bought what
      '*What do you wonder who bought?'

(11) ni zui xihuan [piping   she de shu]?
      you most like criticize who REL book
      '*Who do you like books that criticize?'

(12) ni renwei [shei-de hua   zui   piaoliang]?
      you think whose picture most pretty
      '*Who do you think that pictures of are most pretty?'

(13) ni [yinwei wo shuo-le shenme] er   bu gaoxing?
      you because I said   what   then not happy
      '*What are you unhappy because I said?'

The general nature of the absence of island effects in LF is further evidenced by the fact that LF movement may cross more than one island. Thus, in contrast to the doubly ungrammatical (14a) and (15a), the sentences (14b), (15b), and (16)–(17) are well-formed:

(14) a. **Who do you remember where we bought books that criticize t?
      b.   Who remembers where we bought books that criticize who?

(15) a. **Who do you remember where pictures of t are on sale?
      b.   Who remembers where pictures of who are on sale?

(16) [Zhangsan nian [shei xie   de shu]] zui   heshi?
Zhangsan read   who write REL book most appropriate
'*That Zhangsan read the books that who wrote is the most
appropriate?'
(Who is the x such that it is most appropriate for Zhangsan to read
the books that x wrote?)

(17) ni   zui   tongqing [bei [shei xie   de shu] piping   de   ren]?
you most pity   by   who write REL book criticize REL person
'You sympathize most with persons that are criticized by books that
who wrote?'
(Who is the x such that you sympathize most with the persons who
are criticized by the books that x wrote?)

However, the conclusion, though not implausible, raises the question of
what makes the syntactic and LF components different in this way. The
hypothesis remains a stipulation as long as it is not related to other, inde-
pendently established properties of LF.

A solution to this problem was proposed in Choe (1987), Nishigauchi
(1985), Pesetsky (1987b), and Longobardi (1991). In cases where a n+on-D-
linked *wh*-phrase appears to violate Subjacency or the CED, it was proposed
that the relevant LF movement pied-pipes the entire island in which the *wh*-
phrase occurs, but does not move it out of the island. A piece of very interesting
evidence comes from the fact that, in Japanese and Korean, a question with a
wh-phrase in a complex NP is often not given an answer that specifies the value
of the *wh*-word alone, but requires one that at least repeats the other materi-
als in the island. This requirement also obtains in Chinese. Thus, the Chinese
question (18) can have (19a) and (19b) as possible answers, but not (19c):

(18) ni xihuan [shei xie   de shu]?
you like   who write REL book
'*You like the book thai who wrote?'

(19) a. wo xihuan [Zhangsan xie   de shu].
I like   Zhangsan write REL book
'I like the book that Zhangsan wrote.'

   b. Zhangsan xie de (shu).
'The book (or the one) that Zhangsan wrote.'

   c. ??Zhangsan.

The requirement of (19b) as a minimal answer seems to indicate that (18) is
a question concerning the identity of the book (in terms of the identity of its
author), but not a question that directly concerns the identity of the author
alone. That is, it seems that the relevant "*wh*-phrase" to undergo move-
ment in LF is the entire complex NP that contains *shei*, and not *shei* alone.

A mechanism of feature percolation is proposed in Nishigauchi (1985) (cf. Longobardi 1991) to execute this idea, whereby the entire island in (18) is treated as having the feature [+wh] that matches the [+wh] feature of the COMP to which it moves. Since the *wh*-word *shei* is not moved out of the island, no violation of Subjacency actually happens, despite appearances to the contrary. According to the pied-piping hypothesis, then, both syntactic movement and movement in LF obey island constraints. The problem concerning the supposed Syntax-LF asymmetry disappears, a strict correspondence between the two components is established, and the existence of syntactic movement in LF receives further support.

2   PROBLEMS WITH THE PIED-PIPING HYPOTHESIS

Attractive as it appears, however, the pied-piping hypothesis raises important problems that seem to cast serious doubt on its correctness as a key to the Syntax-LF asymmetry. In the first place, as Huang (1982) had already pointed out (in discussing it as a straw man then), the pied-piping hypothesis runs counter to superiority facts. To see this, first note that the following contrasts are quite clear and systematic:

(20) a *Where did [people from t] buy what?
      b. What did [people from where] buy t?

(21) a. *Who did [pictures of t] please who?
      b. Who did [pictures of who] please t?

The ill-formedness of the (a) sentences shows that overt movement out of a subject is blocked (by the CED). The (b) sentences, on the other hand, show that movement from the same position in LF does not show CED effects. In order to maintain CED (or Subjacency) as a valid condition in LF, the pied-piping hypothesis claims that movement to COMP actually involves the entire subjects *pictures of who* and *people from where*. Making this move does not help, however, because the LF structures resulting from such movement should be the same as those of (22), but the latter are, of course, ill-formed.

(22) a. *What did who buy?
      b. *Who did what please?

Similarly, the contrast between (23) and (24) with respect to the Adjunct Condition cannot be attributed to an LF movement that pied-pipes the entire adjunct island in (24), given the ill-formedness of (25):

Who did you get angry because I spoke to t?

(24)   Who got angry because I spoke to who?

(25)   *Who got angry why?

A similar conclusion can be reached in Italian, as Luigi Rizzi has remarked to us in personal communication. In Italian, a *wh*-in-situ is disallowed in the preverbal subject position of an adjunct clause (26a), but not if it is property contained in a subject in such a position (26b):

(26) a. *Questo e' successo mentre chi parlava alla stampa?
      'This happened while who was speaking to the press?'

   b. ??Questo e' successo mentre l'avvocato di chi parlava alla stampa?
      'This happened while the lawyer of whom was speaking to the press?'

Although the marginal status of (26b) might be taken to be an effect of CED, there is independent evidence that this is not the case. The following contrast shows that if a *wh*-in-situ is not in final position, the structure is somewhat deviant:

(27) a. Gianni e' stato arrestato mentre andava a Milano con chi?
      'Gianni was arrested while he was going to Milan with who?'

   b. ??Gianni e' stato arrestato mentre andava con chi a Milano?
      'Gianni was arrested while he was going with whom to Milan?'

A CED explanation of the marginality of (27b) of course would not distinguish it from (27a). This contrast may be explained by the fact that the *wh*-in-situ must be focal, and the natural focus position in Italian is the sentence final position. If so, the marginality of (26b) can be explained on a par with (27b), without invoking the CED.

    Further indication of the lack of CED effects is given by the fact that overt extraction from the postverbal subject of a non-ergative verb is disallowed, but the corresponding *wh*-in-situ is possible:

(28) a. *Di chi parlava [l'avvocato t]?
      'Of whom spoke the lawyer?'

   b. Questa e' successo mentre parlava l'avvocato di chi?
      'This happened while was speaking the lawyer of whom?'

The idea of pied-piping would not help in these cases to avoid the conclusion that CED does not hold in LF. Consider (26a, b) and (28b): if the phrase *l'avvocato di chi* 'the lawyer of whom' is pied-piped alone, CED is still violated when the phrase is extracted from the adverbial clause; if it was possible to simply pied-pipe the whole adverbial clause into the main COMP, with no further movement needed, there would be no explanation

of the ill-formed (26a). Finally, if the phrase *l'avvocato di chi* 'the lawyer of whom' could be moved to the COMP of the adverbial clause and then the adverbial clause could be moved to the main COMP, we would have no way to distinguish (26a) from (26b): either both would violate ECP or neither would.

A second type of problem that argues against the pied-piping hypothesis has to do with the fact that it does not appear to be applicable to the whole range of island violations observed in LF. If the requirement of repeating all the material in an entire island in an elliptical answer is taken to be symptomatic of pied-piping, then the impossibility of using such an elliptical answer suggests that no pied-piping takes place. Now, contrary to those cases where a *wh*-word is contained in a relative clause (or as a possessive NP), the most natural elliptical answer to a question whose *wh*-word occurs in a sentential subject or adverbial clause is one that spells out the value of the *wh*-word alone:

(29) [shei kan zheben shu]   zui   heshi?
     who read this   book most appropriate
     Lit.: 'That who read this book is most appropriate?'

   a. *Zhangsan kan zheben shu.
      'That Zhangsan read this book.'

   b. Zhangsan.

(30) zhe jian shi [gen shei lai-bu-lai] zui you guanxi?
     this thing is with who come-or-not most have relation
     Lit.: 'This thing is most related to whether who will come or not?'

   a. *Gen Lisi lai bu lai.
      'With whether or not Lisi will come.'

   b. Lisi.

If pied-piping is not involved in these sentences, then it is not clear how CED can be maintained in LF. What we can conclude from this is that although certain facts about elliptical answers indicate that pied-piping may occur with some questions, this strategy does not provide a real answer to island violations.[1]

A third consideration that casts doubt on the pied-piping hypothesis is that certain scope facts require a *wh*-word in an island to occur, at the LF level, outside of the island. This is at variance with the pied-piping hypothesis, which attempts to preserve island conditions in LF by the assumption that the *wh*-word never leaves the island. Consider first the following sentence:

(31) Who did everybody see a picture of t?

This sentence contains three quantificational noun phrases whose scope order, under a natural reading, may be *who > everybody > a picture of t* (Who is the person x such that everybody saw one picture or another of x?). Since the *wh*-phrase and the existential quantifier are separated in scope order by the universal, they do not occur as a constituent at LF. A similar situation arises in (32), where the scope order may be *who > most people > every picture of t*:

(32)   Who did most people like every picture of t?

The significance of these facts will be obvious when we consider the following Chinese sentences:

(33)   meige ren dou mai-le [yiben [shei xie   de] shu]?
         every man all   bought one   who write REL book
         'Everybody bought a book that who wrote?'

(34)   daduoshude ren   dou mai-le [[shei xie   de] meiben shu]?
         most   man all   bought who write REL every   book
         'Most people bought every book that who wrote?'

The only significant difference between the Chinese sentences and their English counterparts is that here a *wh*-in-situ, *shei*, occurs within a relative clause headed by a QNP. The range of possible scope interpretations is identical to that of the corresponding English sentences. Thus (33) has the interpretation "Who is the person x such that everybody bought one book or another that x wrote?"—an interpretation according to which 'who' occurs in a position at LF separated from 'a book that x wrote,' with 'everybody' intervening between them. And (34) has the interpretation "Who is the person x such that most people bought every book that x wrote?" These facts are inconsistent with the fundamental claim of the pied-piping hypothesis.

An additional problem posed by sentences like (33)–(34) is what an operator like *every book that who wrote* is supposed to mean. The pied-piping hypothesis implies that it is a *wh*-operator that would be existential in nature (Karttunen 1977), but it is also clear that the entire NP is a universal quantifier. A standard view about such a phrase is, of course, that we have two independent QNPs here, a [+wh] existential quantifier and a universal quantifier. Furthermore, since the [+wh] quantifier must take clausal scope, it must have scope over the universal that dominates it. In other words, such phrases are standard cases of "inversely-linked quantification" of the type discussed in May (1977).[2] That is, the *wh*-word occupies a scope position external to the universally quantified phrase that contains it.

We have seen several empirical problems with the pied-piping hypothesis. There is also a fundamental problem of a more theoretical sort. Any

assumption of LF pied-piping inevitably leads to the question of its relationship to syntactic pied-piping. Although there exists a fairly wide range of possibilities for pied-piping in syntax, the possibilities vary considerably by construction. Appositive relatives seem freest in allowing large amounts of material to be pied-piped. At the opposite extreme are embedded questions, which allow very little pied-piping. The restrictions on pied-piping in embedded questions are illustrated in the following:

(35) a. I wonder who Bill spoke to.
     b. ?I wonder to whom Bill spoke.
     c. I wonder whose mother Bill spoke to.
     d. I wonder whose friend's mother Bill spoke to.
     e. *I wonder pictures of whom Bill saw.
     f. *I wonder Mary and whom Bill saw.
     g. *I wonder the books that who wrote Bill bought.
     h. I wonder which man Bill saw.

It seems that only specifiers may trigger pied-piping in these cases. In particular, except for those constructions that fall under Ross's Left Branch Condition, pied-piping of an entire island is strictly disallowed in both embedded and direct questions. Even in appositives, pied-piping of the sort shown in (35f) and (35g) is impossible:

(36) a. *John, Mary and who came yesterday, . . .
     b. *John, the books that who wrote sold very well, . . .

The LF pied-piping hypothesis must assume that LF pied-piping of a [+wh] phrase into COMP is radically different from syntactic pied-piping. But unless there is a principled reason for this radical difference, the problem concerning the (partial) Syntax-LF asymmetry is simply reassigned: it is not presence or absence of Subjacency or CED, but rather, absence or presence of unconstrained pied-piping. The asymmetry remains.

3.   AN ALTERNATIVE

Having argued against pied-piping as an explanation for the Syntax-LF asymmetry, we wish to indicate our agreement with its proponents that the strategy to derive the asymmetry from something else is both methodologically sound and theoretically desirable. Although pied-piping does not seem to be the correct answer, something else might allow one to achieve that goal. We will now show that there are, in fact, independent properties of grammar that explain this asymmetry.

Chomsky (1986a), citing Torrego (1985), notes that a phrase that is moved to (SPEC of) COMP does not constitute a barrier for movement of

an element contained in that phrase. In the following Spanish example, *del que* 'by whom' has been extracted from the NP *que libros del que* 'what books by whom,' which had been moved into the lower COMP:

(37)   este es el autor [del que]$_i$ no sabemos [$_{CP}$ [que libros t$_i$] leer].
       'This is the author [by whom]$_i$ we know [$_{CP}$ [what books t$_i$] to read].'

This poses a problem for the CED, since extraction of *del que* has taken place from a phrase in COMP that is, under normal assumptions, not properly governed. Similarly, although extraction from within a subject is impossible (as predicted by the CED), this impossibility is overcome once the subject is itself moved to COMP. This is shown by the contrast shown below:

(38)   * esta es la autora [de la que]$_i$ [$_{IP}$ [varias traducciones t$_i$] han ganado
         premios internacionales].
         'This is the author by whom several translations have won
         international awards.'

(39)   [de que autora]$_i$ no sabes [$_{CP}$ [que traducciones t$_i$] han ganado premios
         internacionales].
         'By what author don't you know what translations have won
         international awards?'

A similar contrast is also observable in English:

(40)   a. *Who do you think that [$_{IP}$ [pictures of t] are on sale]?
       b. ?Who do you wonder [[which pictures of t][are on sale]?

To account for these exceptions to CED, Chomsky (1986a) stipulates, under the *Barriers* system, that if A theta-governs B, then A also L-marks the specifier of B. In the example (40b), *wonder* theta-governs CP, so the phrase *which pictures of t* is characterized as being L-marked, and therefore not a Blocking Category (BC) or a barrier for movement. The SPEC of CP therefore does not exhibit CED effects. The subject *pictures of t* in (39) is not L-marked, since it is the SPEC of IP that is not theta-governed. The matrix verb *think/wonder* theta-governs CP in both (40a–b), not IP.

   The CED effects seem to be weakened in more than the SPEC of CP position. Lasnik and Saito (1992) have observed that the following sentence is better than (40a):

(41)   ?Who do you suggest that pictures of t I should buy?

Compare also:

(42) a. *Vowel harmony, I think that articles about t have been published.
      b. ?Vowel harmony, I think that articles about t, you should read
          carefully.

These sentences show that a topicalized phrase does not block extraction
as much as a subject does. This fact suggests that Chomsky's stipulation in
terms of SPEC L-marking is not general enough. What is significant about
these sentences is that the phrases that do not block extraction are phrases
in A'-positions. Regardless of how it might be derived in a more principled
way, we might propose the following as a generalization (cf. Lasnik and
Saito, 1992):[3]

(43) α is a barrier only if it is not an A'-binder.

There is, in fact, already something available in Chomsky's system to
achieve the effect of (43), as Wayne Harbert has independently pointed out
to us. A vital assumption in Chomsky's (1986a: 6) framework is the follow-
ing condition on adjunction operations:

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

This condition limits, in the basic cases, adjunction sites to the two cat-
egories IP and VP. The condition is needed to block certain unwanted but
potentially possible successive-cyclic adjunctions that would otherwise ren-
der the entire system vacuous. Chomsky (1986a) further reasons that (44)
may be derived from considerations of Theta Theory. Regardless of its ori-
gin, suffice it to say that (44) also admits topicalized phrases and phrases in
COMP (both being nonarguments) as possible adjunction sites.
    Chomsky's theory of adjunction is related to another property of the
Barriers framework: the "segment theory of domination" originally pro-
posed by May (1985):

(45) α dominates β iff every segment of α dominates β.

This definition of "dominates" has consequences for adjunction structures
only. In a non-adjunction structure, a node contains exactly one segment.
But an adjunction structure like . . . [$_α$ β [$_α$ . . .]] . . . is said to have a single
node α consisting of two segments, but does not contain two nodes of the
type α. In this structure, β is not dominated by α (nor excluded by the lat-
ter). This, together with the theory of barriers, which refers to an element
included (dominated) by a category and another element excluded by it,
makes it possible to extract something from a barrier by successive adjunc-
tion. That is, by first adjoining β to α before further moving it out, one can
cross a node by crossing "half" of it at a time. A phrase that is a possible

adjunction site thus is not a barrier for movement. More specifically, sentence (40b) may be more thoroughly represented as follows:

(46)   Who$_i$ do you wonder [$_{CP}$ [$_{NP}$ t$_i$ [$_{NP}$ which pictures of t$_i$]][$_{IP}$ are on sale]]?

First, the subject *which pictures of who* is moved into the embedded COMP; since it is now a nonargument, it becomes a possible adjunction site, by (44). This allows *who* to be adjoined to it and then moved into the higher COMP, without crossing a whole barrier node at any time. The relative acceptability of (40b) thus follows. In the rest of this section we will exploit this aspect of the *Barriers* framework and the facts represented by generalization (43), and show that the problem of Syntax-LF asymmetry can be accounted for, under an appropriate semantics of quantification and syntax of scope.

Consider first the following sentence, which poses a problem for Subjacency (more specifically CED) under the system developed in May (1977):

(47)   Pictures of everybody are on sale.

Example (47) allows the QNP *everybody* to have scope over the entire sentence, meaning that for each person x, pictures of x are on sale. The LF representation of (47), given below, together with the application of QR that derives it, violates the CED:

(48)   [$_s$ Everybody$_i$ [$_s$ [$_{NP}$ pictures of t$_i$] are on sale]].

Under the *Barriers* system, nothing we have discussed up to now solves the problem either. This is because the NP *pictures of t* occurs in subject position and is therefore not a possible adjunction site, but the sentence does not exhibit Subject Condition effects. The key to the problem, we propose, is that in the sentence (47), not only may QR affect *everybody*, it can also affect the containing NP *pictures of everybody*: that is, both of them may be considered QNPs. The NP *everybody* is of course quantificational, ranging over individuals, say {John, Bill, Mary}. But *pictures of everybody* can likewise be considered a QNP ranging, in this case, over {John's pictures, Bill's pictures, Mary's pictures}. At least nothing seems to prevent such a construal, nor the application of QR adjoining *pictures of everybody* to IP in (47), resulting in (49):

(49)   [$_{IP}$ [$_{NP}$ pictures of everybody][$_{IP}$ are on sale]].

This will enable the smaller QNP *everybody* to be adjoined, under QR, first to *pictures of everybody*, then to the higher IP, with neither steps of adjunction crossing any barrier at all. The fact that scope interpretation of *everybody* does not show CED effects thus follows without any stipulation

that restricts CED from applying in LF. The well-formedness of the follow-ing sentences follows in the same way:

(50)   Who did pictures of who please?

The NP *pictures of who*, though not itself a [+wh] operator that directly moves into a [+wh] COMP (given the strict conditions on pied-piping noted earlier), can nevertheless be analyzed as a [-wh] QNP (ranging over, again, {John's pictures, Bill's pictures, Mary's pictures}) that falls under the domain of QR. IP-adjunction of this QNP will then enable the *wh*-in-situ to be adjoined to it and then moved into the COMP.

Under our proposal, the contrast between the well-formed (50) and the ill-formed **Who did pictures of t please you?* follows from the fact that *pictures of who* in (50) can be IP-adjoined at LF but not at S-Structure. This in turn follows from the fact that QR (as an instance of IP-adjunction) is a rule of LF, not of Syntax. This also follows from a stipulation made in Chomsky (1986a) that allows VP-adjunction but disallows IP-adjunction of *wh*-phrases, though we suspect that there may be a way to derive this as a theorem. More generally, we may assume that IP-adjunction in LF is equivalent to QR, which affects any expression that is quantificational in nature. On the other hand, if IP-adjunction happens in the Syntax, it is identified as a case of topicalization. That the subject *pictures of t* in **Who did pictures of t please you?* cannot have been IP-adjoined in Syn-tax presumably follows from the general impossibility of vacuous subject topicalization (**John, came*, cf. note 3). In addition, certain restrictions exist that prevent "weak" NPs (Barwise and Cooper 1981) that are in focus from being topicalized. Thus, while strong NPs *like every picture, most people*, and *that book* are topicalizable, weak NPs like *wh*-phrases are not:

(51)   ?I believe that every picture, he has seen.

(52)   ?I hope that most of the books, you will like.

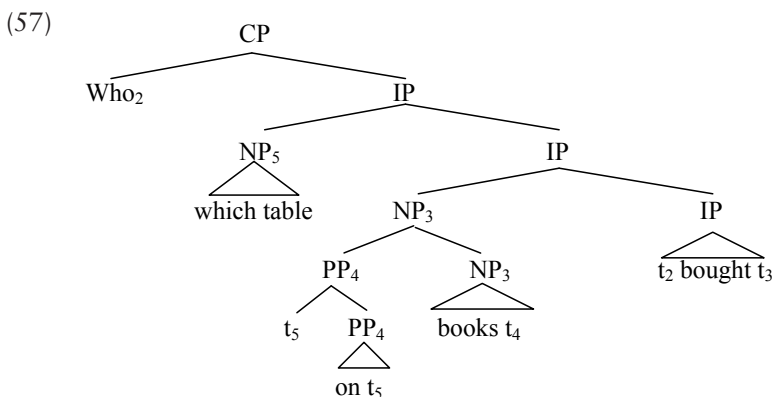(53)   *Who said that which pictures, you took?

(54)   Who thinks that what, you will buy?

It is also well known that embedded topicalization structures are rela-tively marked (cf. Emonds 1976; also Hooper and Thompson 1973). All these combine to reduce the possibilities of S-Structure IP-adjunction, and explain why apparent violations of island constraints are much more wide-spread in LF than in Syntax.

Let us turn now to examples pertaining to other island constraints. Con-sider the contrast shown in (55) and (56):

(55) a. *What color hair did you meet [many students with t]?
    b. Who met [many students with what color hair]?

(56) a. *Which table did you buy [the books on t]?
    b. Who bought [the books on which table]?

Each of the (a) sentences is ruled out by CED, since a *wh*-phrase has been extracted out of an adjunct modifier of the object NP, crossing two barriers (the adjunct PP node, and the object NP node that inherits barrierhood from it). The grammaticality of the (b) sentences follows in the following way. In (56b), for example, the object NP *books on which table* may be IP-adjoined under QR. This creates a nonargument position that enables the PP *on which table* to be adjoined to it. In turn, the NP *which table* may be adjoined to this PP, and then moved into COMP:

(57)

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                            CP
             ┌──────────────┴──────────────┐
           Who₂                            IP
                          ┌─────────────────┴──────────────┐
                        NP₅                                IP
                        /△\               ┌────────────────┴──────────┐
                   which table          NP₃                          IP
                                   ┌──────┴──────┐                   /△\
                                 PP₄           NP₃              t₂ bought t₃
                                 / \           /△\
                               t₅   PP₄     books t₄
                                    /△\
                                  on t₅
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In postulating that PP_4 may undergo adjunction, we consider it a quantificational expression ranging over some appropriate PP meanings, e.g., {on this table, on that table, on the long table, etc.}. Similarly, in the case of a *wh* word occurring in an adjunct clause, as in *Who got angry because I talked to who?*, the entire *because*-clause may be IP-adjoined, as it ranges over, say, {because I talked to Mary, because I talked to Jane, etc.}. In the case of *Wh* Island violations, as in *Who remembers where we bought what*, the entire embedded clause may be adjoined to the matrix IP, as a quantificational expression ranging over interrogative propositions. {where we bought the book, where we bought the pencil, etc.}. Each time an island is IP-adjoined, it ceases to be an island for extraction. All other apparent island violations may be similarly accounted for, as well as the superiority violation represented by cases like *What did which man buy?* In this last case, the NP *which man* may first be IP-adjoined as a QNP ranging over individual men. Then the determiner *which* can be taken as a *wh*-operator that ranges over Specifier meanings, e.g., {this, that, my, John's, etc.}. This

determiner may be first adjoined to the QNP *which man* and then moved into COMP. The LF structure of *What did which man buy* is:[4]

(58) $[_{CP}$ [Which$_2$ what$_3$] did $[_{IP}$ [t$_2$ man]$_4$ $[_{IP}$ t$_4$ buy t$_3$]]].

We thus derive the Syntax-LF asymmetry with respect to Subjacency and CED from (a) the theory of adjunction within the *Barriers* framework, and (b) the existence of QR in LF versus its absence in Syntax. The idea that certain constructions properly containing QNPs may be construed as QNPs themselves that are subject to QR may have some resemblance to the idea of pied-piping, but the two must be clearly distinguished. Pied-piping under *wh*-movement is severely limited to cases where *wh*-phrases occur as specifiers of NPs, presumably under a general principle governing feature percolation in Syntax. On the other hand, the scope of QR is semantically defined, and it may affect any constituent that may be semantically construed as being quantificational. If our account is right, it enables us to maintain a strict correspondence hypothesis between Syntax and LF, thereby providing very strong arguments for the existence of the latter as a level of syntactic representation. In addition, given the important role that QR plays in it, this account also lends further support to the existence of QR as a syntactic process of adjunction.

4.   ECP EFFECTS

A question that arises from this account of the LF-Syntax asymmetry is whether it preserves ECP effects in LF, preventing long-distance movement of an adjunct or subject whose trace needs to be antecedent-governed. We have assumed, following Huang (1982) and Lasnik and Saito (1984), that the following facts fall under the ECP:

(59) *Who did what please t?

(60) *Who remembers what we bought why?

These sentences can be ruled out in the following way. According to our current assumption, a *wh*-phrase in situ may first undergo QR before moving into COMP, then movement of *what* into COMP in (59) does not cross any barrier:

(61) $[_{CP}$ [what$_3$ who$_2$] did $[_{IP}$ t$_3$ $[_{IP}$ t$_3$ please t$_2$]]]?

The initial trace t$_3$ is antecedent-governed by the intermediate trace adjoined to IP. However, the intermediate trace is also subject to the ECP, as argued in Lasnik and Saito (1984). We can then rule out (61) on the basis of the fact that

the intermediate trace is not antecedent-governed, given the COMP-indexing mechanism first proposed by Aoun, Hornstein, and Sportiche (1981). Similarly for a sentence like *What did you buy why?* Both subject and adjunct superiority effects thus continue to fall under the ECP, as before.

Turning to (60), the proposed account does not block the extraction of *why* from the embedded *Wh* Island. This is because the entire island may be adjoined to the matrix IP, and ceases to be a barrier for the extraction of *why* into the matrix COMP. This situation is no different from what happens with complement *wh*-phrases in situ:

(62) Who remembers where we bought what?

Our account still allows us to distinguish between (60) and (62), however, along with other superiority facts. In the LF structure of (60), there is one intermediate trace of *why* that cannot be antecedent-governed, in particular the trace that it leaves behind when it moves into the matrix COMP (thereby doubly filling the latter). In the case of (62), the movement and adjunction of *what* does not need to leave an intermediate trace, since the initial trace is already lexically governed in accordance with the ECP, as reasoned in Lasnik and Saito (1984).

But this account is clearly insufficient to rule out singular questions in Chinese-Japanese where the relevant question phrase is an adjunct located in an island. For example, (63) is ungrammatical, and (64) cannot be interpreted as a direct question that seeks a value for *weishenme* 'why':

(63) *ni   xihuan [[Lisi weishenme piping   de] shu]?
        you like   Lisi why   criticize REL book
        '*You like [books [that Lisi criticized why]]?

(64)   ni   xiang-zhidao [shei weishenme bu lai]?
        you wonder   who why   not come
        'Who$_2$ do you wonder [why$_3$ [t$_2$ will not come t$_3$]]?
        Not: 'Why$_3$ do you wonder [who will not come t$_3$]?'

Take the intended but unavailable reading of (64) for example. Adjunction of the embedded clause *shei weishenme bu lai* to the matrix IP would void the barrierhood of the embedded question, enabling *weishenme* to move into the matrix COMP as much as it does *shei*. Furthermore, since the matrix COMP is empty at S-Structure, the intermediate trace left by *weishenme* must be antecedent-governed. This must be the case, or the following sentence would be wrongly predicted to be uninterpretable as a direct *why*-question:

(65)   ni   renwei [Zhangsan weishenme mei lai]?
        you think   Zhangsan why   not come
        'Why do you think [Zhang san didn't come t]?'

Note that the derivation of the LF-structures of (63)–(64) from their S-Structures in Chinese-Japanese is very much on a par with the derivation of S-Structures from D-Structures for corresponding sentences in English:

(66)   *Why$_2$ did you wonder [what I bought t$_2$]?

(67)   *How$_2$ did you read [the book that John wrote t$_2$]?

As Lasnik and Saito (1984) and Chomsky (1986a) show, the crucial offending trace in these structures is the (last) intermediate trace left behind when *why* or *how* gets out of a given island, not the one immediately before it enters the matrix COMP. That is, in the representation (68) for (66), the offending trace is t$_2$, not the VP-adjoined t"$_2$.

(68)   [$_{CP}$ why$_2$ did you [$_{VP}$ t"$_2$ [$_{VP}$ wonder [$_{CP}$ what I t'$_2$ bought t$_2$]]]]?

Since we have assumed that the adjunction of an island voids the latter's barrierhood, the ECP effects of sentences like (63)–(64) in Chinese-Japanese cannot be derived.

One solution to this dilemma, we would like to suggest, is to adopt an idea of May (1985), who argues that in an adjunction structure, the top segment of the node consisting of *n* segments is an absolute barrier to government. (At the same time, we continue to assume with Chomsky that only complete categories—nodes with all segments included—constitute barriers for Subjacency and CED—which is reminiscent of May's [1977] suggestion that Chomsky-adjoined nodes don't count as bounding nodes.) This requires a reformulation of the notion of government. Chomsky discusses two definitions of government, one in terms of domination and one in terms of "exclusion," with respect to the adjunction structure (69), and considers whether α is a possible governor for β, but simply assumes that α is possible governee for δ.

(69)   ... δ ... [$_\gamma$ ... α ... [$_\gamma$ ... β ...]]

What we need is a definition that excludes α as a possible governee.

(70)   α governs β iff α m-commands β and for every γ, γ a barrier, if γ does not exclude β then γ does not exclude α.

The immediate result of (70) is that only those categories that are lexically governed (or theta-governed) can undergo successive-cyclic adjunction; but those whose traces need to be antecedent-governed cannot. Since adjunct traces require antecedent-government, all intermediate traces left by successive movement or adjunction are required. An intermediate trace left at an adjunction site, however, cannot be antecedent-governed because the node-

segment that dominates it blocks government from outside. As an example, consider again (64). Recall that the only way to void the barrierhood of the *Wh* Island is for the embedded clause to be adjoined to the matrix IP and for the wide-scope *wh*-phrase to adjoin to this embedded clause before moving into the matrix COMP. The LF-Structure for the Chinese sentence (64) under the *why*-question reading would look like (71):

(71) $[_{CP}$ why$_2$ $[_{IP}$ $[_{CP}$ t''$_2$ $[_{CP}$ who t$_2$ will not come]]$_3$ $[_{IP}$ you wonder t$_3$]]]

But in this structure the intermediate trace (t''$_2$) of *why* is not antecedent-governed. The unavailability of a reading represented by (71) thus follows as a consequence of the ECP. (The lack of such effects with lexically governed *wh*-phrases follows, again, from the fact that their successive adjunction need not leave a trace behind.)

   The definition (70) is motivated not only by ECP effects in LF, but is also needed to block overt adjunct extraction from A'-phrases. Recall that sentences like (40b) are quite acceptable:

(40b)   ?Who$_2$ do you wonder [[which pictures of t$_2$][are on sale]]?

Extraction of an adjunct from an A'-phrase in COMP is completely ill-formed, however:

(72)   *[On which table]$_2$ do you wonder [[which books t$_2$][I will buy]]?

The distinction between (40b) and (72) does not follow from Chomsky's system (since successive adjunction of *on which table* would cross no barrier), but is an immediate result of the definition (70).[5]

5.   SOME CONSEQUENCES

The redefinition of government suggested in (70) will have wide-reaching consequences that we cannot address in full. Here we briefly discuss two of them.

   The first is that there is no successive VP-adjunction, at least in cases where adjuncts are moved. As Chomsky notes, successive VP-adjunction of adjuncts is necessary to allow their (apparent) long-distance extraction, as evidenced by sentences like (73):

(73)   How$_2$ do you think [t'$_2$ [John fixed the car t$_2$]?

Under the assumption that VP is not L-marked, it is by definition a Blocking Category and a Barrier. If VP-adjunction cannot take place, the matrix VP would block antecedent-government of t'$_2$ by *how*$_2$, and (73) would be

incorrectly ruled out by the ECP. Our proposed account, if correct, will force us to abandon this account of (73). An idea is to simply assume that VP is not a BC (nor a barrier) because it is L-marked. Chomsky points out that VP must be theta-governed (by I), since VP-movement across a *Wh* Island produces only weak Subjacency effects:

(74)   Fix the car, I wonder whether he will t.

It is possible that the trace of VP is actually L-marked (or lexically governed), and not just theta-governed, and that actually L-marking is required (when antecedent-government does not obtain), not the weaker theta-government. If so, the requirement of do-support when the I^0 is nonlexical immediately falls out under the ECP:

(75)   Fix the car, I wonder whether he *(did) t.

To execute the idea that VP is L-marked, we might hypothesize that I^0 is lexical. (Since it does not theta-govern the subject, the subject is still a BC.) In a finite clause, if the IP contains an auxiliary, the inflected Aux is lexical and it L-marks the VP. If there is no auxiliary, V raises into I to support the nonlexical I^0 and lexicalizes the latter. (The V-trace is antecedent-governed, the VP being now L-marked by the inflected V, as reasoned by Chomsky.) In a gerundive or participial clause, V raises into INFL to support *-ing*, and in an infinitive *to* is a lexical I^0 (it is sufficient to lexically govern a VP trace). In all cases, then, VPs are L-marked. (If VP-movement takes place, *do* support, instead of V-raising, is obligatory.) V-raising bleeds the process of VP-movement, because a moved VP would contain a V-trace not bound or governed by its antecedent.

   A problem with this view noted by Chomsky is how one can rule out nonlocal movement of an (uninflected) V from VP into C^o.

(76)   *$[_{CP}$ What$_2$ $[_{C'}$ eat$_3$ $[_{IP}$ you will $[_{VP}$ t$_3$ t$_2$]]]]?

The problem is that the trace of the verb, t$_3$, is not separated from its antecedent by any barrier, if VP is L-marked. If VP is not L-marked, then both VP and IP will be barriers, and (76) is ruled out by the ECP, as desired. However, (76) can be ruled out by ECP if we adopt the Minimality Condition (MC). If VP is not L-marked, then the INFL *will* is a closer governor of t$_3$, and under the MC the I' is a barrier even though it is not a maximal projection or a BC. Unlike Chomsky, who assumes that the I^o is not a closer governor that satisfies the MC, we may assume that it does satisfy the MC as a governor of the trace t$_3$, though not its proper governor. (We might say that ECP requires either L-marking not just theta-government or antecedent-government. The INFL *will* in (76) governs VP and its subject, as well as the trace t$_3$. But it properly governs only the VP, by L-marking it,

as a lexical category that theta-governs VP. Since it does not theta-govern the trace t_3, it does not L-mark it; and since the trace is not antecedent-governed either, it is not properly governed.)

If the idea of analyzing VP as being L-marked can be worked out successfully, this in fact will simplify matters considerably. Note that unlike successive COMP-movement and IP-adjunction, which have considerable overt, independent evidence, the evidence for successive VP-adjunction seems to be completely theory-internal (at least in English), and one may wonder why there is no similar overt evidence for successive VP-adjunction. Especially if IP-adjunction is excluded under *wh*-movement, there is even more reason to ask why VP-adjunction should be allowed; these questions do not arise, of course, once VP is analyzed as being L-marked.

Another consequence of our proposal is that the theory of government and the theory of movement can only be partially unified under a theory of barriers, but the unification is not complete. Only a full category, one that dominates all of its segments, is a barrier for movement, but the top segment of a barrier alone blocks government. There is something suggesting that this might not be a bad result. Recall that the theory of barriers ties together the two conditions Subjacency and CED. But it seems that Subjacency effects are weaker than CED effects, even when they involve the same number of barriers crossed. For example, Wh Islands and noun phrase complement constructions permit extraction of the following kind to some degree:

(77)   ?This is the book which I wonder who wrote.

(78)   ?This is the book that John made the claim that he wrote.

However, it seems that crossing a single barrier in a CED violation seems to produce much worse results:

(79)   *Which table do you wonder which books on t John will buy?

Recall that since *which books on t* is in an A'-position, it is a possible adjunction site. Thus the extraction of *which table* need only cross one barrier, the PP containing *on t*, but the result is clearly worse than (77)–(78).

Chomsky (1986a) also notes that the Minimality Condition is relevant to the definition of a barrier to government, but not of a barrier for movement. Like (70), this also has the effect of further restricting movement of non-L-marked elements.

Our discussion of these consequences is obviously incomplete, though the issue is clear. If these turn out to be desirable consequences, then the account for the Syntax-LF asymmetry proposed above will receive considerable support. The existence of LF will be further supported, also, as a

result of the possibility of maintaining a strict correspondence hypothesis between Syntax and LF. If these turn out to be undesirable consequences, it seems we must hold on to the weaker correspondence and allow the two components of grammar to be different with respect to the theory of bounding.