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Chapter 5

Wh-in-Situ: Movement and Unselective Binding

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The hypothesis that a syntactic level of Logical Form (LF) intervenes between S-Structure and semantic interpretation has been widely discussed and, by some, assumed. In this chapter I use the phenomenon of *wh-in-situ* to argue for the existence of this syntactic level.

A *wh-in-situ* is a *wh*-phrase that has not undergone *Wh*-Movement by S-Structure—that is, it has not visibly moved to Comp. In English *wh*-in-situ are found exclusively in multiple interrogations, as in (1a), whose S-Structure representation is given in (1b): the *wh*-phrase *what* in (1a) is an instance of *wh*-in-situ.[1]

(1) a. Who read what?
b. $[_{S'}[_{Comp}$ *who*$]$ $[_{S}$ e_t read *what*$]]$

I will argue that *certain wh*-in-situ that are unmoved at S-Structure actually undergo *Wh*-Movement in the mapping from S-Structure to LF. In turn I argue for LF as a level by showing that a clustering of properties characterizes the proposed LF representations—the normal argument for a level of representation. The hypothesis of *Wh*-Movement at LF is of course not new. What is new here is the word *certain*, which will be crucial to the discussion to follow. Although some scope properties and other observations have long suggested *Wh*-Movement at LF, other facts have tended to dilute the case for such LF movement.

In this chapter I will show that the case for LF movement is actually quite strong. It is simply necessary to distinguish *two* types of *wh*-in-situ in terms related to discourse. One type moves, and the other does not. This distinction has identical consequences in a strikingly wide variety of languages, of which I consider English, Japanese, and Polish here. The distinction is especially interesting, I believe, because both

types of *wh*-in-situ display scope ambiguities. This leads me to characterize the distinction in a manner very close to and inspired by Heim's (1982) distinction between indefinites and quantifiers.

5.1 Scope and Movement

5.1.1 Multiple Questions in English

A felicitous answer to (1a) involves a set of ordered pairs of people and things read, for example, *Bill read the dictionary; Harry read the encyclopedia; etc*. The *what* is thus "paired" with the *who*. *Wh*-in-situ in multiple interrogation are interesting because pairings of this sort may be taken to reveal *scope* ambiguities, as discussed first by Baker (1970). We can see this in (2).

(2) *Who* knows *where* we bought *what?*

Sentence (2) shows two *wh*-phrases in Comp (*who* and *where*) and one *wh*-in-situ (*what*). The sentence is ambiguous: *what* may be "paired with" either the *wh* in the lower Comp or the *wh* in the higher Comp. If the *wh*-in-situ is paired with the *wh* in the lower Comp, a felicitous answer must be of the form seen in (3a). If the *wh*-in-situ is paired with the *wh* in the higher Comp, a felicitous answer must be of the form seen in (3b).

(3) a. *John* knows where we bought what (for instance, he knows that we bought the book in Amsterdam, the record in Groningen, etc.)
b. *John* knows where we bought the *book* (for instance, in Amsterdam); *Mary* knows where we bought the *record* (for instance, in Groningen); etc.

Let us take the pairings in the answers to reflect pairings of *wh*-phrases in the interpretation of the questions.

I will discuss two prominent accounts of these ambiguities. The first is due to Baker.[2] Baker proposed to represent the scope of *wh*-phrases, both moved and in situ, by coindexing the *wh*-phrase with the Q morpheme found in the Comp of interrogative clauses.[3] For Baker, sentence (1) might be represented as in (4).

(4) *Baker-style representation*
$[[_{Comp}$ $Q_{i,j}$ $who_i]$ e_t read $what_j]$

The ambiguity in (2) will result from the two coindexing possibilities for *what*. The narrow-scope interpretation reflected in (3a) results from

coindexing with the lower Q, as shown in (5a); the wide-scope interpretation reflected in (3b) results from coindexing with the higher Q, as shown in (5b).

(5) a. [[$_{Comp}$ Q_j *who*$_j$] e_j knows [[$_{Comp}$ $Q_{i,k}$ *where*$_k$] we bought *what*$_i$ e_k]]
b. [[$_{Comp}$ $Q_{i,j}$ *who*$_j$] e_j knows [[$_{Comp}$ Q_k *where*$_k$] we bought *what*$_i$ e_k]]

The second proposal for assigning scope to *wh*-in-situ stems from Chomsky (1976) and has been developed by Kayne (1979), Jaeggli (1980a, 1982), Aoun, Hornstein, and Sportiche (1981), Huang (1981), and others. In this proposal *wh*-in-situ undergo the familiar rule of *Wh*-Movement at the syntactic level of LF. Thus, all *wh*-words are in Comp at LF—both those that were already moved at S-Structure and those that were moved at LF. The scope of a *wh*-phrase is determined by which Comp the phrase finds itself in. In Chomsky's analysis (1) might be represented as in (6).

(6) [[$_{Comp}$ *what*$_j$ *who*$_i$] e_i read e_j]

The narrow-scope reading of (2) results from LF movement of the *wh*-in-situ to the lower Comp; the wide-scope reading, from movement to the higher Comp. (7a) and (7b) show these LF representations.

(7) a. [[$_{Comp}$ *who*$_j$] e_j knows [[$_{Comp}$ *what*$_i$ *where*$_k$] we bought e_i e_k]]
b. [[$_{Comp}$ *what*$_i$ *who*$_j$] e_j knows [[$_{Comp}$ *where*$_k$] we bought e_i e_k]]

Chomsky's proposal follows from the general theory of grammar if the theory contains the principle in (8), and if the statement in (9) is also true.

(8) Every quantifier (operator) occupies an $\bar{A}$-position (nonargument position) at LF.

(9) *Wh*-phrases are quantifiers (operators).

There has not been much debate about the two analyses of *wh*-in-situ. Indeed, it might seem that the choice between the two proposals, Baker's and Chomsky's, is not an empirical issue. After all, if our only task is to assign scope to a *wh*-in-situ, it is easy to assign the appropriate scope using either Baker's or Chomsky's representations. To the extent to which the two analyses have been compared (see, for instance, Huang 1981:fn. 24), the main question has been which analysis to use and which not to use. I will argue, however, that the choice *is* an empirical issue. Not only is it an empirical issue, but both analyses are correct, in their own ways. Each analysis is correct for a particular

interpretation of *wh*-in-situ, and each type of representation is correctly associated with a different group of properties.

5.1.2 Indefinites

My analysis is inspired by the discussion of indefinites by Heim (1982), who develops ideas of Lewis (1975). Heim argues that although indefinite NPs show scope ambiguities of the familiar sort, indefinites are not quantifiers. She notes that the quantificational character of an indefinite depends on what quantifiers or adverbs of quantification happen to be in the neighborhood. Thus, (10a–d) have the paraphrases with real quantifiers found in (11a–d) ((10) and (11) from Heim 1982: 123, 127).

(10) a. If a man owns a donkey, he always beats it
b. In most cases, if a table has lasted for fifty years, it will last for another fifty
c. Sometimes, if a cat falls from the fifth floor, it survives
d. If a person falls from the fifth floor, he or she will very rarely survive

(11) a. For every man and every donkey such that the former owns the latter, he beats it
b. Most tables that have lasted for fifty years last for another fifty
c. Some cats that fall from the fifth floor survive
d. Very few people that fall from the fifth floor survive

From data like these, Heim concludes that indefinites "simply have no quantificational force of their own at all, but are rather like variables, which may get bound by whatever quantifier is there to bind them" (p. 127). The binders, like *always* in (10a), are thus *unselective*, in Lewis's sense: they may bind more than one variable. An intermediate representation of (10a) may thus be given as in (12).

(12) [always$_{i,j}$ [if a man$_i$ owns a donkey$_j$, he$_i$ beats it$_j$]]

By straightforward syntactic operations, *always* ends up binding variables in the position of the indefinites, where the domain of quantification is restricted by the predicates *is a man* and *is a donkey*. Note that I am simplifying Heim's treatment here for my purposes. I return to Heim's treatment of "novel indefinites," as in *A man is here to see you*, in the final section of the chapter.

Heim contrasts this treatment of indefinites with a more traditional view of indefinites as quantifiers—the tradition stemming from Russell.

tactic properties are important. I argue for LF, not by showing its "usefulness" to semantic interpretation, since, as has been frequently noted, a semantics could interpret S-Structure representations without LF. Nor do I argue for LF because I want a "disambiguated level." (Indeed, May 1985 argues that not all scope ambiguities are resolved at LF.) I argue for LF by showing that certain aspects of semantic interpretation display *the characteristic properties of movement rules*. In response to this observation, I give the output of visible syntactic movement and the output of certain scope assignments parallel representations.

In this chapter I thus argue that LF is more than a solution to the problem of assigning scope. Both unselective binding and extraction assign scope, yet only the extraction operation is expected to show all three movement properties seen in (18).[4] Previous work on *wh*-in-situ failed to distinguish the two types of scope assignment for *wh*-in-situ. The case for LF movement was correspondingly weaker: not all instances of scope assignment to *wh*-in-situ showed the diagnostics of movement. Making the distinction clarifies the issue: the scope assignment that really depends on movement does show the expected clustering of movement properties. Given that a *clustering* of syntactic properties characteristic of movement holds of one of these methods of scope assignment, we have identified a syntactic level: LF.

5.2 Superiority Effects as a Diagnostic for Movement

5.2.1 Nested Dependencies

Chomsky (1973) noted that a *Superiority Condition* applies to multiple interrogations in English. His condition was a constraint on movement at S-Structure, but we can for convenience restate it as a condition on S-Structure representations.

(19) *Superiority Condition*
In a multiple interrogation, where a *wh*-phrase is in Comp and another is in situ, the S-Structure trace of the phrase in Comp must c-command the S-Structure position of the *wh*-in-situ.

The Superiority Condition makes the correct distinctions in examples like (20) and (21).

(20) a. *Who*$_i$ did you persuade e_i to read *what?*
b. ??*What*$_j$ did you persuade *who(m)* to read e_j?

(21) a. Mary asked [*who*$_i$ [e_i read *what*]]?
b. *Mary asked [*what*$_j$ [*who* read e_j]]?

In the (a)-examples the trace of the *wh* in Comp correctly c-commands the S-Structure position of the *wh*-in-situ. In the (b)-examples the trace of *wh* in Comp does not c-command the *wh*-in-situ—just the opposite, in fact.[5] Hence the contrasts.

If embedded as is in the grammar, the Superiority Condition is quite odd. One might expect considerations of scope to require the *wh*-in-situ to bear some c-command relation to the *wh* in Comp, but it is hard to understand why the *wh*-in-situ should have to bear some particular relation to the *trace* of the *wh* in Comp. I think we can make sense of the Superiority Condition if we assume a version of Chomsky's analysis of *wh*-in-situ. In particular, if *wh*-in-situ does move at LF, we may explain Superiority effects as the result of a condition familiar from S-Structure *Wh*-Movement.

Structures like (22a) and (23a) are often taken to be somewhat unacceptable, since they violate the *Wh*-Island Condition. Nonetheless, it has frequently been observed that they are more acceptable, or more interpretable, than their counterparts (22b) and (23b) (see, among other works, Kuno and Robinson 1972; Bordelois 1974; Fodor 1978; Pesetsky 1982, forthcoming).

(22) a. ?*What book*$_j$ don't you know *who*$_i$ to persuade e_i to read e_j?

b. **Who*$_i$ don't you know *what book*$_j$ to persuade e_i to read e_j?

(23) a. ?This is one book *which*$_j$ I do know *who*$_i$ to talk to e_i about e_j

b. *John is one guy *who*$_i$ I do know *what book*$_j$ to talk to e_i about e_j

The lines drawn between each *wh* in Comp and its trace suggest the source of the problem. In the (a)-examples the *wh*-trace dependencies are *nested*, whereas in the (b)-examples they cross. The (b)-examples may be ruled out by some version of a *Nested Dependency Condition*.

(24) *Nested Dependency Condition*
If two *wh*-trace dependencies overlap, one must contain the other.

The Nested Dependency Condition is a condition on *movement*. We can see this in some examples from Chomsky 1976.

Translated into generative linguistic terms, this view proposes that indefinites, like other quantifiers, move to an $\bar{A}$-position (typically adjoining to S) at the level of LF and treat the syntactic trace left by movement as the variable they bind. The outcome of these syntactic manipulations readily translates into standard logical notation (see May 1977).

(13) [a man$_i$ [a donkey$_j$ [if e_i owns e_j, he$_i$ always beats it$_j$]]]

Besides the previous argument, why else might one favor either Heim's or Russell's type of analysis? One might examine whether indefinites show familiar island constraints on syntactic binding. Indeed, scope assignment for indefinites does *not* obey these normal restrictions on extraction operations. For example, the indefinite in (14) may take scope over the *if*-clause. If this indefinite receives scope by extraction, as in (15a), we cannot easily explain why it disobeys the island condition that prevents just such extraction in the *wh*-question (15b) and the topicalization structure (15c).

(14) If John comes upon a donkey, Mary always tries to hide it

(15) a. [a donkey$_i$ [if John comes upon e_i, Mary tries to hide it$_i$]]
b. *What donkey$_i$, if John comes upon e_i, does Mary try to hide it$_i$?
c. *This donkey$_i$, if John comes upon e_i, Mary tries to hide it$_i$

Since indefinites do not obey this and other island conditions on extraction, we have another argument that they are not assigned scope by extraction.

It should now be clear why I have juxtaposed the *wh*-in-situ discussion with the debate over indefinites. The distinction between Baker's and Chomsky's analyses of *wh*-in-situ is almost the same as the distinction between Heim's and Russell's analyses of indefinites. In fact, Baker's Q is simply an unselective binder in Lewis's and Heim's sense. Though Baker did not have indefinites in mind, his syntactic mechanism of Q-indexing clearly anticipates and parallels Lewis's and Heim's analysis of adverbs of quantification and indefinites.

I have noted the temptation to treat Baker's and Chomsky's analyses as rivals. The debate between Lewis's and Heim's approach and Russell's approach has had a different character. Although indefinite NPs may involve unselective binding, there is little question about whether English has quantifiers that involve some version (liberally construed)

of an extraction operation. Lewis's and Heim's analysis thus distinguishes real quantifiers from unselectively bound elements, while arguing that both exist.

One reason for this distinction is that there are scope phenomena that do obey island conditions. *Every*, for example, cannot take scope outside the *if*-clause in (16).

(16) *If John comes upon every donkey at the zoo, Mary tries to hide it

This is readily explained if *every* is interpreted after an extraction takes place.

(17) [every donkey$_i$ [if John comes upon e_i, Mary always tries to hide it$_i$]]

An NP with *every*, unlike an indefinite, does take scope as a result of extraction, and familiar island phenomena thus obtain.

In this chapter I demonstrate that some *wh*-in-situ are treated according to Baker's proposal: without movement but with unselective binding, like indefinites. Other *wh*-in-situ are treated according to Chomsky's proposal: with movement at the level of LF, like real quantifiers. This distinction can be motivated only by the sort of evidence I cited earlier in the discussion of indefinites and quantifiers: does a particular usage of *wh*-in-situ show the properties that are diagnostic of movement?

Considerations of this sort constitute perhaps the only possible kind of argument for a syntactic level of LF derived from S-Structure by movement operations. Movement is a relation between two positions α and β such that

(18) a. α c-commands β.
b. α lacks an independent thematic role.
c. The distance between α and β is governed by a cluster of island conditions (of the sort I have discussed).

In the proposed analysis of quantifiers and in Chomsky's proposal for *wh*-in-situ, (18a) and (18b) are trivially satisfied. (18c) is the interesting case. Are *wh*-in-situ ever subject to the sort of island conditions that are diagnostic of movement? My answer will be "Yes, sometimes."

This answer, if correct, is of some general interest. When one argues that some *wh*-in-situ do undergo movement and others do not, one makes a rather strong case for the existence of LF. LF is a level of interpretation intermediate between S-Structure and semantics whose *syn-*

like *Which book did you read?*, the range of felicitous answers is limited by a set of books both speaker and hearer have in mind. If the hearer is ignorant of the context assumed by the speaker, a *which*-question sounds odd.[9] Similarly, in a multiple *which*-question like *Which man read which book?* the speaker assumes that both speaker and hearer have a set of men and a set of books in mind, and that the members of ordered man-book pairs in a felicitous answer will be drawn from the sets established in the discourse. No such requirement is imposed on *wh*-phrases like *who*, *what*, or *how many books*. These phrases may be *non-D-linked*. If a speaker asks *How many angels fit on the head of a pin?*, there is no presumption that either speaker or hearer has a particular set or quantity of angels in mind.

If D-linking does govern the possibility of a Baker-style interpretation for *wh*-in-situ, we might then modify (9) as follows.

(33) Non-D-linked *wh*-phrases are quantifiers and adjoin to S′.

This adjunction is obligatory at LF, because of principle (8), which requires every quantifier to appear in an $\bar{A}$-position at LF.

The statement in (33), I will argue, is a principle of the grammar, from which the facts just observed follow. I will assume that both Baker-style and Chomsky-style treatments of *wh*-in-situ are allowed by Universal Grammar. Principles (33) and (8) together exclude a Baker-style treatment for non-D-linked *wh*-phrases. By contrast, suppose the following statement is true.

(34) D-linked *wh*-phrases are not quantifiers.[10]

It follows that D-linked *wh*-phrases are able to receive a Baker-style interpretation, without movement. As a result, they escape the Nested Dependency Condition and therefore fail to exhibit Superiority effects.[11]

If the absence of Superiority effects with *which*-phrases is truly due to D-linking and principle (33), we might expect Superiority effects to disappear even with *who*, *what*, and *how many books*, if we can force these *wh*-phrases to be D-linked. Speakers differ on this question. Bolinger (1978) attempts to argue against the very existence of syntactic Superiority effects on the basis of examples like (35a) (his (73)). Crucially, the context he establishes implies D-linking of *what* and *who*. I agree with his judgment in this case (though not with his overly sweeping conclusions), particularly if all the *wh*-phrases are given extremely heavy stress. Another example, perhaps easier to accept, is (35b).

(35) a. I know what just about everybody was asked to do, but *what* did *who* (actually) do?

b. I know that we need to install transistor A, transistor B, and transistor C, and I know that these three holes are for transistors, but I'll be damned if I can figure out from the instructions *where what* goes!

Even (32b) can be deemed acceptable in the proper context, particularly if we know that the voters fall into certain groups, how many are in each group, and who the candidates are, but simply do not know who each group voted for. Nonetheless, judgments on these examples, like all judgments swayed by context, are quite delicate. If the facts are as I suggest, then it seems correct to associate the Baker-style interpretation with D-linking.[12]

I thus formulate and support the hypothesis that some *wh*-in-situ move at LF, and others do not. The moved *wh* show a diagnostic for movement: Nested Dependency effects. The unmoved *wh* fail to show this diagnostic. I claim that *wh* must move at LF only if it is non-D-linked. D-linked *wh* do not have to move. Even if they do not move, however, they take scope, thanks to the binding mechanism proposed by Baker.

5.3 Move *Wh* in a Language without *Wh*-Movement

The discussion so far immediately raises the question of languages like Japanese. In this section I will show that my distinction indeed extends to Japanese and explains a pattern of island conditions and island violations that restores a missing argument for LF.[13] In languages like Japanese no *Wh*-Movement to Comp occurs at S-Structure. All *wh*-phrases are in situ, even in embedded questions. An overt Q morpheme—here, *ka* or *no*—marks the scope of *wh*.

(36) a. Mary-wa John-ni nani-o ageta-no?
Mary-Top John-Dat what-Acc gave-Q
'What did Mary give to John?'

b. Mary-wa [$_{S'}$ John-ga nani-o katta-ka] sitte-iru
Mary-Top John-Nom what-Acc bought-Q know
'I know what John bought'

c. Mary-wa [$_{S'}$ John-ga nani-o yonda to] itta-no?
Mary-Top John-Nom what-Acc read that said-Q
'What did Mary say that John read?'

(25) a. *What books$_i$* have *those men$_j$* written e_i about *each other$_j$?*
b. I told *them$_i$* [*what books$_j$* [PRO$_i$ to read e_j]]

Where the Nested Dependency Condition appears to be violated in the relation between two positions, it turns out that this relation does not meet the criteria for movement outlined in (18).[6]

Now let us return to the multiple interrogations in (20) and (21). Suppose they do receive a Chomsky-style interpretation at LF. If we simply stipulate that *wh*-in-situ moves to a position slightly to the left of the Comp with which it is interpreted, the Superiority Condition is explained. For our purposes, we will accomplish this stipulation by assuming that LF movement of *wh*-in-situ adjoins the *wh* to S′ (as first proposed by Jaeggli (1980a, 1982); the utility of this assumption in the present context was suggested to me by Edwin Williams, personal communication), instead of moving it into Comp.[7] (26a–b) and (27a–b) show the LF representations for (20a–b) and (21a–b), respectively, if this stipulation is correct.

(26) a. [$_{S'}$ *what$_j$* [$_{S'}$ *who$_i$* [$_S$ you persuade e_i to read e_j]]]
b. ??[$_{S'}$ *who$_i$* [$_{S'}$ *what$_j$* [$_S$ you persuade e_i to read e_j]]]

(27) a. . . . [$_{S'}$ *what$_j$* [$_{S'}$ *who$_i$* [$_S$ e_i read e_j]]]
b. *. . . [$_{S'}$ *who$_i$* [$_{S'}$ *what$_j$* [$_S$ e_i read e_j]]]

Whenever Superiority effects show up, a Chomsky-style LF representation violates the Nested Dependency Condition. Given the bizarre nature of the Superiority Condition, it is encouraging that we can derive its effects from the Nested Dependency Condition. In turn, if the Nested Dependency Condition is a condition on movement, then Nested Dependency effects will diagnose movement. Since *wh*-in-situ show Nested Dependency effects, we have a strong argument for LF movement of *wh*-in-situ—an argument for a Chomsky-style analysis.

5.2.2 Absence of Expected Superiority Effects

The preceding discussion is interesting because it is not entirely true. In a number of cases expected Superiority effects do not show up.[8]

(28) a. *Which man$_i$* did you persuade e_i to read *which book?*
b. *Which book$_j$* did you persuade *which man* to read e_j?

(29) a. Mary asked *which man$_i$* e_i read *which book*
b. Mary asked *which book$_j$ which man* read e_j

I have claimed that Superiority effects show up when LF movement of *wh*-in-situ runs afoul of the Nested Dependency Condition. The obvious explanation for the lack of Superiority effects in (28a–b) and (29a–b) is that *which*-phrases in situ, unlike *who* or *what*, do not undergo LF movement.

The situation becomes even more interesting when we note that *which*-phrases show the same scope ambiguities as other *wh*-phrases. (30) is as ambiguous as (2); indeed, many speakers seem to find the ambiguity even sharper with *which*-phrases than with *who* or *what*.

(30) *Which man* knows *where which woman* will live?

If this discussion is correct, *which*-phrases in situ require a method of scope assignment that does not involve LF movement—for example, a Baker-style representation, with unselective binding by Q. The scope of a *which*-phrase may be determined by the Comp that contains its index after Baker-style binding has taken place. No Superiority effects are expected to show up because no movement takes place. (29b), for example, will have a representation after Baker-style binding like (31) (compare (27b)).

(31) . . . [$_{S'}$[$_{Comp}$ Q$_{i,j}$ *which man$_i$*] [$_S$ e_i read *which book$_j$*]]

Nonetheless, we cannot allow *wh*-in-situ to choose freely between Baker-style and Chomsky-style analyses. Clearly, *who* and *what* in (20a–b) and (21a–b) must receive a Chomsky-style analysis, or we will not ever expect to find Superiority effects.

A number of proposals come to mind. For example, it might be relevant that *which* is a specifier inside an NP, whereas *who* and *what* are heads of their NPs. (See Fiengo 1980 and Guéron and May 1984 for suggestions of this type.) Yet it seems that Superiority effects remain with other *wh*-specifiers.

(32) a. I need to know *how many people$_i$* e_i voted for *whom*
b. *I need to know *who(m)$_j$ how many people* voted for e_j

Given (32), it seems equally unlikely that "heaviness" of the *wh*-phrase is at stake.

I wish to suggest that the crucial difference between a *which*-phrase and the *normal* occurrence of *who* or *what* is found in discourse. (See Katz and Postal 1964:94 for similar discussion, as well as Kuroda 1969.) Roughly, *which*-phrases are *discourse-linked (D-linked)*, whereas *who* and *what* are normally not D-linked. When a speaker asks a question

(42) establishes that *wh*-phrases with *ittai* may take scope outside their clause and also that *ittai* is not limited to root environments.[18]

(42) Mary-wa [$_S$' John-ga *ittai* *nani-o* yonda to] itta-no?
Mary-Top John-Nom the-hell what-Acc read that said-Q
'What the hell did Mary say that John read?'

I have hypothesized (a) that Subjacency *does* hold of LF movement and (b) that *ittai* forces a non-D-linked interpretation for *wh*-in-situ. This entails, by (8) and (33), that *ittai wh*-phrases must move at LF and that Subjacency effects should be detected. In fact, they are. (43a–b) differs from (39a–b) only in that the *wh*-phrase *nani* 'what' has been replaced with *ittai nani* 'what the hell'. Nonetheless, the result appears to be quite ungrammatical.[19]

(43) a. *Mary-wa [$_{NP}$[$_S$' John-ni *ittai nani-o* ageta] hito-ni] atta-no?
b. *Mary-wa [John-ga *ittai nani-o* yomu mae-ni] dekaketa-no?

These examples thus provide evidence both for Subjacency at LF and for the connection drawn in the previous section between obligatory LF movement and discourse. I will have further comments on *ittai* in the next subsections.[20]

5.3.2 Subjacency Violations and D-Linked *Wh*-Phrases

The first experiment—forcing a *wh*-phrase to be non-D-linked—has succeeded: the expected Subjacency effects appeared. My hypotheses also predict that Subjacency effects should disappear with *wh*-in-situ only when the *wh*-in-situ is D-linked. At first sight, this prediction appears to be false. A sentence like (39a) or (39b) may be freely used in Japanese even when the *wh*-phrase is non-D-linked. Important work by Choe (1984) and Nishigauchi (1984), however, helps to save the hypotheses.[21] This work shows that even examples like (39a–b), when examined more carefully, show Subjacency effects. I will demonstrate in turn that *these* Subjacency effects do indeed depend on discourse.

Choe and Nishigauchi take into account not only the grammaticality of various *wh*-questions in Japanese and Korean, but also the felicity of various answers to these questions. My examples will be from Japanese. The following are natural discourses in Japanese; that is, the answer corresponds in a natural way to the *wh*-phrase in the question.

(44) Q: Mary-wa John-ni *nani-o* ageta-no?
'What did Mary give to John?'
A: Konpyuutaa desu
computer Cop
'It's a computer'

(45) Q: John-wa *nani-o* yonda-no?
'What did John read?'
A: "Sensoo to Heiwa" desu
War and Peace Cop
'It's *War and Peace*'

Everything is much the same if the *wh*-phrase is in an embedded sentence.

(46) Q: Mary-wa [$_S$' John-ga nani-o yonda to] omotteiru-no?
Mary-Top John-Nom what-Acc read that think-Q
'What does Mary think that John read?'
A: "Sensoo to Heiwa" desu
'It's *War and Peace*'

When a *wh*-word is embedded in an island, however, an answer that simply corresponds to the *wh*-phrase is no longer felicitous for many or most speakers. Instead, a felicitous answer must recapitulate the entire island. Although speakers differ on the strength of these judgments, the data for most speakers seem to be as presented in the following examples, and I have not found speakers who present the opposite judgments.[22] The questions in (47)–(48) are the same sentences presented in (39a–b), respectively:

(47) Q: Mary-wa [$_{NP}$[$_S$' John-ni nani-o ageta] hito-ni] atta-no?
'What did Mary meet the man who gave to John?'
A1: */??Konpyuutaa desu
'It's a computer'
A2: [$_{NP}$[$_S$' Konpyuutaa-o ageta] hito] desu
computer-Acc gave man Cop
'It's the man who gave a computer (to him)'

The previous discussion of English immediately raises interesting questions about such languages. Following Huang's (1981, 1982) "Chomsky-style" analysis of similar phenomena in Chinese, Lasnik and Saito (1984) propose that *Wh*-Movement to Comp does apply in Japanese, much as in English. For them, the salient difference between Japanese and English questions is simply the absence of *Wh*-Movement at S-Structure: all *Wh*-Movement takes place at LF. (36a), for example, would have an LF representation in which *Wh*-Movement took place (to a right-hand Comp), as in (37).

(37) $[_{S'}[_{S}$ Mary-wa John-ni e_i ageta$]$ $[_{Comp}$ -no *nani-o*$_i]]$

Lasnik and Saito's proposal has a troubling aspect, however. The proposed LF movement appears not to show an important diagnostic of movement—namely, the cluster of effects sometimes captured by the Subjacency Condition (as noted at least since Kuno 1973). (They do argue, again following Huang, that the proposed movement obeys at least one of the diagnostics for movement—namely, a version of Chomsky's (1981) Empty Category Principle. I will remark briefly on this argument in note 31.) In particular, the proposed movement violates the Complex NP Constraint and the constraint on extracting from adjuncts. We see these constraints for English in the ungrammatical sentences of (38) and their grammatical Japanese translations in (39).[14]

(38) a. **What*$_i$ did Mary meet $[_{NP}$ the man $[_{S'}$ who gave e_i to John$]]$?
b. ?**What*$_i$ did Mary leave before John read e_i?

(39) a. Mary-wa $[_{NP}[_{S'}$ John-ni nani-o ageta$]$ hito-ni$]$ atta-no?
Mary-Top John-Dat what-Acc gave man-Dat met-Q
b. Mary-wa [John-ga nani-o yomu mae-ni] dekaketa-no?
Mary-Nom John-Nom what-Acc read before left-Q

From facts like these, Huang (1982) as well as Lasnik and Saito conclude that Subjacency does not apply at LF. This conclusion is perfectly plausible but nonetheless disappointing. Given that island phenomena of this sort are one of the principal diagnostic tests for movement, it becomes harder to argue convincingly that the derivation of LF really does involve movement. A potential argument for LF movement thus seems to be missing.

The discussion in the preceding section suggests a different approach. Suppose Subjacency *does* hold at LF. We should investigate whether the apparent absence of Subjacency effects in sentences like

(39a–b) is connected to the discourse status of the *wh*-phrases in question. Perhaps Subjacency appears to be violated only when the *wh*-in-situ does not have to move at LF. This approach can be investigated with two experiments:

1. Force an occurrence of *wh*-in-situ to be aggressively non-D-linked. If the proposed hypotheses are correct, such a *wh*-in-situ *must* undergo LF movement. If Subjacency holds at LF, then Subjacency effects should show up.
2. In apparent Subjacency violations like (39a–b), show that the *wh*-in-situ must be D-linked, hence allowed to receive scope without movement.

I perform these experiments in the following subsections. I show that the first experiment turns out exactly as predicted by the theory. The second does not. In this case, however, work by Choe (1984) and Nishigauchi (1984) suggests an independent explanation, which, in fact, ends up reinforcing my hypothesis about the LF distinction between D-linked and non-D-linked *wh*-in-situ.

5.3.1 Forcing a Non-D-Linked Reading

Phrases like *what the hell* are good candidates for "aggressively non-D-linked" *wh*-phrases. Roughly speaking, the whole point of uttering a question like *What the hell did you read that in?* is to express surprise in the answer. The appropriate answer is presumed not to figure in previous discourse.[15] Note the sharp contrast between the colloquial (40a) and the impossible (40b).

(40) a. What the hell book did you read that in?
b. *Which the hell book did you read that in?

(40b) can be ruled out by the conflict between aggressively D-linked *which* and aggressively non-D-linked *the hell*.

Japanese *ittai* seems to have the same function as English *the hell*.[16] Not surprisingly in a head-final language, *ittai* precedes the *wh*-phrase with which it is interpreted.[17]

(41) Mary-wa John-ni *ittai* *nani-o* ageta-no?
Mary-Top John-Dat the-hell what-Acc gave-Q
'What the hell did Mary give to John?'

LF.[28] If *dono konpyuutaa* does not have to move, since it is D-linked, then Subjacency is irrelevant, and the acceptability of the first answer is predicted. The question in (54) need not have the Chomsky-style representation in (50). Rather, it has the Baker-style representation in (55).

(55) Mary-wa [$_{NP}$[$_{S'}$ John-ni *dono konpyuutaa-o*$_t$ ageta] hito-ni] atta-*no*$_t$?

Why should the "pied-piping" second answer also be possible? Two possibilities present themselves. First, a movement option might be available even for D-linked *wh*-phrases. Second, the same percolation of the *wh*-feature that is necessary to allow pied-piping in movement cases might allow Baker-style Q indexing to apply optionally to the full NP, as in (56).

(56) Mary-wa [$_{NP}$[$_{S'}$ *John-ni dono konpyuutaa-o ageta*] *hito-ni*]$_i$ atta-*no*$_i$?

Since Comp now contains the index, not of *dono konpyuutaa*, but rather of the whole complex NP, the Felicity Principle will yield the second answer in (54). There are various ways to distinguish the two proposals, involving complex NPs embedded in other complex NPs. I will not attempt an investigation here.

5.3.3 Results

Summarizing, I believe that this section has achieved two goals. First, my central hypothesis concerning the interaction between D-linking and LF movement has been strongly confirmed by evidence from Japanese. Second, this hypothesis has provided a formerly missing argument for movement at LF—an argument from Subjacency. I showed first that non-D-linked *wh*-phrases do indeed obey Subjacency. In the case of *ittai*-phrases, which prohibit pied-piping, I demonstrated Subjacency effects simply by examining *wh*-questions. In other cases I followed Choe and Nishigauchi in examining the pattern of felicitous answers. Once a *wh*-phrase is D-linked, however, the evidence for Subjacency disappears, lending further credence to the idea that D-linked *wh*-in-situ are assigned scope by a mechanism like Baker's, without movement.[29]

Finally, I should like to emphasize a methodological point. If my discussion is correct, then work that deals with *wh*-in-situ in particular must take extraordinary care in drawing conclusions based on data.

Simple inspection of a grammatical utterance in which a *wh*-in-situ appears to take scope out of an island, for example, cannot be used in and of itself as a basis for conclusions about the status of islands at LF or about the existence of LF. One must carefully investigate at least the discourse status of the *wh*-phrases and the possibility of a pied-piping analysis.[30]

5.4 East European

Some of the most striking evidence for the discourse distinction (called to my attention by Jae Choe, personal communication) concerns the East European *Sprachbund* that exists with respect to multiple interrogation. The range of phenomena I will discuss comes from Polish. For most speakers, the same facts hold in Romanian, and Petr Sgall (personal communication) suggests that they may also hold in Czech. I do not have specific information on the other languages of this group.

Lasnik and Saito (1984) discuss sentences like (57a–b) from Polish. The judgment they cite is given in parentheses.

(57) a. Zastanawiam się [kto co przyniesie]
I-wonder who what will-bring
'I wonder who will bring what'

b. (*)Zastanawiam się kto przyniesie co

They claim that in Polish multiple interrogations like (57a–b) all the *wh*-phrases that are interpreted together are fronted at S-Structure to an $\bar{A}$-position. We will not be concerned here with the nature of this position—whether Comp or an adjunction site (see Toman 1981 for some discussion). Based on the contrast between (57a) and (57b), Lasnik and Saito formulate the following generalization for Polish (a particular setting of a general parameter).

(58) In Polish every *wh* must be in an $\bar{A}$-position at S-Structure. (p. 239)

The kind of movement seen in (57a) is exactly what is proposed for LF in the Chomsky-style analysis of *wh*-in-situ. Polish (and the other languages of the *Sprachbund*) is interesting because, with respect to *wh*, at least, it seems to wear its LF on its sleeve. I will suggest that this is truer than has been realized.

In particular, there is more to the data than Lasnik and Saito's discussion suggests. In her original discussion of multiple interrogation in

(48) Q: Mary-wa [John-ga nani-o yomu mae-ni] dekaketa-no?
'What did Mary leave before John read?'

A1: *"Sensoo to Heiwa" desu
'It's *War and Peace*'

A2: ["Sensoo to Heiwa"-o yomu mae] desu
War and Peace-Acc read before Cop
'It's before (he) read *War and Peace*'

As both Choe and Nishigauchi note, these facts immediately suggest pied-piping. Suppose that the following principle holds in Japanese.

(49) *Felicity Principle*
A felicitous answer to a *wh*-question consists of a phrase structurally identical to the *wh*-phrase whose index is immediately dominated by the Comp of the question at LF.[23]

Let us now consider the consequences if Subjacency does apply at LF and if the *wh*-phrases in (47) and (48) receive a Chomsky-style movement analysis. Although *Wh*-Movement cannot move the *wh*-phrase out of the complex NP in (47) and out of the adjunct in (48), nothing a priori prevents pied-piping of the entire complex NP or adjunct.[24] If pied-piping applies, (47) and (48) have the LF representations in (50) and (51), respectively.

(50) Mary-wa e_i atta- [$_{Comp}$ no [$_{NP}$[$_{S'}$ John-ni nani-o ageta] hito-ni]$_i$]

(51) Mary-wa e_i dekaketa- [$_{Comp}$ no [John-ga nani-o yomu mae-ni]]

The Felicity Principle correctly predicts the pattern of answers.[25]

If Choe and Nishigauchi are correct, examples that have been presented as Subjacency violations in Japanese are not Subjacency violations at all. Thus, the second experiment—to show that D-linking and only D-linking allows Subjacency violations—has not failed; rather, it has not begun.

First, however, we need to deal with a problem created by Choe's and Nishigauchi's analysis. The examples with *ittai* and the examples just considered really make the same point: non-D-linked *wh*-phrases must move at LF, and this movement obeys Subjacency. Nonetheless, they make the point in contradictory ways. In the case of *ittai* we saw Subjacency effects by looking for grammaticality judgments on *wh-questions;* in the cases just considered we saw the effects only by looking at the *answers* to the questions. This was because of the pied-piping option. If a *wh*-word in an island may pied-pipe the whole island with it,

the only possible way to detect Subjacency is through the answers, thanks to the Felicity Principle. But why then did we detect Subjacency effects in *ittai questions?*

Clearly, the examples with *ittai* must prohibit LF pied-piping for some reason. Note, however, that this prohibition is not a *deus ex machina,* since a similar prohibition is visible at S-Structure in English *the hell* phrases.

(52) a. Pictures of whom cost the most at the sale?
b. *Pictures of who the hell cost the most at the sale?

(53) a. I wonder what the hell he's talking about
b. *I wonder about what the hell he's talking

The examples in (53) might be due to a style clash between the relatively formal pied-piping and *the hell.* Those in (52), however, cannot be due to such a clash. Since pied-piping is obligatory here, the pied-piping in (52a) does not seem at all formal.[26] Furthermore, *what on earth* works much the same as *what the hell,* in that it disallows pied-piping; but it is not incompatible with the relatively formal register necessary to allow pied-piping in (53).[27]

Putting this problem aside, I return to the question of whether Subjacency effects do indeed disappear when *wh*-in-situ is D-linked. The relevant case is (54). Strikingly, my hypothesis is confirmed: Subjacency effects do indeed disappear. Compare (54) with (47).

(54) Q: (Context: IBM-to, Apple-to, Fuzituu-to, Matusita-no naka-de . . .)
'Among IBM, Apple, Fujitsu, and Panasonic (National) . . .'
Mary-wa [$_{NP}$[$_{S'}$ John-ni *dono konpyuutaa-o* ageta] hito-ni atta-no?
'*Which computer* did Mary meet the man who gave to John?'

A1: IBM-no konpyuutaa desu
IBM-Gen computer Cop
'It's the IBM computer'

A2: [$_{NP}$[$_{S'}$ IBM-no konpyuutaa-o ageta] hito] desu
IBM-Gen computer-Acc gave man Cop
'It's the man who gave the IBM computer (to him)'

The acceptability of the first answer is unexpected if all *wh*-in-situ must move at LF and if, as I have argued, Subjacency does hold at

Which-phrases unselectively bound by Q seem to function pronominally in exactly this way: they are "familiar" rather than novel, returning old entries in the filing system of discourse. In this they contrast with the normal use of phrases such as *who* and *what*, but they act much like pronouns. (66) displays this contrast. In (66b) it is natural, almost obligatory, to assume that the question is asking for a choice among the men who entered the room. In (66c) considerations of textual connectedness make this assumption possible but much less natural.[36]

(66) a. Some men entered the room. Mary talked to them
b. Some men entered the room. Which (ones) did Mary talk to?
c. Some men entered the room. Who did Mary talk to?

We can thus say that *which*-phrases do have the properties of indefinite NPs but that they are familiar rather than novel.

The phenomenon of "accommodation" discussed by Heim can then explain the use of *which*-phrases in "quiz show" contexts (see note 9).

(67) For 100 dollars, which German author wrote *Faust?*

The discourse need not contain any mention of *Faust* or of Goethe. Both the quizmaster and the contestants may be equally ignorant of the answer. The question thus violates various felicity conditions on the use of "familiar" NPs like *which:* there is no preexisting file entry applicable to the situation. Under these circumstances quizmaster and contestants "[add] to the file enough information to remedy the infelicity" (Heim 1982:372), for instance, *A German author wrote Faust.*[37]

There is thus a natural connection between *which*-phrases and one instance of unselective binding—namely, the discourse binding seen with pronouns. The connection between this discourse binding and the interpretation of questions, however, remains to be drawn.

5.6 Finishing Touches

One salient detail remains to be taken care of. If D-linked *wh*-phrases do not have to undergo movement to satisfy (8), why are they required to move in English examples like (68)?

(68) a. I wonder which book you read
b. *I wonder you read which book

Evidently, although no property intrinsic to *which*-phrases forces them to move, there is some property intrinsic to an interrogative Comp in English that forces this Comp to be occupied by a *wh*-phrase at S-Structure. Recall that nothing *prevents* a D-linked *wh*-phrase from moving to Comp (but see note 32). Therefore, if moving *which book* to an interrogative Comp at S-Structure is the only way to satisfy the requirements of this Comp, then it must so move.

Borrowing a leaf from Lasnik's (1981) discussion of why Affix Hopping is obligatory, I suggest that the requirement is essentially morphological: the Q morpheme must be supported by some appropriate adjacent phrase. Suppose the candidates are Infl or a *wh*-phrase.

(69) The Q morpheme must cliticize to a *wh*-phrase or Infl. (S-Structure)

In English Infl is not adjacent to Comp. Hence, *Wh*-Movement moves *wh* to Comp at S-Structure (unless Comp already contains a *wh*-phrase like *whether*), and cliticization takes place.[38] In Japanese, however, Infl and Comp are adjacent in clause-final position; hence, cliticization takes place without *Wh*-Movement.[39]

5.7 Conclusions

Once we separate the properties of D-linked *wh*-phrases from those of non-D-linked *wh*-phrases, we see that scope assignment to non-D-linked *wh*-phrases has essentially all the properties of syntactic movement.[40] I take this to be a strong argument for the level of Logical Form, since levels are motivated by just such a clustering of properties. Additionally, we see that what is paramount in exploring Logical Form are its properties as a *syntactic* level on the road to interpretation, not one or another arbitrarily assigned semantic property like disambiguation of scope.

It is also interesting to notice that the S-Structure treatment of *wh*-phrases in English, Japanese, and Polish essentially exhausts the spectrum of variation among languages, if we exclude mixed languages that optionally move *wh* or optionally move more than one. Yet despite the surface variety, the LF treatment of *wh*-in-situ in these languages appears to be the same. This is as expected, since the LF properties enunciated here are not plausibly learned by children from experience but must belong to Universal Grammar.

Polish, Wachowicz (1974) notes that examples like (57b) are not actually ungrammatical. She considers examples like (59),

(59) W końcu, kto robi co?
finally who does what

and notes that they are actually acceptable in a very particular context. By now the reader may guess what that context is:

> [Such] questions are somewhat different from echo questions. We can call them clarifying questions. The speaker could ask [(59)] in the following situation. There are various tasks, and several people to be assigned for them. Proposals have been made how to pair up people and tasks, but no fixed plan has been set up yet. The speaker of [(59)] is confused by the proposals, and wants to have a fixed plan. (Wachowicz 1974:159)

This observation appears to hold quite generally: all non-D-linked *wh*-phrases move to an $\bar{A}$-position at S-Structure, but D-linked *wh*-phrases may stay in situ. The (b)-sentences of (60)–(62) all have the special usage described by Wachowicz.[31]

(60) a. Kto kogo zabił?
who whom killed
b. Kto zabił kogo?

(61) a. Kogo kiedy Maria zabiła?
whom where Maria killed
b. Kogo Maria zabiła kiedy?

(62) a. Kogo jak Maria zabiła?
whom how Maria killed
b. Kogo Maria zabiła jak?

Polish and the other languages of its group thus show on the surface what I have hypothesized for the LF representations of English and Japanese.[32] We can handle the details in a number of ways. One possibility is to claim that the following statements hold in Polish.

(63) a. More than one *wh* may undergo *Wh*-Movement in a single clause.
b. There is no LF *Wh*-Movement.[33]

We might speculate briefly on how (63b) might find its place in a learnable system of core grammars. The answer might be that (63b) is the unmarked case, given the existence of languages like Italian that

lack multiple interrogation entirely.[34] In any case, if true, the distinctions drawn here between D-linked and non-D-linked *wh*-in-situ are certainly parts of Universal Grammar, not learned from experience by the child.[35]

5.5 D-Linking

English, Japanese, and East European thus all provide evidence that non-D-linked *wh*-phrases are assigned scope by movement at the level of LF, whereas D-linked *wh*-phrases are assigned scope without movement. The next question is why movement versus nonmovement should correlate with D-linking. In particular, I have argued that the scope of D-linked *wh*-phrases is assigned by unselective binding, much as scope is assigned to indefinite NPs in Heim's system. Yet indefinites and D-linked *wh*-phrases may seem strange bedfellows.

In this section I will not solve this problem, but I will speculate briefly on the direction a possible solution might take. The key here is Heim's treatment of indefinite NPs, like *a man* in the sentence *Suddenly, a man appeared*. Heim proposes that an existential quantifier is introduced by a general rule of *Existential Closure*, which then proceeds to unselectively bind the indefinite. Importantly, the indefinite must also be interpreted as "novel" in the discourse. Heim later combines these requirements, assimilating Existential Closure to a more general phenomenon in which variables may be bound by "file cards" in a discourse representation. Uttering a novel indefinite creates a new entry in the filing system. Pronouns also exist, which have the discourse properties of indefinites except that they are not novel but are instead bound by an already existing entry, as in (64a–b).

(64) a. A man walked into the room. *He* was wearing a fur coat
b. Some men walked into the room. *They* were wearing fur coats

The scope of the "file card" may vary, affecting the interpretation both of the indefinite and of a "familiar" pronoun that may return the indefinite (see Partee 1973 on such de dicto pronouns).

(65) a. John claimed Bill believed that I'd eaten a pizza. Mary even claimed that Bill believed it had anchovies. But in fact I ate chicken that night
b. John claimed Bill believed that I'd eaten a pizza. Mary even claimed that Bill believed it had anchovies. But in fact Bill believed that I'd eaten chicken.

14. The adjuncts in Japanese seem to be complex NPs; hence, there may be no real distinction between Complex NP Constraint effects and adjunct effects.

15. Roger Higgins (personal communication) brings up the question of the exclamative use of *the hell*. If John starts to leave the room and I say *Where the hell do you think you're going!*, I may know perfectly well that John is heading home. Nonetheless, we might still want to say that *where the hell* is non-D-linked, since *home* is in fact not a destination under previous discussion and there is no "accommodation" here. (See note 9.)

16. Speakers of Korean differ on whether Korean *todeche*, used much like *ittai*, acts like *ittai* with respect to the facts in question.

17. As Junko Itô (personal communication) points out, it is vital to distinguish this use of *ittai* from its use as a sentence adverb, meaning roughly 'in general'. The speakers with whom I worked had little difficulty in disambiguating the uses, which is essential if the effects discussed in the text are to be observed.

18. If *ittai* has such limitations, then the examples that follow tell us nothing about Subjacency. Nishigauchi (1985) claims that the acceptability of sentences like (42) is indeed "low" for him, but other informants do not share this intuition, or at worst find a marked contrast between (42) and (43b).

19. Complex NPs where the embedded S′ is not a relative clause—for example, of the *fact that* type—show weaker Subjacency effects, exactly as with English S-Structure movement.

(i) ??What did Mary remember the fact that John read?

(ii) ??Mary-wa [$_{NP}$[$_{S'}$ John-ga *ittai* *nani-o* yonda] koto-o]
Mary-Top John-Nom the-hell what-Acc read fact-Acc
wasureteiru-no?
remembered-Q

20. Kitagawa (1984) points out some other relevant facts concerning *ittai*. Japanese has generally been taken not to have visible Superiority effects, plausibly because it cannot easily be seen in a multiple interrogation which of a set of *wh*-phrases has moved first. Nonetheless, contrasts of the following sort suggest Superiority (where *dare-ga* receives a non-D-linked interpretation).

(i) a. [Ittai dare-ga] nani-o tukamaeta-no?
the-hell who-Nom what-Acc caught-Q

b. ??Dare-ga [ittai nani-o] tukamaeta-no?
who-Nom the-hell what-Acc caught-Q

Clever construction of examples with center embedding shows that the contrast does involve c-command, and not some left-to-right restriction on *ittai*. Kitagawa notes that if we make the assumption that the *ittai*-phrase *must move to Comp first*, before the other *wh*-phrase does, then (ia–b) will be analogous to familiar English contrasts like *Who caught what?* versus **What did who catch?* In (ib) the object has moved to Comp first; in (ia) the subject has done so. Finally, the assumption that *ittai*-phrases must move to Comp first is not so shocking once we examine the English contrast in (ii) and the French examples in (iii) from Richard Kayne (personal communication; see Kayne 1972:97). Unlike English, French normally allows matrix *wh*-phrases to remain in situ even with the nonecho interpretation.

(ii) a. Who the hell caught what?
b. *Who caught what the hell?

(iii) a. Où (diable) est-il allé?
'Where (the devil) did he go?'
b. Il est allé où (*diable)?

Why *ittai*-phrases must move to Comp first is a mystery to me. It is striking that elements that move to Comp first in Japanese are those that must move at S-Structure in English and French. The elements that move first to Comp seem to act as the "sorting key" for the answer, as suggested by Kuno (1982). Thus, *Which book did which man read, in alphabetical order?* invites a set of pairs alphabetized by book titles, whereas *Which man read which book, in alphabetical order?* invites a set of pairs alphabetized by men's names. The distinction between S-Structure movement and LF movement in languages like English might actually be a distinction between elements that serve as a sorting key, moving as soon as possible to fulfill that function, and those that can wait. The notion "sorting key" seems obviously related to the syntactic notion "head of Comp" in the sense of Lasnik and Saito.

21. Choe and Nishigauchi reached similar conclusions independently, Choe for Korean as well as Japanese. These results were also anticipated in Lee 1982 and in an early draft of Huang 1981. Also see Kayne 1983: sect.3.2.

22. Except Kuno and Masunaga (1985) in certain cases; see Pesetsky 1985.

23. I say *whose index is immediately dominated* rather than *which is immediately dominated* to allow Baker-style analyses of the type to be motivated shortly.

24. Once again, as in note 19, *fact that* complex NPs show weaker Subjacency effects than do complex NPs with relative clauses; thus, although recapitulating the whole island gives a more felicitous answer to example (ii) in note 19, the "simple" answer seems to be only weakly bad here (as noted by Nobuko Hasegawa, personal communication).

(i) A1: ?"Sensoo to Heiwa" desu
'It's *War and Peace*'

A2: [$_{NP}$[$_{S'}$ "Sensoo to Heiwa"-o yonda] koto] desu
'It's the fact that (he) read *War and Peace*'

25. Interestingly, the starred answers in (47) and (48) apparently improve for some speakers if the copula is omitted, in colloquial speech. Perhaps with the copula omitted the answers are no longer full sentences and are thus not governed by grammatical principles like the Felicity Principle. In a related observation, James Yoon (personal communication) suggests that the starred answers improve in Korean if the more formal copula *ipnita* (= Japanese *desu*) is replaced with the more colloquial *yo*. Something along these lines might also explain why English does not show similar effects: to the (stilted) question *Pictures of whom do you like the most?*, the answers *Mary* and *Pictures of Mary*

Finally, the interaction of discourse factors with other syntactic properties is intricate and difficult to decipher, as has long been recognized. Heim's (1982) study (along with parallel studies by Kamp and others) took an important step in working out certain areas of interaction that are amenable to linguistic inquiry. This chapter has attempted to link Heim's results to the study of *Wh*-Movement in Logical Form—a link, if correct, of some importance.

Notes

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1. I will generally ignore echo questions, like *You saw WHO?*, except for a few miscellaneous remarks.

2. See also Katz and Postal 1964:sect. 4.2.4. A version of Baker's proposal has been revived in Van Riemsdijk and Williams 1981.

3. The difference between Katz and Postal's 1964 *Q* morpheme and the [+WH] feature introduced by Chomsky and Lasnik (1977) is essentially terminological. I will assume a Q morpheme in "Baker-style" representations, as well as anachronistic traces and Comp.

4. Elements that are unselectively bound are thus distinct from *any*, if the analysis in Aoun, Hornstein, and Sportiche 1981 and Hornstein 1984 is correct (but see Kurata 1986), and from *wh*-in-situ in echo questions (see Hendrick and Rochemont 1982), which are treated like names and, if they can be said to have scope at all, have obligatory widest scope.

5. The contrast between (20b) and (21b) may be due to the fact that (21b) also violates the Empty Category Principle (ECP) at LF. See Kayne 1979 and subsequent work, as well as Kayne 1983:fn. 13 and May 1985.

6. In Pesetsky 1982 I argued that certain movements—namely, movement to an A-position (argument position)—are also not subject to the Nested Dependency Condition. This might not be so, as I discuss in Pesetsky, forthcoming.

7. Strictly speaking, to derive a hierarchical condition like Superiority, we need a hierarchical, not linear, version of the Nested Dependency Condition. Elsewhere (Pesetsky 1982, forthcoming) I argue for exactly such a Nested Dependency Condition: a hierarchical nesting constraint based on paths in a phrase marker, which I call the *Path Containment Condition*. Although there are empirical differences between the linear and hierarchical theories that are relevant to the Superiority Condition, they do not affect the main points of this chapter. On the other hand, if the Path Containment Condition is wrong, and a linear approach is correct, then (as Gert Webelhuth, personal communication, has pointed out) we do not need to assume adjunction to S′ to derive the Superiority Condition. Movement to a left-hand position in Comp, as in (6), will work as well.

8. The examples in (29) appear to have been noted first by Chomsky (1980a), who attributes the observation to Richard Kayne. See also Koster 1978. Kayne (1983, loc. cit.) tentatively denies any grammaticality contrast here and in similar cases involving the ECP. To my ears, ECP contrasts exist between *who*, *what*, and so forth, and *which N′* along the lines of the Superiority contrasts cited in the text.

(i) ??Tell me what proves that who is innocent

(ii) Tell me which piece of evidence proves that which person is innocent

9. Of course, the set of books need not actually have been verbally specified in an utterance, as long as both speaker and hearer make the same assumptions about context. This is the phenomenon of "accommodation" discussed by Heim. Thus, if Mary is looking at a shelf full of books, John might sneak up behind her and ask *Which book are you planning to steal?*, without any preceding utterances. An apparent exception to my proposed generalization about *which*-phrases occurs in "quiz show" contexts, to which I return in a later section.

10. For a similar distinction motivated by Romance clitics, see Cinque 1985 and references cited therein.

11. Note that I have not said whether or not D-linked *wh*-phrases *may* optionally be moved in a multiple interrogation. So far it is only clear that they *need not* be moved. I return to this question in note 32.

12. Kuno and Robinson (1972) argue that all *wh*-in-situ obey a clausemate condition, effectively excluding the wide-scope interpretation for example (2). Hankamer (1974) disagrees, claiming that the wide-scope reading does indeed exist. He notes, however, (footnote 3) that the wide-scope reading is only available for *wh*-phrases that are, in my terms, D-linked—including D-linked *who* and *what*. My judgments do not coincide with Hankamer's here. Nonetheless his judgments are interesting, since they suggest that for some speakers LF movement is clause-bound, wide scope being possible only when assigned without movement. There is a clear parallel to widely accepted judgments on quantifier scope (not my own).

13. Kuno and Masunaga (1985) have offered a rejoinder to my arguments from Japanese as they appear in an earlier version of this chapter. I reply to their discussion in Pesetsky 1985. Nishigauchi (1985, 1986) also provides very relevant further discussion and debate.

seem equally acceptable to me. English lacks a normal answering pattern with anything like the copula seen in Japanese or Korean.

26. Guglielmo Cinque (personal communication) observes that pied-piping is also generally ruled out with *wh diavolo* phrases in Italian, as in English, except where a single preposition is pied-piped as in (53b). If this is related in some way to the obligatoriness of P pied-piping in Italian, then we have an unexplained difference between English and Italian.

27. Why should there be a prohibition on pied-piping with *ittai* or *the hell?* An answer for Japanese may be found in an observation by Nishigauchi (1985). If pied-piping were possible in an example like (43a), such an example would be grammatical because the pied-piping convention allows the whole island to be treated as a *wh*-phrase and moved. Suppose that *ittai* must be attached to the *wh-phrase* that actually undergoes movement. Then if *ittai* attaches to *nani-o*, *nani-o* must be the *wh*-phrase that undergoes LF movement. Since that movement violates Subjacency, (43a) is ungrammatical. On the other hand, if *ittai* is attached to the whole island that contains *nani-o*, then that island should count as a *wh*-phrase, pied-piping should be possible, and the sentence should be grammatical. Nishigauchi observes that this is the case. Thus, (i) seems to be much better than (43a).

(i) Mary-wa ittai [$_{NP}$[$_{S'}$ John-ni nani-o ageta] hito-ni] atta-no?

Thus, pied-piping might not really be forbidden with *ittai*. Rather, *ittai* simply must attach to the *wh*-phrase that moves. When pied-piping is the only way to satisfy Subjacency, then *ittai* must be attached to the entire *wh*-phrase.

On the other hand, it seems to be somewhat unclear whether *ittai* in (i) is interpreted with the *wh*-phrase or has the interpretation "in general" mentioned in note 17. (This is Hoji's (1985:393, ex. (7)) claim about a similar example.) One other ground for caution might be the absence of examples like (i) with English *the hell: *Whose pictures the hell. . . .* If Nishigauchi's suggestion is correct, it somewhat undercuts the claim that the island properties of *ittai* are solely due to "aggressive non-D-linking," though other properties of *ittai* continue to point in that direction (see note 20, note 28, and elsewhere). On the other hand, the *ittai* data would provide striking evidence in favor of LF pied-piping and would continue to contribute an argument for my central claim: although pied-piping saves non-D-linked *wh*-words from Subjacency violations at LF, D-linked *wh*-words do not need to be saved, since they do not move.

28. Nishigauchi (1984) gives an example with *dono* that, he claims, still requires a "pied-piping" answer. I am told, however, that *dono*, unlike English *which*, is not always D-linked. Setting up an explicit context as I have in (54) is crucial to forcing a D-linked reading and getting the results as shown. A related fact may be the possibility, noted by Hajime Hoji (personal communication), of *ittai dono konpyuutaa;* compare English **which the hell* in (40). *Ittai dono konpyuutaa* acts like other *ittai*-phrases with respect to Subjacency.

29. Hoji (1984) presents a number of additional, very interesting arguments from Japanese in favor of the distinction I have drawn. He notes, for example, that although the overt pronoun *kare* cannot normally be used as a bound variable, it may be "bound" or "corefer" with a *dono*-phrase, *if* that phrase is interpreted as D-linked.

(i) *Dare$_i$-ga [kare$_i$-no haha] -o semeta-no?
who-Nom he-Gen mother-Acc criticized-Q
'Who$_i$ criticized his$_i$ mother?'

(ii) Dono hito$_i$-ga [kare$_i$-no haha] -o semeta-no?
which man-Nom he-Gen mother-Acc criticized-Q
'Which man$_i$ criticized his$_i$ mother?'

What is more, weak crossover effects, which Hoji and Saito (1983) take to diagnose movement, disappear with D-linked *dono* phrases.

(iii) *[$_{S'}$ Mary-ga [sono hito$_i$]-o semeta koto]-ga *dare$_i$*-o odorokaseta-no?
Lit.: 'The fact that Mary criticized that person$_i$ surprised whom$_i$?'

(iv) [$_{S'}$ Mary-ga [sono hito$_i$]-o semeta koto]-ga *dono hito$_i$*-o odorokaseta-no?
Lit.: 'The fact that Mary criticized that person$_i$ surprised which man$_i$?'

Choe (1984) also demonstrates an argument from weak crossover for pied-piping at LF, which I will not detail here. This argument is criticized by Nishigauchi (1985, 1986); Nishigauchi's criticisms are answered by Hasegawa (in press).

30. Koster (1984), for example, concludes that the phenomenon of "Global Harmony" that holds of S-Structure movement does not hold of LF movement. His conclusions may indeed be correct, but many of his Dutch examples involve arguably D-linked *which* (*welk*) phrases, and pied-piping might even be an option for others.

31. Intriguingly, *dlaczego* 'why' may *not* remain in situ, whereas *zjakiego powodu* 'for what reason' may.

(i) Kogo dlaczego Maria zabiła?
whom why Maria killed

(ii) *Kogo Maria zabiła dlaczego?

(iii) Kogo Maria zabiła zjakiego powodu?
whom Maria killed for-what reason

What seems to be at stake is that it is cross-linguistically extremely difficult to D-link the word that means *why*. This has an obvious relation to the facts concerning *why* discussed by Huang (1981, 1982) and by Lasnik and Saito (1983). In particular, they note (I simplify) that in Chinese and Japanese *why* cannot take scope out of an island. Yoshihisa Kitagawa (personal communication) reports that if one can force a D-linked reading for *why* in Japanese—an extremely difficult task—this scope restriction disappears. As an additional element for the explanation of the properties of *why*, note that it thoroughly resists pied-piping, closing the loophole available to other *wh*-words.

(iv) ?People who live where are the most likely to suffer from allergies?

(v) *People who left why are the most likely to succeed?

Thus, the properties of *why* might be due to Subjacency, as originally suggested by Huang (1981), and not to the ECP, as suggested by Huang (1982) and by Lasnik and Saito.

32. Polish in fact provides an opportunity to ask a question we could not answer before (see note 11). Granted that movement of D-linked *wh*-phrases is not obligatory in multiple interrogations, is it an option? Wachowicz (1974:n. 161) gives a relevant example that suggests that it is not an option: "Polish sentences containing two instances of the interrogative word 'which' sound better if only one of them has been fronted, e.g. *która dziewczyna zauważyła który błąd* 'which girl noticed which error'." Perhaps one must be fronted to satisfy the syntactic requirements discussed in section 5.6, but no other may be fronted, in accordance with some kind of "Move only when necessary" principle; see Chomsky 1986. One native speaker of Polish, at least, does not find fronting of both *which*-phrases so bad, but speakers of Romanian in general do find fronting bad in this case.

33. Except perhaps for movement of a single *wh* to a matrix Comp, as in Lasnik and Saito's example (72); though it is not clear that this example is really acceptable except as an echo question.

34. At least one Italian speaker suggests that multiple interrogation is sometimes marginally possible (as in *Chi ha detto che cosa?* 'Who said what?') when the *wh*-in-situ is D-linked, as (63) plus the other hypotheses advanced here would predict. On the other hand, Guglielmo Cinque notes (personal communication) that such expressions are not productive as true multiple interrogations and may be confined to newspaper style.

35. Nonetheless, there may be languages that do not allow even D-linked *wh*-in-situ to remain unmoved at LF; these languages might lack Q-indexing. An example is Kikuyu, as pointed out by Victoria Bergvall (personal communication). Bergvall (1984) notes that *wh*-in-situ is possible in Kikuyu much as in Japanese, although an S-Structure movement option is available. *All wh*-in-situ, no matter what the context, show clear Complex NP Constraint effects, much like Japanese *ittai wh*-phrases. This suggests that (1) the pied-piping option is missing in Kikuyu, and (2) Q indexing is also missing. Learnability considerations make one hope that this pattern is somehow related to the full optionality of S-Structure *Wh*-Movement in Kikuyu, which has both English and Japanese question types, but I have no insight to offer.

36. Compare also . . . *what men did Mary talk to?*, which acts like *who*, in my judgment. Also, Jerry Morgan (personal communication) correctly notes that many quantifiers appear to act like *which:* for example, *Some men entered the room. All were wearing suits*. This could indeed argue that *all* does not undergo LF movement; for example, in dialects like my own in which quantification is not clause-bound, *all* does not show ECP effects. Alternatively, *all* could be a genuine moving quantifier, yet one containing a restricting term (compare *all of the men*) that is D-linked. See Kuno 1982 for some discussion of related issues.

Also notice that in many cases the appropriate antecedent for *which* is less an indefinite than an NP with "wide-scope *or*." As discussed by Partee and Rooth (1982), such NPs have a number of properties in common with indefinites, including insensitivity to islands (*pace* Larson 1985).

(i) Bill was telling me that he'd recently arrested Mary, who owned either a dog that barked too much or a cat that destroyed furniture. I forget which it was

(ii) John was talking about Bill, who he evidently considered either dishonest or dumb. I forget which it was

37. This information may also sometimes be expressed overtly; for instance, compare the (a)- and (b)-continuations in (i). The (b)-continuation does not naturally continue to ask about the assassin, as the (a)-continuation does.

(i) For 100 points and a chance at the jackpot:
In 1963 a man shot Kennedy in Dallas.
a. Which man then ran to a movie theater to hide?
b. Who then ran to a movie theater to hide?

38. Dominique Sportiche (personal communication) points out that this might entail the absence of S-Structure movement in questions like *Who left?*, yielding essentially the Generalized Phrase Structure Grammar S-Structure representation for such questions, defended recently by Chung and McCloskey (1983) (see discussion in Chomsky 1985). I am personally doubtful about the facts claimed in that article, but the theoretical consequence is worth noting.

39. This does not explain why S-Structure *Wh*-Movement *must not* take place in Japanese (a general property of SOV languages), but it does explain why it is not obligatory.

40. One possible exception might be the Coordinate Structure Constraint, if Kuno and Masunaga (1985:ex. (14)) are correct; compare the opposite conclusions based on English in Pesetsky 1985:chap. 4.