44 Multiple-Wh-Questions

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1 Introduction

1.1 Wh-expressions as diagnostics of scope
1.1.1 Fronting and possible answers as indicators of scope
1.1.2 Constraints on Scope: ECP and Subjacency
1.1.3 Alternatives to Covert Movement
1.1.4 Overview of the chapter

1.2 Cross-linguistic variation in multiple-wh-questions
1.2.1 Non-fronting languages
1.2.2 Multiple-fronting languages
1.2.3 Languages without multiple-wh-questions
1.2.4 Optional-fronting languages
1.2.5 Explanations for typological variation

2 Superiority effects

2.1 Amelioration under D-linking
2.2 Explanations for superiority
2.2.1 Within the Principles and Parameters framework
2.2.2 Economy-based accounts
2.2.3 Accounts based on functional wh

2.3 Typological variation in Superiority effects
2.3.1 Superiority in multiple-fronting languages
2.3.2 Languages without Superiority effects

3 Subjacency and wh-in-situ

3.1 The diagnostic of possible answers
3.1.1 Single- vs. multiple-pair answers
3.1.2 Deriving single- and multiple-pair answers

3.2 Pair answers across islands
3.2.1 Single-pair answers across islands
3.2.2 Multiple-pair answers across islands

3.3 Reassessing Subjacency at LF
3.3.1 The evidence for and against Subjacency
3.3.2 Specification, scope, and D-linking

4 Conclusion
1 Introduction

1.1 Wh-expressions as diagnostics of scope

1.1.1 Fronting and possible answers as indicators of scope

I will begin this survey of multiple-wh-questions by outlining those theoretical claims for which the study of wh-dependencies has been particularly important. These include the claim that there is a level of syntactic representation intermediate between overt syntax and the interpretive module, known as Logical Form (LF), and that movement at this level is subject to the Empty Category Principle (ECP) but not Subjacency.

Wh-expressions provide a special window on the nature of syntactic dependencies because in many languages they appear at the periphery of the clause, in the position at which they are assumed to be interpreted. In this they differ from quantified expressions, for example, which also may be argued to require clausal scope for interpretation but do not seem to occur in a specially designated scope position in any language. To appreciate the diagnostic power of wh-expressions, consider a simple question in English, such as (1a), and one of its possible answers, given in (1b):

(1)  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Which book did Bill buy?</td>
</tr>
<tr>
<td>b.</td>
<td>(Bill bought) War and Peace.</td>
</tr>
</tbody>
</table>

(2)  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>( \lambda p \exists x [\text{book}(x) &amp; p = \text{bought}(\text{Bill}, x)] )</td>
</tr>
<tr>
<td>b.</td>
<td>{Bill bought War and Peace, Bill bought Aspects}</td>
</tr>
</tbody>
</table>

Intuitively, the fronted wh-expression is linked to the object of the verb buy. Syntactic tests, using agreement and
binding facts, for example, can further establish the syntactic dependency between the fronted element and the gap in argument position. In logical form this dependency is understood as an operator–variable relation. Under a standard semantics for questions such as Hamblin (1973) or Karttunen (1977), (1a) is interpreted as in (2a), yielding the set of propositions obtained by varying assignments to the variable bound by the \( \exists \) operator. In a context where the quantifier ranges over the set \{War and Peace, Aspects\}, we get the set of propositions in (2b) as the denotation of the question. An appropriate answer is understood to be one that picks out the true proposition from this set, specifying in effect, a value for the fronted \( \text{wh} \)-expression. Structure (2c) makes explicit the mapping from syntactic structure to semantic interpretation (Bittner 1994; von Stechow 1996). The crucial operation that shifts a sentence from a declarative proposition-type meaning to an interrogative set-of-propositions type meaning hinges on the propositional variable \( p \) over which lambda abstraction can take place. Crucially for our purposes, the fronted \( \text{wh} \)-expression must be interpreted outside the scope of this variable. If the +WH specification on C0 is taken to be the position at which the propositional variable is introduced, and the fronted \( \text{wh} \) taken to be in \[\text{Spec, CP}\], the mapping from syntax to semantics is straightforwardly compositional. Thus, one might take fronting of \( \text{wh} \)-expressions as direct evidence of their scope position.

Multiple-\( \text{wh} \)-questions have special syntactic and semantic properties. In English they are formed by fronting one \( \text{wh} \)-expression and leaving the other(s) in situ. Possible answers to such questions specify values not only for the fronted \( \text{wh} \)-expression but also for those in situ:

\[
\begin{align*}
\text{(3)} \\
\text{a. Which student bought which book?} \\
\text{b. Bill bought War and Peace, Sue bought Aspects.}
\end{align*}
\]

\[
\begin{align*}
\text{(4)} \\
\text{a. } \lambda p \exists x \exists y \ [\text{student}(x) \& \text{book}(y) \& p = \text{bought}(x,y)] \\
\text{b. } \{\text{Bill bought War and Peace, Bill bought Aspects, Sue bought War and Peace, Sue bought Aspects}\} \\
\text{c. } [CP \ \text{Which student}_{i}[IP \ t_i \ \text{bought which book}]] \rightarrow [CP \ \text{Which student}_{j}[IP \ t_j \ \text{bought } t_j]]
\end{align*}
\]

If we take possible answers as a diagnostic, and assume that specification of values is due to clause external existential quantification binding variable positions inside IP, as the Hamblin–Karttunen semantics of questions suggests, multiple-\( \text{wh} \)-questions force us to the conclusion that there must be a way of interpreting \( \text{wh} \)-expressions in situ that allows them to form operator variable relations of the kind shown in (4a). Following the syntax–semantics mapping outlined above, it appears plausible to assume that the \( \text{wh} \)-in-situ moves covertly to a position outside C0. A semantic argument for the existence of LF can thus be made using possible answers to multiple-\( \text{wh} \)-questions as indirect evidence.

### 1.1.2 Constraints on Scope: ECP and Subjacency

If considerations of interpretability lead us to postulate an abstract level of syntax, it should be possible to characterize it in theoretical terms. In particular, one could ask if there are constraints on the operation of Move \( \alpha \) at this level. In this subsection we will consider evidence that has been used to establish the status of the ECP and Subjacency as constraints on movement at LF.
To see how multiple-\textit{wh}-questions have shaped our view of LF, consider the following questions, uttered out of the blue:

(5)

\begin{tabular}{|l|l|}
\hline
a. & Who saw what? \\
\hline
b. & ?*What did who see? \\
\hline
\end{tabular}

(6)

\begin{tabular}{|l|l|}
\hline
a. & How did Bill read what? \\
\hline
b. & *What did Bill read how? \\
\hline
\end{tabular}

The choice of which \textit{wh}-expression will be fronted in a multiple-\textit{wh}-question is clearly sensitive to the status of the argument. In (5) a subject is chosen over the object for fronting, in (6) an adjunct is preferred over the object. This phenomenon, which goes by the name of Superiority in the literature, can be accounted for by imposing syntactic requirements on traces:

(7)

\begin{tabular}{|l|l|}
\hline
a. & \{CP[Spec-i what][Spec-i who][IP t_i saw t_j]\} \\
\hline
b. & \{CP[Spec-j who][Spec-i what][IP t_i saw t_j]\} \\
\hline
\end{tabular}

(8)

\begin{tabular}{|l|l|}
\hline
a. & \{CP[Spec-i what][Spec-i how][IP Bill read t_j t_i]\} \\
\hline
b. & \{CP[Spec-j how][Spec-j what][IP Bill read t_j t_i]\} \\
\hline
\end{tabular}

(9)

\begin{tabular}{|l|l|}
\hline
\textbf{Empty Category Principle:} &  \\
\hline
Traces must be properly governed. &  \\
A properly governs B iff A theta-governs B or A antecedent-governs B (Chomsky 1986a). &  \\
\hline
\end{tabular}

The ECP states that traces must be properly governed and an account of the Superiority effects can be given if it is assumed that [Spec, CP] carries the index of the first \textit{wh}-expression that moves into it (Lasnik and Saito 1992). As the derivations in (7a) and (8a) show, the ECP is respected when covert movement is from the theta-marked direct object position, leaving the subject or the adjunct trace created at S-structure to be antecedent governed by the fronted \textit{wh}-expression. In the unacceptable cases in (7b) and (8b), the situation is reversed. Though the trace created at S-structure satisfies the ECP (doubly), the trace created at LF does not.
Note that ECP as a constraint on S-structure movement can also be established on the basis of examples like (10). The explanation for the contrast between (10a) and (10b) draws on the same elements of explanation as the contrast between (7a) and (8a), and (7b) and (8b). Structure (10b) is unacceptable because an intervening complementizer blocks antecedent government of a trace in non-theta position:

(10)

a. \([CP_{\text{Spec-i}} \text{Which author}\_i][C' \text{do} [IP \text{you believe} [CP [IP t\_i \text{wrote the book}]]]?\]

b. *[CP_{\text{Spec-i}} \text{Which author}\_i][C' \text{do} [IP \text{you believe} [CP [\text{that} [IP t\_i \text{wrote the book}]]]?\]

What makes the argument from multiple-*wh*-questions for the existence of ECP effects at LF significant is that it gives content to the idea that LF is a level of syntax, with properties in common with S-structure. This result is important because it is an argument against an alternative view in which assignment of scope can be a viewed as a purely semantically driven step in the computation.

Let us turn now to constraints on scope covered by the subjacency condition. As Ross (1986) showed, though *wh*-fronting can occur across clauses, it is restricted in certain contexts:

(11)

a. Which book did Mary tell John to buy t?

b. Which book does Mary think John will buy t?

(12)

a. *Which book does Mary know a man who has read t?*

b. Which book is such that Mary knows a man who has read it?

(13)

a. *Which book does John know where Mary bought t?*

b. Which book is such that John knows where Mary bought it?

Here we have evidence that *wh*-dependencies created at S-structure are syntactically constrained. In (12a), the fronted *wh*-expression associated with a position inside the complex noun phrase is clearly unacceptable (Ross's CNPC). It is easy to see that the problem is not semantic in character. Sentence (12b) shows that if the relevant dependency between the *wh*-expression and the gap inside the complex noun phrase could be established in (12a), it would be interpretable as a proper request for information. The contrast between (13a) and (13b) makes the same point for *wh*-dependencies involving embedded questions (Ross's *Wh*-Island Constraint). The two can be subsumed under the Subjacency Condition:

(14)
Subjacency Condition (Chomsky 1986a):

If \((\alpha_i, \alpha_{i+1})\) is a link of a chain, then \(\alpha_{i+1}\) is subjacent to \(\alpha\). \(\beta\) is n-subjacent to \(\alpha\) iff there are fewer than \(n+1\) barriers for \(\beta\) that exclude \(\alpha\).

Given that \(wh\)-in-situ in multiple-\(wh\)-questions moves at LF, one can test whether the Subjacency Condition also holds at that level. The following data test the relevance of the two subcases of Subjacency:

(15)

| a. | Who knows a man who wrote which book? |
| b. | Bill knows a man who wrote \(Aspects\). |

(16)

| a. | \(\lambda p \exists x \exists y \ [\text{person}(x) \& \text{book}(y) \& p = \exists z \ [\text{man}(z) \& \text{wrote}(z,y) \& \text{knows}(x,z)]\) |
| b. | \{Bill knows a man who wrote \(Aspects\), Sue knows a man who wrote \(Aspects\), Bill knows a man who wrote \(LGB\), Sue knows a man who wrote \(LGB\)\} |

(17)

| a. | Which student knows where Mary bought which book? |
| b. | Bill does/Bill knows where Mary bought which book. |
| c. | Bill knows where Mary bought \(Aspects\) and Sue knows where Mary bought \(LGB\). |

(18)

| a. | \(\lambda p \exists x \exists y \ [\text{student}(x) \& \text{book}(y) \& p = \text{know}(x, \lambda p' \exists z \ [\text{place}(z) \& p' = \text{buy}(\text{Mary}, y \text{ at } z)]\) |
| b. | \{Bill knows where Mary bought \(Aspects\), Sue knows where Mary bought \(Aspects\), Bill knows where Mary bought \(LGB\), Sue knows where \(Mary\) bought \(LGB\)\} |

Baker (1970) argued that the possibility of answering (17a) with (17b) or (17c) indicates a syntactic ambiguity in the scope of \(wh\)-in-situ. Answers like (17b), specifying values for the fronted \(wh\) only, can be derived if the \(wh\)-in-situ takes scope over the embedded clause. List answers like (17c), on the other hand, which pair students and books, indicate that the \(wh\)-in-situ takes matrix scope, in violation of the \(Wh\)-Island Constraint. A similar argument, based on possible answers, has been made for matrix scope of the \(wh\)-in-situ in (15), in violation of CNPC. These examples establish a difference between operator–variable dependencies created at S-structure and those created at LF. On the basis of such examples, it has been claimed that the Subjacency Condition does not hold at LF.

As in the case of the ECP, the scope of \(wh\)-in-situ is crucial in establishing the status of Subjacency at LF. Quantifiers, for example, do not help in this regard. Example (19) shows that a reading where for each book there is a possibly different student who thinks John will buy it is not available:

\(\lambda p \exists x \exists y \ [\text{student}(x) \& \text{book}(y) \& p = \text{know}(x, \lambda p' \exists z \ [\text{place}(z) \& p' = \text{buy}(\text{John}, y \text{ at } z)]\)
(19) Some student thinks John will buy every book.

Since we know from (11b) that this is a context which allows extraction, the inability of the ∀ quantifier to take scope over the ∃ suggests that it is a property of Quantified NPs that their scope must be clause-bounded (but see chapter 74 for discussion). The relevance of subjacency at LF, therefore, cannot be determined by examining the behavior of quantifiers, and our primary source for this claim remains the interpretive possibilities of wh-in-situ.

1.1.3 Alternatives to Covert Movement

We have seen that the observable syntactic structure of English multiple-wh-questions reveals the scopal property of one wh-expression directly by fronting it, while concealing that of the other(s), for which we must look to indirect evidence in the form of appropriate answers. We have also seen that these twin indicators of scope make multiple-wh-questions an extremely powerful diagnostic tool. Adopting the Principles and Parameters model of grammar, I have demonstrated the power of multiple-wh-questions to test the syntactic properties not only of S-structure but also of LF. There are, of course, many alternative analyses of the phenomenon that have been proposed over the years and we will discuss some of them in subsequent sections. For now, I would like briefly to mention three mechanisms for interpreting wh-expressions which do not depend on movement, namely, Cooper-storage, Unselective Binding, and Choice Functions. My aim here is to explicate differences between them with respect to the assignment of scope as well as to note points of contact. I will not try at this point to summarize the particular arguments made or specific conclusions drawn by the proponents of each approach.

Let us take as a starting point the idea that covert movement is not essential to the interpretation of wh-in-situ, or other scope-bearing elements for that matter. An alternative proposed by Baker (1970) depends on co-indexation between a Q-morpheme in complementizer position and a wh-in-situ. His analysis of (17a), repeated below as (20a), shows the two scope possibilities discussed earlier:

(20)

<table>
<thead>
<tr>
<th>a. Who knows where Mary bought what?</th>
</tr>
</thead>
<tbody>
<tr>
<td>b. [Q_i who[t_i knows [Q_{j,k} where_j Mary bought t_j what_k]]]</td>
</tr>
<tr>
<td>c. [Q_{i,k} who[t_i knows [Q_j where_j Mary bought t_j what_k]]]</td>
</tr>
</tbody>
</table>

Note that given a proposal like this, the notion of LF as essential to the syntax–semantics interface can be dispensed with, but only if it is combined with an alternative way of interpreting the wh-expression than the one given in section 1.1. The wh-expression there is interpreted like an existential generalized quantifier which combines with a predicative expression built up out of the denotation of C', the syntactic constituent it has scope over. The challenge posed by structures like (20b–c), or any other structure encoding scope without covert movement, is to find a compositional way of assigning clausal scope to expressions within the clause at the interface level.

Engdahl (1986), working within a non-derivational syntactic framework, suggests that wh-in-situ should be interpreted on a par with other generalized quantifiers using the storage mechanism of Cooper (1983). Briefly put, this involves interpreting the wh in argument position as a variable and keeping its quantificational force, the existential along with the restriction, in store till an appropriate scopal position is reached, at which point existential binding of the variable is effected. Hamblin–Karttunen denotations, equivalent to the ones derived under the movement approach, could thus be derived for multiple-wh-questions without having to take recourse to covert movement.
A second approach for interpreting *wh*-in-situ without movement is proposed by Pesetsky (1987a) and Nishigauchi (1986, 1990). Recognizing the kinship between *wh*-expressions and indefinites, they adopt the unselective binding approach of Lewis (1975), Kamp (1981a), and Heim (1982), where the indefinite provides a variable that must be bound by sentential operators. Under this approach, we might take the

\[
\mathcal{C}_{\text{wh}}^0
\]

to provide not only the propositional variable \( p \), but also the existential quantifier binding the *wh*-variables. In the basic cases, the resulting set of propositions is the same as in the other proposals considered so far, but there is a crucial difference with respect to the status of the common noun inside the *wh*. In this case, it remains within the scope of the propositional variable, simply adding an additional condition on the variable:

(21)

| a. | Which student read which book? |
| b. | \([Q_{i,j} \text{ which student}_i[t_i \text{ read which book}_j]]\) |
| c. | \(\lambda p \exists x \exists y [\text{student}(x) \& p = \text{read}(x,y) \& \text{book}(y)]\) |

The third approach, proposed by Reinhart (1997), is similar in that it takes the *wh*-in-situ to be an indefinite bound by existential closure. The key difference is in the interpretation of the common noun. Reinhart points to the fact that the unselective binding approach makes the wrong prediction in cases like the following:

(22)

| a. | Who will be offended if we invite which philosopher? |
| b. | \(\lambda p \exists x \exists y [p = ([\text{invite}(we, y) \& \text{philosopher}(y)] \rightarrow \text{offended}(x))]\) |
| c. Lucie will be offended if we invite Donald Duck. |

(23)

| a. | \(\lambda p \exists x \exists f [p = ([\text{invite}(we, y) \& f(\text{philosopher})] \rightarrow \text{offended}(x))]\) |
| b. | \(\lambda p \exists x \exists f [\text{student}(x) \& p = \text{read}(x, f(\text{book}))]\) |

As (22b) shows, the *wh*-in-situ is in the antecedent of a conditional. This means that any individual who is not a philosopher suffices to make the antecedent false and hence the conditional proposition true. Sentence (22c) thus qualifies as a potential answer to the question. Reinhart therefore argues for a treatment of *wh*-in-situ in terms of choice functions. Under this view the quantification ranges over functions that take a (non-empty) set and pick out an individual from that set. *Wh*-expressions, like other indefinites, do not contribute an individual variable but denote a set to which the existentially quantified function applies. The problem is resolved since Donald Duck would simply not be a possible value for \( f(\text{philosopher}) \) in (23a). For completeness I give the interpretation of the simpler case (21a) in (23b).

The availability of well-defined semantic mechanisms like Storage, Unselective Binding, and Choice Functions makes it clear that *wh*-scope phenomena are not inextricably linked to movement and successful analyses have been given
which dispense with movement or combine movement with alternative scope-assignment strategies to different degrees. On the two ends of the spectrum, then, lie frameworks like the Principles and Parameters model that encode all scope relations via movement, and frameworks that eschew movement altogether, such as Head-driven Phrase Structure Grammar. For the first type of framework, alternative scope mechanisms are obviously superfluous while they are clearly essential for the second type. There are also a number of interesting possibilities that fall between these two opposing points. One, advocated by Pesetsky (1987a), favors wh-movement at S-structure and LF but allows for certain (discourse-linked) wh-expressions to be subject to unselective binding. Pesetsky thus argues for a uniform characterization of Move \( \alpha \) at both syntactic levels, explaining the non-standard behavior of some wh-in-situ as a reflection of their being a distinct phenomenon subject to distinct principles. Reinhart (1997), on the other hand, takes the possibility of covert movement to be antithetical to the basic tenets of Minimalism, and argues for a movement account for fronted wh only, reserving an account in terms of choice functions for all wh-in-situ. As is clear in even this cursory list, a number of a priori defensible positions are possible. One might wonder to what extent the issues raised by multiple-wh-questions, discussed within a framework utilizing movement as the sole scoping mechanism, transfer to frameworks that rely on other mechanisms. I will try to clarify below the sense in which I believe the central questions about the interface between form and meaning are maintained across these divergent views.

Consider the role of Subjacency in distinguishing between S-structure and LF in the Principles and Parameters model. As we noted, this is based on two types of evidence, evidence of Subjacency effects in fronting possibilities and absence of Subjacency effects in answers specifying values for wh-expressions inside islands. The first kind of evidence is direct, the second indirect in that it relies on the premise that possible answers specify values for all and only wh-expressions that have matrix scope. In subsequent sections we will have a chance to probe this assumption more fully. Taking it at face value for now, it can be easily shown that the descriptive generalizations revealed by multiple-wh-questions have equal significance in alternative models of grammar.

In a non-derivational model like Engdahl's, for example, something akin to Subjacency applies to operator–gap dependencies when wh-operators are in clause-initial position. The same does not apply to wh-in-situ, whose quantificational force can be held in store beyond the relevant bounding nodes. Approaches such as Pesetsky's, adopting unselective binding for D-linked wh-in-situ, or those like Reinhart's, adopting choice functions for all wh-in-situ, make similar distinctions. A dichotomy between two scope mechanisms is recognized, only one of which is considered sensitive to subjacency. While there are substantive differences between the various positions, the point I would like to emphasize is that they share fundamental assumptions about the relation between possible answers and scope. To the extent that the argument for a particular property of abstract movement turns on the diagnostic of possible answers, and specification of values is linked to binding of a variable in argument position by an existential quantifier with scope over the propositional variable, it will also be of relevance in models employing alternative scope mechanisms. Although I will continue to talk in terms of movement much of what I say is intended to apply more generally.

### 1.1.4 Overview of the chapter

In the previous subsections I have tried to convey an idea of the central role that multiple-wh-questions play at the interface of syntax and semantics. In doing so, I have introduced the two empirical phenomena that have been central in the analysis of multiple-wh-questions: Superiority effects and apparent violations of Subjacency. In the next subsection, I will broaden the empirical base by surveying languages in which multiple-wh-questions are formed differently from English. Section 1.2, therefore, has a primarily typological goal, after which the chapter takes up the task of examining the theoretical import of descriptive generalizations more closely. In doing so, it also tries to refine those generalizations.

Section 2 begins by noting that Superiority effects are not manifested in D-linked contexts and goes on to a survey of various accounts that have been given for the presence or absence of Superiority. It concludes by addressing the
possibility of cross-linguistic variation in Superiority. Section 3 takes a closer look at subjacency violations typically associated with *wh*-in-situ. It begins by examining the nature of pair answers on which this view is based and goes on to elaborate the semantics required to derive them. It ends with a reassessment of the claims about subjacency.

It might be worthwhile, before proceeding further, to delineate the intended coverage of this survey. Using answers to questions as a guide, I confine my study of multiple-*wh*-questions to those whose appropriate answers require specification of values for more than one *wh*-expression. By this criteria, questions with the following schemata do not qualify as proper objects of this case study, if their appropriate answers give values for only one *wh*-expression:

(24)

| a. | [ . . . WH₁ . . . [ . . . WH₂ . . . ]] |
| b. | [ . . . WH₁ . . . [ . . . WH₂ . . . t₁] ] |

(25)

| a. | Who wonders when Mary will come? |
| b. | ravi kyaa soctaa hai, ki meri kab aayegii Hindi |
| Ravi what thinks that Mary when will come |

(Dayal 1996a)

(26)

| Despre care₁ [scedil tii [cineⱼ tⱼ i-a povestit tⱼ]? Romanian |
| about which you-know who to-him has told |
| ‘Which one do you know who told him about?’ |
| a. | |

(Comorovski 1989)

| Ni xiang-zhidao [shei mai-le sheme]. Chinese |
| b. you wonder who bought what |

(Huang 1982a)

Examples of the schema in (24a) are given in (25a–b). Example (25a) only requires information about the identity of *wh₁*. Example (25b) instantiates what is known as the Scope Marking or Partial *Wh* Movement construction, characterized by the fact that it appears, on surface at least, to seek for the identity of *wh₂* only. The schema in (24b) is exemplified by the possibility in some languages of scoping out of a *wh*-island, whether at S-structure or LF. Sentence (26a) is a question about the fronted *wh* and although (26b) is ambiguous with regard to which *wh* takes matrix scope, only one of them can do so. Although I will mention such cases in describing the cross-linguistic possibilities in the next section, and in other sections whenever relevant, I will not delve into issues raised by them. Scope Marking and Wh extraction out of islands are discussed in chapters 47 and 77, respectively, to which I refer the reader. I should also mention that this chapter should be read in conjunction with chapter 77, since there is substantial overlap between them.
1.2 Cross-linguistic variation in multiple-wh-questions

1.2.1 Non-fronting languages

English, the language I have used so far to illustrate the theoretical import of multiple-wh-questions, represents only one of three documented strategies for the formation of such questions. This section introduces the two other strategies, namely, the absence of fronting in some languages and the obligatory fronting of all wh-expressions in others. We will also briefly consider two other language types, those in which multiple-wh-questions are unattested and those in which wh-expressions are said to be optionally fronted. The section ends with a summary of some explanations that have been given for the existence of variation in (multiple) question formation across languages.

Let us begin with wh-in-situ languages which have played a crucial role in the development of syntactic theory. We will base our survey of such languages on Chinese and Japanese. The following illustrate simple multiple questions in the two languages respectively:

(27)

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Shei} & \text{mai-le} & \text{sheme} & (\text{ne})? \\
\text{who} & \text{buy-ASP} & \text{what} & \text{Q} \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Dare-ga} & \text{nani-o} & \text{katta} & \text{ka}? \\
\text{who-NOM} & \text{what-ACC} & \text{bought} & \text{Q} \\
\hline
\end{array}
\]

b. ‘Who bought what?’

(28)

\[
\begin{array}{|c|c|}
\hline
\text{[CP WH}_i \text{WH}_j[\text{IP} \ldots \text{t}_i \ldots \text{t}_j \ldots ]] \\
\hline
\end{array}
\]

The wh-expressions are in their base positions here, a fact that could be demonstrated more clearly if arguments other than the subject were being questioned. Additionally, there is a morpheme identifying the clause as interrogative, either optionally or obligatorily. Broadly speaking, two proposals have been made about the interpretation of wh in these languages. One, schematized in (28a), treats wh-in-situ as moving at LF in order to be interpreted. Under this view, fronting and non-fronting languages differ only in the level at which movement takes place. The other view allows wh-expressions to remain in situ but interprets them via unselective binding, treating the Q-morpheme as the relevant operator. This is schematized in (28b).

I will begin by summarizing the key arguments for the movement approach, the reference point for which is Huang's (1982a) influential work on Chinese. It is obvious that superiority effects cannot be discerned in simple questions, but Huang argued that ECP is nevertheless operative in the interpretation of wh-in-situ. In a context like (29a) where the matrix verb selects a +WH complement, it is possible for the object wh-in-situ to be interpreted with matrix scope, but not the adjunct. The availability of a wide-scope reading for the embedded object also reveals the other important property of LF movement that Huang argued for, namely, the insensitivity to syntactic islands. This is further shown by the possibility of a direct question interpretation for (29b), where the wh-expression is contained inside a complex
Huang's characterization of the interpretive possibilities of $w_h$-in-situ has been challenged on the basis of Japanese by Nishigauchi (1986, 1990) and Choe (1984). Nishigauchi argues that although the Japanese counterpart of (29b) does have a direct question interpretation, the Japanese translation for (29a) can only be understood with both embedded $w_h$-elements taking narrow scope:

(30)

$w_h$-in-situ has been studied by Aoun and Li (1993a) and Tsai (1994b), who argue in favor of unselective binding also for Chinese but locate the difference in the domain within which such binding must take place in the two languages. A different account of the facts is given by Watanabe (1992a), who maintains that LF $w_h$-movement is not subject to subjacency, positing S-structure movement of an abstract $w_h$-element in Japanese to account for the $w_h$-island effect noted by Nishigauchi.

8
As we see, the languages under consideration make a significant contribution to our understanding of the syntactic principles governing scope assignment for \(wh\)-in-situ. The issue of whether Subjacency applies to \(wh\)-in-situ, even in languages like Japanese, is not a settled question. Watanabe (1992a) and Dayal (1996a) both note that conclusions about subjacency have to take into account the fact that introducing a \(wh\) in the matrix clause in structures like (30a) has a dramatic effect. Example (32), like its English counterpart, readily allows for an answer pairing individuals with books:

(32)

<table>
<thead>
<tr>
<th>Dono</th>
<th>sensei-ga</th>
<th>[Mary-ga</th>
<th>doko-de</th>
<th>dono</th>
<th>hono-o</th>
<th>katta]-</th>
<th>ka</th>
<th>sitteimasu</th>
<th>ka?</th>
</tr>
</thead>
<tbody>
<tr>
<td>which</td>
<td>professor-NOM</td>
<td>Mary-NOM</td>
<td>where</td>
<td>which</td>
<td>book-ACC</td>
<td>bought</td>
<td>Q</td>
<td>know</td>
<td>Q</td>
</tr>
</tbody>
</table>

‘For which professor \(x\) and book \(y\), does \(x\) know where Mary bought \(y\)?’

In section 3 we will return to the question of subjacency effects with \(wh\)-in-situ, from the perspective of a more refined understanding of the role of possible answers in diagnosing scope. The brief discussion here lays out the basic facts that have been reported in the literature.

### 1.2.2 Multiple-fronting languages

Let us turn now to the other end of the spectrum, to languages with multiple \(wh\)-fronting. The primary question posed by the possibility of multiple fronting is whether all the \(wh\)-elements are in their final scope position in these languages or whether they move to peripheral positions within the clause. In (33a) all \(wh\)-expressions are in [Spec, CP] position, in (33b) they are adjoined to IP. The structure in (33c) represents a position in between where one \(wh\) occurs in Spec while the others are adjoined to IP:

(33)

<table>
<thead>
<tr>
<th>a.</th>
<th>[CP (WH_i) (WH_j) (WH_n) (\ldots) [IP (\ldots) (t_i) (t_j) (t_n) (\ldots) ]]</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>[IP (WH_i) (WH_j) (WH_n) (\ldots) [IP (\ldots) (t_i) (t_j) (t_n) (\ldots) ]]</td>
</tr>
<tr>
<td>c.</td>
<td>[SPEC, CP (WH_i) [IP (WH_j) (WH_n) [IP (\ldots) (t_i) (t_j) (t_n) (\ldots) ]] ]</td>
</tr>
</tbody>
</table>

Various authors have argued for these possibilities, but we will base our survey of multiple-fronting languages on Rudin (1988b), who argues that multiple-fronting languages instantiate either (33a) or (33c). Her study focuses on Polish, Serbo-Croatian, Czech, Bulgarian (all Slavic languages), and Romanian (a Romance language) (see also Comorovski 1989, 1996). Rudin claims that in Bulgarian and Romanian, all \(wh\)-expressions move into Spec, while in Serbo-Croatian, Polish, and Czech, one \(wh\) moves into Spec while the others adjoin to IP. She classifies the first set as +MFS (Multiply Filled Spec) language and the second set as −MFS language. I give examples below from Bulgarian to represent +MFS languages and Serbo-Croatian to represent the −MFS languages. I abstract away from a discussion of internal differences among the languages of each group:

(34)

| Koj | kogo | vizcaron-da? |
Rudin identifies four properties distinguishing the two types of language, which she claims follow from the proposed distinction in landing sites. Only +MFS languages allow multiple wh-extraction from a clause and countenance wh-island violations. Only −MFS languages allow the insertion of clitics, parentheticals, adverbs, etc. after the first wh-expression and allow the wh-expressions to be in any order.

Consider the possibility of multiple extractions: 10

Since the matrix verb selects a −WH complement, both wh-expressions must take matrix scope. This happens obligatorily at S-structure in Bulgarian. In Serbo-Croatian, however, only one embedded wh can be fronted. The other wh must occur in the preverbal focus position. This is analogous to English, though it is possible to front the object wh as well as the subject wh without any apparent superiority effect. Rudin argues that languages that allow multiple whs to adjoin to [Spec, CP] at S-structure (option 33a) provide an escape hatch for multiple wh-expressions to move
through without violating subjacency, as shown in (38). Languages that adopt IP-adjunction for all but one wh instead (option 33c) encounter a subjacency violation if multiple whs are extracted.11

This difference in adjunction sites, she notes, also accounts for the fact that nothing can intervene between the first wh and other whs in Bulgarian but may do so in Serbo-Croatian. In (39) the auxilliary obligatorily follows all the wh-expressions. In (40), on the other hand, it must follow the first wh-expression. Taking the auxiliary to be in C0 accounts for the distribution. Similar arguments are made on the basis of adverbials and parentheticals:

(39)

<table>
<thead>
<tr>
<th>Koj (*e)</th>
<th>kakvo (*e)</th>
<th>na</th>
<th>kogo</th>
<th>e</th>
<th>dal?</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td>what</td>
<td>to</td>
<td>whom</td>
<td>has</td>
<td>given</td>
</tr>
</tbody>
</table>

(40)

<table>
<thead>
<tr>
<th>Ko</th>
<th>je</th>
<th>što (*je)</th>
<th>kome (*je)</th>
<th>dao?</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td>has</td>
<td>what</td>
<td>to whom</td>
<td>given</td>
</tr>
</tbody>
</table>

‘Who gave what to whom?’

A related difference is in the order of fronted wh-expressions. In Bulgarian it is fixed. (39) instantiates the only permissible sequence for this sentence. In Serbo-Croatian, (40) shows one of six possible orders. Rudin points out that the restriction in fronting in Bulgarian mirrors superiority effects in English and suggests that Bulgarian wh-words occupy the same position at S-structure that English ones occupy at LF, namely [Spec, CP]. The first wh moves to Spec while the others adjoin to it, adjunction being to the right. It is therefore expected that restrictions on fronting should be correlated in the two languages even though they differ in the level at which wh movement takes place. The absence of superiority effects in Serbo-Croatian does not follow from its being a −MFS language (see section 2). The survey here indicates the relevance of these languages to a theory of syntactic movement.

1.2.3 Languages without multiple-wh-questions

The survey of typological variation would not be complete without noting that multiple-wh-questions are not universally available. The two best-known examples of languages that do not allow multiple-wh-questions are Irish, discussed in McCloskey (1979), and Italian, analyzed by Calabrese (1984).

McCloskey notes that (41a, b) are unacceptable in Irish and Calabrese gives (42) for Italian:

(41)

<table>
<thead>
<tr>
<th>*Cé</th>
<th>aL</th>
<th>rinne</th>
<th>caidé?</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td>COMP</td>
<td>did</td>
<td>what</td>
</tr>
</tbody>
</table>

a. ‘Who did what?’

<table>
<thead>
<tr>
<th>*Caidé</th>
<th>aL</th>
<th>thug</th>
<th>sé</th>
<th>do</th>
<th>cé?</th>
</tr>
</thead>
</table>
According to McCloskey, multiple *wh* in Irish is impossible because Irish *whs* are not generated in argument position. Instead they select for S' (CP), later followed by deletion of a pronoun in argument position. As he notes, however, to derive the absence of multiple-*wh*-questions, it would have to be stated that the selected S', CP be non-interrogative.

Calabrese correlates the absence of multiple-*wh*-questions in Italian with its disallowing sentences like (43), which have multiple focus and, intuitively, would form appropriate answers to (42). His view is that *wh*-expressions are marked with a focus feature, which can only be assigned in the postverbal position in Italian. Thus, multiple-*wh*-questions are ruled out because such marking is necessarily restricted to one per clause.

McCloskey's and Calabrese's proposals locate the absence of the relevant forms to language specific properties (see below for Adams 1984 on this). Unfortunately, these proposals have not been pursued in subsequent literature and the theoretical implications of languages without multiple-*wh*-question remain largely unexplored. Legendre et al. 1998 discuss, for example, consequences of such languages for OT syntax. The question posed by the existence of such languages is what the optimal (hence grammatical) structure in Italian would be for the LF ‘Who ate what?’ They point out that the impossibility of any such structure shows that members of the candidate set are not determined on the basis of shared LFs, as in Grimshaw (1997b).

### 1.2.4 Optional-fronting languages
A question that might be worth addressing here is whether there are languages in which wh-fronting is optional. Though such languages have been reported, they do not intersect with strategies for multiple wh-formation in interesting ways. A familiar example of an optional-fronting language is French, but multiple-wh-questions in French are formed analogously to English. Furthermore, the option of having wh-in-situ in single-wh-questions is restricted to root clauses. French is therefore typically classified as a fronting language. Examples of languages considered to have true optional fronting are Bahasa Indonesian (Saddy 1991), Egyptian Arabic (Wahba 1991), and Palauan (Georgopoulos 1991b). However, the possibility of fronting in these languages is restricted to one wh-expression and there appear to be no superiority type effects, typical of movement to [Spec, CP]. Cheng (1997) provides evidence to argue that the apparent movement is, in fact, an instance of clefting and classifies these languages as in-situ. At any rate, no language has been reported in which there is the option of leaving all wh-expressions in situ or moving all to [Spec, CP], that is, an optional-multiple-fronting language. We assume, therefore, that optional movement cross-linguistically is either scrambling (which can affect all wh-expressions) or clefting (which is restricted to a single wh-expression). In either case, the principles governing such movement would not be limited to wh-expressions but would apply to non-interrogative arguments as well.

1.2.5 Explanations for typological variation

In concluding our introduction to the multiple-wh-question phenomenon, let us consider how the attested variation in question formation strategies fits into the picture of universal grammar. As in other studies of typological variation, the goal is to derive differences on the basis of a few parametric choices.

The most worked out proposal has been made by Cheng (1997) and I will discuss that first. According to Cheng, all languages are required to distinguish interrogative clauses from non-interrogative ones at S-structure but they may differ with respect to how they do so. The Clausal Typing Hypothesis draws on the idea that a language may choose to mark interrogative clauses by the presence of a Q-morpheme in C0, or by movement of a wh-expression to a [Spec, CP] from where C0 can be marked +WH via Spec–Head agreement. Combined with principles of economy, this predicts that languages with Q-morphemes will be wh-in-situ languages since there would be no motivation for overt movement at S-structure. Languages without such morphemes would be forced to move one wh to [Spec, CP]. Languages like Chinese and English instantiate the two possibilities admitted by this approach. Multiple-fronting languages like Bulgarian and Serbo-Croatian, however, are not predicted by this approach since only one wh movement can be forced by the requirement for Clausal Typing. An auxiliary explanation is therefore called for to account for movement of the other wh-expressions. Cheng points to the fact that in the languages known to have multiple fronting, indefinites are formed by adding an affix to wh-expressions. From this she concludes that wh-expressions have a null interrogative determiner. Given that these languages lack Q-morphemes, one of the wh-expressions must move to [Spec, CP] for clausal typing. The motivation for movement of the other wh-elements, however, is independent of requirements of clausal typing. It is forced instead by the need for the null determiner to be licensed at S-structure, for which it must establish a local relation with the C0 +WH. Adjunction to [Spec, CP] or to IP both qualify as governed positions, accounting for Rudin's distinction between +MFS and −MFS languages.

Another proposal for the existence of different strategies in question formation is presented by Adams (1984) and, following her, Rudin (1988b). This approach combines two standard views about parametric variation in wh-movement. One idea is that all languages require wh movement for interpretation but they differ in the level by which such movement must take place, an idea for which Cheng's Clausal Typing Hypothesis provides the motivation. This allows for the broad distinction between wh-movement and in-situ languages. The other is that languages may or may not have a filter against multiple wh-words in Spec, originally formulated as the filter against Doubly Filled Comp. Though typically languages are expected to vary on this filter only at S-structure, Adams extends it further, arguing for
a more general version of it: *[\text{COMP/Spec, CP} \alpha \text{COMP/Spec, CP}] at level X of the grammar. By barring adjunction at LF as well as S-structure, she derives the fact that languages like Irish and Italian do not have multiple-\textit{wh}-questions and by allowing adjunction at S-structure and LF, the fact that Bulgarian and Serbo-Croatian require multiple fronting.\footnote{Rudin, adopting Adams's proposal, notes that although it works straightforwardly for +MFS languages, the status of fronting in −MFS languages requires further elaboration. She takes the fact that only one \textit{wh} moves into Spec to be evidence that such languages are like English, and unlike Bulgarian and Romanian, in enforcing the filter at S-structure. To drive the distinction between English which leaves the other \textit{wh}-words in situ and −MFS languages that require obligatory adjunction to IP, Rudin suggests that some languages may not allow LF movement to take place from A-positions. While this is needed to complete the account, it should be noted that this part of the proposal remains quite speculative.}

In concluding this section, I would like to point out that explanations for cross-linguistic variation would have to be modified once alternative scope-assignment possibilities are admitted. For example, under Reinhart's proposal, non-multiple-\textit{wh} languages cannot be derived by the Doubly Filled Comp Filter applying at S-structure and LF alone. Unless it is also stated that the language cannot interpret \textit{wh}-expressions via choice functions, the possibility of \textit{wh}-in-situ remains open. In the case of −MFS languages, Reinhart's proposal could open up an alternative explanation for obligatory IP adjunction. If such languages had the Doubly Filled Comp Filter at S-structure but not LF, it would allow movement of multiple \textit{wh} at LF. Rudin's proposal that LF movement could only be from A'-positions, forcing partial movement at S-structure, could be motivated by positing a language specific ban against choice functions. No doubt, more work would have to be done to see whether such an approach would hold up against other considerations, such as Reinhart's theoretical objection to LF movement within a minimalist framework. And at the empirical level, it would have to be shown that regular indefinites in these languages behave differently from languages in which choice functions exist, a not too promising prospect. My goal here in making these suggestions is not to present them as serious proposals but merely to indicate how developments in the semantics of questions can impact on typological explanations.

2 Superiority effects

1 Introduction 3 Subjacency and \textit{wh}-in-situ 4 Conclusion  NOTES  REFERENCES

2.1 Amelioration under D-linking

In the previous section, I isolated two empirical properties of multiple-\textit{wh}-questions – Superiority effects and Subjacency violations – and outlined in broad terms the possible cross-linguistic variation in the formation of multiple-\textit{wh}-questions. I would now like to take a closer look at these empirical properties and their theoretical import. The goal of this section is to probe the nature of Superiority effects, leaving Subjacency violations for section 3. We will begin our survey of Superiority by discussing the notion of D-linking, a condition under which such effects seem to be canceled. The impact of D-linking is shown for languages like English where one \textit{wh}-expression is fronted, as well as for languages like Bulgarian where all such expressions move.

An important observation about Superiority is that the effects do not survive if the \textit{wh}-expressions are changed from a monomorphemic \textit{who}, \textit{what}, etc. to a complex phrase of the form \textit{which} \textit{N}. These effects were noted by Katz and Postal (1964) and Bolinger (1978), but the first extensive discussion is due to Pesetsky (1987a):
Synergy : 275-326

**Who read what?**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Who did you persuade to read what?</td>
</tr>
<tr>
<td>b.</td>
<td>*What did you persuade who to read?</td>
</tr>
<tr>
<td>c.</td>
<td>Which book did you persuade which man to read?</td>
</tr>
</tbody>
</table>

(45)

**A priori, the difference in acceptability could be due to a syntactic or a semantic difference. A possible syntactic difference might be that *which* is a specifier while *who*/*what* are heads. Pesetsky, however, rejects this possibility, pointing to the fact that *how many*, which would also be classified a specifier, displays superiority effects:**

(46)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>I need to know how many people voted for whom.</td>
</tr>
<tr>
<td>b.</td>
<td>*I need to know who(m) how many people voted for t_j.</td>
</tr>
</tbody>
</table>

Pesetsky argues that the difference in superiority effects is due to a lexical dichotomy between *wh*-words, depending on whether they refer to a given set of entities in the context of utterance. While *which* phrases appear to bear the relevant relation to discourse inherently, monomorphemic *wh*-expressions can lend themselves to the relevant D-(discourse) reading in appropriate contexts. When they do, Superiority effects are not manifested, as shown in the following ((47a) is from Bolinger):

(47)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>I know what just about everybody was asked to do, but *what did who (actually) do?</td>
</tr>
<tr>
<td>b.</td>
<td>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.</td>
</tr>
</tbody>
</table>

The correct generalization, then, is that the Superiority condition applies to non-D-linked *wh* only or, alternatively, that D-linked *wh* are exempt from the Superiority Condition. Pesetsky argues that the lexical distinction between two types of *whs* correlates with a difference in methods of scope assignment. Non-D-linked *whs* take scope via movement and are subject to the normal constraints. D-linked *whs* get bound by unselective Q-operators (à la Choe and Nishigauchi) and are exempt from those constraints. This is illustrated below:

(48)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[i who_i what_j [t_i read t_j]]</td>
</tr>
</tbody>
</table>
b. \( [Q_i \text{ which book}_j [\text{which man}_i \text{ read } t_j]] \)

c. **Nested Dependency Condition/Path Containment Condition:**

If two \( \text{wh} \)-trace dependencies overlap, one must contain the other.

In (48a) both \( \text{wh} \)-words move, being non-D-linked, violating (48c). In (48b), however, there is only one dependency at issue. The other \( \text{wh} \)-word being interpreted in situ via unselective binding. Monomorphemic \( \text{wh} \)-words, in contexts like (47), are interpreted similarly. Note that under this view, it is the D-linking of the \( \text{wh} \)-word in situ that is critical in the amelioration of Superiority effects. As pointed out to me by Chris Barker, however, (48b) is degraded if \textit{which man} is replaced by \textit{who}, a fact unexplained by Pesetsky's account.

Although Pesetsky's distinction has a semantic–pragmatic basis, the fact that \textit{which} NPs are exclusively D-linked provides a diagnostic which he uses to argue for a third type of \( \text{wh} \)-expression. Since \textit{the hell} in (49) is compatible with \textit{what} but not \textit{which} it is argued to be aggressively non D-linked:

\[
\begin{array}{|c|}
\hline
\text{a. What the hell book did you read that in?} \\
\hline
\text{b. *Which the hell book did you read that in?} \\
\hline
\text{c. ?What the hell book did which man read?} \\
\hline
\end{array}
\]

Given his claim that only D-linked \( \text{wh} \) can be interpreted in situ, the fact that aggressively non D-linked \( \text{wh} \)-expressions exist provides a new tool for distinguishing moved vs. non-moved \( \text{wh} \)-expressions in languages. Sentence (49a), under this view, would be a question requiring obligatory movement. It should be noted, however, that this kind of expression does not readily occur in multiple-\( \text{wh} \)-questions. The question in (49c), to the extent that it is acceptable, does not lend itself to a multiple-pair answer and has the feel of an echo question. This, as far as I can see, does not follow from the account presented. Thus, some care needs to be taken in using such expressions to diagnose obligatory movement.

Pesetsky’s identification of the role of D-linking in redeeming Superiority violations has been extremely influential in further developments in the theory of \( \text{wh} \)-scope phenomenon. It is worth noting, however, that the aspect of his account that has held up is the correlation between \textit{which} phrases and non-canonical scope, not the claim that such expressions are interpreted in situ. A potentially important piece of evidence with regard to the status of D-linked phrases and (non)-movement comes from multiple-fronting languages. Pesetsky cites Wachowicz’s (1974) discussion of Polish as corroborating the prediction made by his theory that D-linked \( \text{wh} \)-expressions may be exempted from fronting. But these facts have not gone unchallenged (see Cheng 1997 for discussion).

Doubts about a non-movement analysis for D-linked \( \text{wh} \)-expressions surface when one considers Comorovski’s (1989, 1996) discussion of multiple-fronting language. Recall Rudin's observation that +MFS languages impose a strict restriction on the order of \( \text{wh} \)-words (cf. 34 above) akin to the Superiority condition in English. Comorovski shows that this restriction is relaxed if the \( \text{wh} \)-words are D-linked. The following Romanian examples illustrate this point:

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Pe care}_i & \text{cin}_j [t_j] & \text{li}_i & \text{a} & \text{văzcaронt at } t_j] \\
\hline
\end{array}
\]
Comorovski also notes that in Romanian (and Bulgarian), extraction out of *wh*-islands are only acceptable under D-linking:

(51)

(52)

It is clear from Comorovski’s description of the facts that D-linking is a significant factor in overriding restrictions on fronting but not in making fronting itself unnecessary. This is corroborated in subsequent work on multiple fronting by Richards (1997). Of course, it should be noted that Pesetsky’s claim that D-linked *wh* can be interpreted via unselective binding without movement does not commit him to a non-movement analysis. He addresses, for example, the question of why English single-*wh*-questions require fronting by appealing to a language-specific need for the Q-morpheme to be triggered by the presence of a *wh*-word in Spec. Similarly, multiple fronting of D-linked expressions could be motivated on the basis of their status as polarity items requiring a local relation with the Q-operator, as proposed by Cheng (1997). However, facts like (50–52) do strike a cautionary note against a simple correlation between D-linking and non-movement. Setting this aside, the role of D-linking as a factor in the formation and interpretation of multiple-*wh*-questions is generally accepted as having cross-linguistic validity.

## 2.2 Explanations for superiority

### 2.2.1 Within the Principles and Parameters framework

<table>
<thead>
<tr>
<th>Synergy</th>
<th>275-326</th>
</tr>
</thead>
<tbody>
<tr>
<td>which-ACC</td>
<td>who</td>
</tr>
<tr>
<td>‘Which one was last seen by whom?’</td>
<td></td>
</tr>
</tbody>
</table>
| *[Ce] cinej[tj a vațcaron ut tj]?
| what | who | has | seen |
| *(Despre carei cinej[tj tcedili a vorbit tj])? |
| about which who to-you has told |
| *(Despre cei cinej[tj tcedili a povestit tj])? |
| about what you-know who to-him has told |
| *(Despre carei cinej[tj i a povestit tj])? |
| about which you-know who to-him has told |
| *(Despre cei cinej[tj i a povestit tj])? |
| about what you-know who to-him has told |
With the caveat about D-linking in place, let us turn to explanations of the basic Superiority phenomenon. The first explanation is found in Chomsky (1973), who explained it by positing the Superiority Condition. In combination with strict cyclicity, (53) derives not only the asymmetries observed in fronting but also \textit{wh}-island effects:

\begin{quote}
\textbf{Superiority Condition:}

No rule can involve X,Y in the structure \ldots X \ldots [\_ \ldots Z \ldots WYZ \ldots ], where the rule applies ambiguously to Z and Y and Z is superior to Y.
\end{quote}

Though the condition was essentially a description of the phenomenon in structural terms, it served to bring Superiority into theoretical center stage. Syntactic theory has since then grappled with this problem at every stage of its development. Instead of trying faithfully to summarize the many explanations that have been offered over time, I will try to highlight those analyses that have been particularly influential. Taking the Principles and Parameters model as a landmark, we can identify three distinct approaches to Superiority. As already discussed in section 1.1.2, a leading view of the phenomenon takes ECP as regulating fronting possibilities. Another proposal, discussed above (due to Pesetsky 1987a), takes the relation between two dependencies as critical to the explanation. A third approach, advocated by Aoun \textit{et al.} (1987), relates superiority to Binding Theory.

The ECP-based account has already been shown to deliver the basic Superiority effect, namely, that, given a multiple-\textit{wh}-question with one lexically governed argument and one not so governed, it is the latter that will be fronted. Here I would like to indicate some further issues that arise as a consequence. The approach predicts, for example, that a multiple-\textit{wh}-question with two \textit{wh}-expressions that are not lexically governed will be ungrammatical. The COMP-indexing mechanism will ensure that the overtly fronted \textit{wh} will antecedent govern its trace but the other trace will necessarily remain ungoverned. This is shown in (54a, b):

\begin{quote}
\begin{tabular}{lll}
  a. & *How did John go where? \\
  b. & *Where did John go how? \\
  c. & Who went where?
\end{tabular}
\end{quote}

One problem that this approach encounters is the determination of the class of \textit{wh}-expressions that are lexically governed. In particular, the status of locative and temporal expressions, \textit{where} and \textit{when}, is an issue. The unacceptability of (54a) suggests that the trace of \textit{where} could not be lexically governed, but there are other cases, such as (54c), where the explanation for acceptability turns on the trace being lexically governed. Attempts have been made to address this question but we will not discuss them at any length here, simply alerting the reader to the fact.

An interesting problem that surfaces under this approach has to do with the effect of additional \textit{wh}-expressions. They seem to improve the violation, even when that additional \textit{wh} does not leave a lexically governed trace. This problem, noted in passing by Chomsky (1981), was discussed at some length by Kayne (1984a). In fact, he discussed the effect of an additional \textit{wh} in the context of Superiority violations. (55a, b) and (56a, b) show normal constraints on fronting. The questions in (55c) and (56c) show the improvement due to the presence of an additional \textit{wh}:

\begin{quote}
\begin{tabular}{lll}
  a. & *How did John go where? \\
  b. & *Where did John go how? \\
  c. & Who went where?
\end{tabular}
\end{quote}
(55)

| a. | I'd like to know who hid what there. |
| b. *I'd like to know what who hid there. |
| c. ?I'd like to know what who hid where. |

(56)

| a. | I'd like to know who hid it where. |
| b. *I'd like to know where who hid it. |
| c. ?I'd like to know where who hid what. |

(57)

Let \( \beta_1 \ldots \beta_j, \beta_{j+1} \ldots \beta_n \) be a maximal set of empty categories in a tree \( T \) such that \( \exists \alpha, \forall j, \beta_j \) is uniformly bound by \( \alpha \). Then \( \{\alpha\} \cup \left( \bigcup_{1 \leq j \leq n} G_{\beta_j} \right) \) must constitute a subtree of \( T \).

| a. | *\([\alpha \text{ where}]_1[\text{1 who}]_2[\text{hid}]_2[\text{it}]_2 \) |
| b. | \([\alpha \text{ where}]_2[\text{1 who}]_2[\text{2 hid}]_2[\text{2 what}]_2 \) |

According to Kayne, what is relevant in these cases is whether the fronted \( wh \) and the \( wh \)-element(s) in situ can satisfy connectedness, as defined in (57a). The unacceptable (56b), for example, has a representation as in (57b). The \( wh \)-in-situ, not being canonically governed, cannot form an appropriate sub-tree with the fronted \( wh \)-word. The additional \( wh \)-word in (57c) is governed by the verb. Being governed in the canonical direction for the language, its g-projection extends upwards, connecting with the fronted \( wh \)-word and properly including the subject \( wh \)-word in-situ. This is shown in (57c).

Kayne's augmentation of the ECP-based accounts remained till very recently the primary explanation for these facts. Note that this augmentation of the theory is distinct from the one argued for by Pesetsky (1987a) in that it seeks to regulate ordinary \( wh \)-expressions, not a special class of D-linked expressions. Similar augmentations would be required within theories adopting the Path Containment Condition (cf. 48c).

Aoun et al. (1987) propose an account that seeks to unify explanations for standard superiority effects and their absence with D-linked \( wh \). It takes as its governing principle the Generalized Binding Theory of Aoun (1986):

(58)

| a. | An anaphor must be X-bound in its governing category. |
| b. | A pronominal must be X-free in its governing category. |
| c. | An R-expression must be A-free. (where X = A or A') |
According to them, the critical difference between wh-expressions that do and those that do not display Superiority is in their structural complexity. Arguing that QR moves only the wh-quantifier, not its restriction, they posit the following representations:

(59)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>*What did who buy?</td>
</tr>
<tr>
<td>b.</td>
<td>[i what_i who_j][t_j AGR_j buy t_j]</td>
</tr>
</tbody>
</table>

(60)

<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Which book did which woman buy?</td>
</tr>
<tr>
<td>b.</td>
<td>[i which book_i which_j][t_j woman_k AGR_k buy t_j]</td>
</tr>
</tbody>
</table>

Taking traces to be anaphoric elements subject to Principal A, they note an important difference between the two cases with respect to whether AGR counts as an accessible Subject for the subject trace. In (59b) it clearly does, defining the governing domain within which the anaphor-trace must be A’-bound. In (60b), however, AGR is indexed with the NP containing the anaphor trace. The trace therefore does not have a governing domain and can remain free.

The Generalized Binding Account is meant to be a purely structural account of variation in superiority effects, potentially rendering Pesetsky's empirical generalization irrelevant to movement theory. As pointed out by Comorovski (1996), is it not clear whether this is so. She notes that cases claimed to show the irrelevance of non-D-linked Superiority violations, in fact, do carry presuppositions. Though the wh-words in (61) may not range over a set of familiar entities of the ordinary sort, they arguably range over a set of familiar kinds. She notes that a purely structural account of the phenomenon must meet the challenge of creating contexts showing this not to be the case. Recall that (46) above, where how many N, though complex, is shown to display superiority effects, makes the same point:

(61) Which type of book does which type of man read?

2.2.2 Economy-based accounts

A fundamental shift in the nature of the explanation for Superiority effects occurred with the advent of the Minimalist Program (Chomsky 1993, 1995c) and Optimality Theory (Prince and Smolensky 1993). The guiding idea behind the Principles and Parameters model was that movement was always available unless such movement resulted in a structure that violated some principle of grammar. In contrast, the intuition informing Minimalism was to take movement as undesirable, unless forced by some principle. This conceptual shift is marked by the replacement of Move α by Movement as Last Resort as a central tenet of syntactic theory.

Consider the explanation for Superiority proposed in Chomsky (1993). Movement is forced only when the morphological features of an expression need to be discharged under a feature-match with a functional category, as stated in the principle of Greed. Further, Procrastinate rates covert movement less costly than overt movement. Finally, Shortest Move requires movement to be to the closest potential landing site where Greed can be satisfied. This means that wh-expressions, across and within languages, can differ in whether they have strong features that would force movement or weak features that could not trigger movement. Since only one wh-expression is fronted in English
multiple-wh-questions, it follows that only one wh-expression carries strong features. The Superiority effect, then, reduces to a question about determining why subjects, rather than objects, in the basic case, must carry strong features. Before we look at the specifics of the explanation, it may be worth noting that wh-expressions that do not carry strong features will still need to be interpreted, either via covert movement or via choice functions, as argued by Reinhart (1997).16

To return to the question of Superiority, one approach is to take Shortest Move to apply transderivationally. As elaborated in Kitahara (1994) and Oka (1995), the optimal candidate is chosen from a set of convergent derivations having the same numeration and the same LF. Under this view, (62a) and (63a) belong in the same reference set since they have identical LFs. It is obvious that Shortest Move is respected in the former but not in the latter, specially if the choice-function analysis is adopted for interpreting wh-in-situ. Note that this requires constraints to hold globally:

(62)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>[who_{i}[t_i saw what]]</td>
</tr>
<tr>
<td>b.</td>
<td>[what_{j} who_{i}[t_i saw t_j]]</td>
</tr>
<tr>
<td>c.</td>
<td>[Q_{j} who_{i}[t_i saw t_j]]</td>
</tr>
</tbody>
</table>

(63)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>*[what_{j} did [who see t_j]]</td>
</tr>
<tr>
<td>b.</td>
<td>[who_{i} what_{j}[t_i saw t_j]]</td>
</tr>
<tr>
<td>c.</td>
<td>[Q_{i} what_{j}[t_i saw t_j]]</td>
</tr>
</tbody>
</table>

An alternative possibility, mentioned in Chomsky (1993) and developed more fully in Chomsky (1995c), is to put the burden for movement on the properties of the functional category which is the target of movement, rather than on the moved expression. Given this view, wh-expressions can be thought of as a morphologically unified class. We start, then, with a C^0 that needs to attract a wh-expression to its Spec in order to satisfy its requirements, in effect replacing the notion of Move with that of Attract. Now, there is a natural sense in which the subject can fulfil this requirement more economically than the object. The Minimal Link Condition is built into the definition of Attract in such a way as to capture this intuition. Note that this approach to Superiority does not rely on a global application of the constraints. This line of thought has been fully explored in Kitahara (1997).

Accounts of multiple questions within Optimality Theory also play on the tension between formal requirements forcing fronting, such as O_p-Spec, and a general preference against movement such as Stay (Grimshaw 1997b). By ranking O_p-Spec > Stay, fronting of one wh-expression is forced. She discusses the paradigm in (64):

(64)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>What will they put where?</td>
</tr>
<tr>
<td>b.</td>
<td>*[What will where they put?]</td>
</tr>
</tbody>
</table>
In (64a), Op-Spec is violated by where while Stay is violated by what. In (64b), with where moving to an internal specifier position, where violates Stay in addition to Op-Spec. (64a) is the optimal candidate since it involves one less violation of Stay. Although Superiority effects per se are not discussed there, it should be clear how optimal candidates can be identified on the basis of ranked constraints. Some interesting correlations between Minimalist accounts and OT accounts are made in essays contained in Barbosa et al. (1998), in particular Ackema and Neeleman and Legendre et al. Ackema and Neeleman (1998), for example, derive the basic superiority effect through the interaction of three ranked constraints Q-marking (requiring a wh in [Spec, CP]) « Stay (prohibition against movement) » Q-Scope (requiring all wh-expressions to front). The tableau in (65) shows how the explanation works. It should be obvious how differences in ranking can result in different cross-linguistic possibilities for fronting.

(65)

<table>
<thead>
<tr>
<th></th>
<th>Q-Marking</th>
<th>Stay</th>
<th>Q-Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who has seen what</td>
<td>******</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>What has seen who</td>
<td>*******!</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Who what has seen</td>
<td>**<em><strong><strong>!</strong></strong></em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has who seen what</td>
<td>*!</td>
<td>***</td>
<td>**</td>
</tr>
</tbody>
</table>

There are further interesting developments within economy-driven approaches that we will discuss in section 2.3 but before doing that I would like to turn to a somewhat different view of the meaning of wh-expressions that has proved influential in recent literature and discuss its impact on studies of superiority.

2.2.3 Accounts based on functional wh

Another recent approach to Superiority effects takes its cue from the semantics of questions with quantifiers. An observation in the literature, dating back to Kiss (1993) and Comorovski (1989) is that multiple-wh-questions require a list answer in which every member of the subject term is paired but no such requirement is imposed on the object. Consider the following contexts given in Dayal (1996a). In (66a) the fact that there is a woman who will not get paired does not seem to affect the felicity of the question, but in (67) the fact that a man will not get paired makes the question infelicitous:

(66)

<table>
<thead>
<tr>
<th>Speaker A:</th>
<th>We’re organizing singles tennis games between men and women. There are three men interested in playing against women, namely Bill, Mike and John. But there are four women interested in playing against men, namely Mary, Sue, Jane and Sarah.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td><strong>Speaker B: So, which man is playing against which woman?</strong></td>
</tr>
</tbody>
</table>

(67)
**Speaker A:** We’re organizing singles tennis games between men and women. There are four men interested in playing against women, namely Harry, Bill, Mike and John. But there are only three women interested in playing against men, namely Mary, Sue and Jane.

a. **Speaker B:** So, which man is playing against which woman?

Though the judgments are delicate there is a clear contrast which holds up against a wide range of data. This property of multiple-\(wh\)-questions has been explained by Hornstein (1995), Comorovski (1996), and Dayal (1996a), working independently, in terms of Chierchia’s (1993) explanation for the subject–object asymmetry in questions with quantifiers. A question with a universal quantifier in subject position allows functional answers and list answers while a question with the universal in object position allows neither:

\[
\begin{array}{|c|}
\hline
\text{a. Which woman does every man like?} \\
\hline
\text{b. (Every man likes) his mother.} \\
\hline
\text{c. John likes Mary and Bill likes Sue.} \\
\hline
\end{array}
\]

\[
\begin{array}{|c|}
\hline
\text{a. Which woman likes every man?} \\
\hline
\text{b. *His mother (likes every man).} \\
\hline
\text{c. *Mary likes John and Sue likes Bill.} \\
\hline
\end{array}
\]

Building on the view in Engdahl (1986) that \(wh\)-expressions can quantify over functions from individuals to individuals, Chierchia argues that functional \(wh\)-expressions leave a doubly indexed functional trace. The subscripted \(i\)-index identifying it with the \(wh\)-operator is the functional variable. The superscripted \(a\)-index, which can be bound by a c-commanding argument, is an individual variable. Intuitively, the \(a\)-index corresponds to the pronoun in the functional answer and may be taken as having a pronominal character. The LF and interpretation for the functional reading of (68a), under this account, is given below:

\[
\begin{array}{|c|}
\hline
\text{[which woman}_i\text{[every man}_j\text{[t}_j\text{likes}} \\
\hline
\text{a. \[\forall x(\text{woman’}(f(x))) \land p = \forall y[\text{man’}(y) \rightarrow \text{like’}(y, f(y))]\]} \\
\hline
\text{b. \[\lambda p\exists f[\forall x(\text{woman’}(f(x))) \land p = \forall y[\text{man’}(y) \rightarrow \text{like’}(y, f(y))]]\]} \\
\hline
\Rightarrow \{\text{Every man likes his mother, Every man likes his wife, Every man likes his girlfriend}\} \\
\hline
\end{array}
\]

\(Wh\)-quantification here is over variables whose possible values are functions to a set of women, such as mother-of, wife-of, etc. The functional reading of the question denotes the set of propositions, each of which states that every man likes the individual he stands in some functional relation to. One of these propositions will be the true answer in a
given context. The list answer, roughly speaking, is the graph of a function, listing for each member of the domain set the individual who stands in the relevant functional relation to that individual. We will defer further details of the implementation till section 3, except to note that the universal term which provides the domain set has to take scope outside the propositional variable p.

Turning to (69), Chierchia notes that for functional binding to take place an LF like (71a), in which the quantifier c-commands the wh trace, would be needed. Structure (71a) is ruled out as a case of weak-crossover violation since the variable $t_j$ is coindexed with a pronoun to its left, the a-index of the wh-term.\footnote{17}

(71)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>*(which woman$_i$[every man$_j$[$t_i$ likes $t_j$]])</td>
</tr>
<tr>
<td>b.</td>
<td>(which woman$_i$[every man$_j$[$t_i$ likes $t_j$]])</td>
</tr>
</tbody>
</table>

The well-formed LF in (71b) has the quantifier adjoined to VP from which no functional binding can take place. The absence of list answers to questions with quantifiers in object position follows since list answers under this approach are derivative on functional answers. The only available answer here is therefore the individual answer.

Hornstein, Dayal, and Comorovski each point out that if multiple-wh-questions can encode the kind of functional dependencies that questions with quantifiers can, in a question with two wh-expressions, the a-index of one wh can be bound by the other. Taking an example like (72a), there would be two potential LFs for it, only one of which would be syntactically well-formed.\footnote{18}

(72)

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Which man saw which woman?</td>
</tr>
<tr>
<td>b.</td>
<td>[CP[which woman$_j$[CP which man$_i$[IP $t_i$ like $t_j$]]]]</td>
</tr>
</tbody>
</table>
| c. | *[[CP[which woman$_j$[CP which man$_i$[IP $t_i$ like $t_j$]]]]]

In (72b) the subject term binds the a-index of the object term and there is no problem with this binding. In (72c) the object term binds the subject term but this involves a WCO violation since which woman crosses over the pronominal a-index of which man in order to bind it. This provides a straightforward account of why it is the subject wh has the ‘universal force’ identified by Kiss and Comorovski. Dayal (1996a) also provides evidence showing that in languages where scrambling overcomes WCO violations, it is possible to get the universal reading for the scrambled object.\footnote{19} It is against this background that Hornstein and Comorovski develop their accounts of Superiority. Hornstein presents a number of cases showing the correlation between superiority effects and WCO as support for the general approach. The explanation can be demonstrated on the basis of a basic Superiority case like (73a). Given the Minimalist
framework, the fronted \textit{w}h-word is assumed to leave a copy in base position and one of them must be deleted before interpretation:

(73)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>\text{What}_i[\text{who buy what}_j]?</td>
</tr>
<tr>
<td>b</td>
<td>\text{What}<em>i[ wh</em>{ij}^i buy t_{ij} ]</td>
</tr>
<tr>
<td>c</td>
<td>\text{Who}<em>j[t</em>{ij} buy what_{ij}^d ]</td>
</tr>
</tbody>
</table>

(74)

<p>| | |</p>
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<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>\text{[What [who bought what]}}</td>
</tr>
<tr>
<td>b</td>
<td>\text{[who bought what]}</td>
</tr>
<tr>
<td>c</td>
<td>\text{[who [who bought what]}}</td>
</tr>
<tr>
<td>d</td>
<td>\text{[who [t bought what]}}</td>
</tr>
</tbody>
</table>

Hornstein assumes that \textit{w}h-words that bind syntactic variables can be interpreted as ranging over individuals, thereby providing the domain of the function. Full copies are interpreted functionally. Translating this into the current representation, this allows for two interpretive possibilities for the structure in (73a). The possibility in (73b), where we have a function from things to individuals who bought those things is ruled out as a WCO violation. The question that remains for Hornstein is why the possibility in (73c) is ruled out. This would require the steps in (74), deletion of the moved \textit{w}h-word (74b), movement of the in-situ \textit{w}h-word (74c), followed by deletion of its copy (74d). But, as he notes, a structure respecting superiority would yield this result more economically since it would require only two steps (74c and 74d). Thus, (73a) is either ruled out by WCO (74b) or blocked by a more economical derivation. There are further possibilities within the minimalist assumptions for deriving this effect considered by Hornstein, which I will not go into here.

Now, consider what happens when the \textit{w}h-expressions are D-linked. The structure in (75b) shows that deleting the copy of the fronted \textit{w}h-element and interpreting the expression in Spec leads to the familiar WCO violation, analogous to (73b) above. The key difference here, according to Hornstein, is that D-linked \textit{w}hs do not have to be fronted in order to be interpreted as the domain term. Thus the derivation in (76) is viable. Crucially, there is no difference in the number of steps needed to interpret the structure regardless of whether the subject or the object is fronted:

(75)

<p>| | |</p>
<table>
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<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>\text{[which book [which man review which book]]}</td>
</tr>
</tbody>
</table>
Comorovski starts from a different premise. She points out that a list answer to a multiple *wh* requires the members of the domain set to be given. This says, in effect, that at least one *wh*-expression must be D-linked. Two questions arise at this point. Why is there no discernible D-linking for subjects in multiple-*wh*-questions respecting Superiority? What role does D-linking play in Superiority violations? Comorovski draws on the idea in Kuno (1982) that a multiple question is a request for information about pairs, where the question provides a sorting key for arranging that information. In general, subjects tend to carry old information and are natural sorting keys. Fronting of an object *wh*-word is a signal for a change in the structurally encoded criterion for sorting. In functional terms, this means that the object *wh*-word sets the domain of the function:

It remains to be explained, then, why there is no perceived WCO effect. Comorovski notes that backward anaphora is generally possible with universals like *each N*. What *each*-universals and *which* NPs share is the fact that they both carry existential presuppositions, the intuition driving the term D-linking. Taking the presuppositional nature of a *wh*-term to be criterial in over-riding WCO, Superiority violations are claimed to be predictable on the basis of their possible functional answer.

While Hornstein and Comorovski both take the functional *wh*-approach as a key element of the explanation, they end up with very different results. For Hornstein, the subject that has been crossed over by a D-linked *wh* remains the domain term but not for Comorovski. This difference is, in principle, testable. However, it should be noted that Hornstein's conclusion about the nature of the pairings permitted in a question with two *which* Ns does not accord with the intuitions reported in (66–67) above. For him, two D-linked phrases require the members of each term to be exhaustively paired so the direction of functional dependency is not predicted to make a difference. Comorovski, however, does predict that in acceptable cases of Superiority violation, it will be the object-*wh*-word that is exhaustively paired while the subject *wh* may or may not be. In unpublished work, Dayal (1994) reported that
Superiority violations do result in a requirement of exhaustivity for the object *wh* but the judgments for the subject term were unclear. Similar effects seem to obtain for scrambled versions of multiple-*wh*-questions in languages like Hindi and Japanese, which is suggestive that the same points may be at issue ([Dayal 1996a](#)). It would be fair to say, however, that the semantic consequences of Superiority violations remain an open issue in functional and other accounts of multiple-*wh*-questions.

### 2.3 Typological variation in Superiority effects

#### 2.3.1 Superiority in multiple-fronting languages

Having surveyed a range of explanations for Superiority effects in English, let us return to the issue of ordering in multiple-fronting languages. Recall that the basic generalization in Rudin was that in +MFS languages, where all movement was to [Spec, CP], there was a strict ordering among the fronted *wh*-word while in the −MFS languages the order was free. This issue is taken up in [Richards (1997)](#) who proposes an explanation within the Minimalist framework.

Richards takes Bulgarian multiple-*wh*-questions such as (34), repeated below in (78), as his starting point. As shown in (78a), the first step in the derivation involves movement of the highest *wh*-word as an instance of Attract Closest. This is analogous to the English Superiority case. The fact that the second *wh*-word, when it moves, is ‘tucked in’ as in (79b) rather than extending the tree with an outer specifier as in (79c), is argued to be evidence that Shortest Move is in play:

(78)

<table>
<thead>
<tr>
<th>Koj</th>
<th>kogo</th>
<th><em>zcaron</em> da?</th>
</tr>
</thead>
<tbody>
<tr>
<td>who</td>
<td>whom</td>
<td>sees</td>
</tr>
<tr>
<td>‘Who saw whom?’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Koj <em>zcaron</em> da kogo?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(79)

<table>
<thead>
<tr>
<th>Spec koj[ti <em>zcaron</em> da kogo]</th>
<th>Spec-1 koj [Spec-2 kogo] [ti <em>zcaron</em> da tj]</th>
<th>*Spec-2 kogo j[Spec-1 koj [ti <em>zcaron</em> da tj]]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bošković ([1997](#)), however, extends Rudin's paradigm by noting that although there are strict restrictions on the leftmost *wh*-word, the order of other *wh*-expressions in Bulgarian is relatively free (see also [Comorovski 1996](#)). Thus, putting the direct object before the indirect object does not lead to ungrammaticality in (80b). The order of the tucked in *wh*-expressions appears to contradict Attract Closest:

(80)
Richards explains this paradigm on the basis of a Principle of Minimal Compliance which he describes using the following metaphor. In a given structure, if one expression pays the taxes imposed on movement within that structure, other such expressions are exempted from paying those taxes. In this case, the second and the third wh-expressions are exempted from Attract Closest since the dues are paid by the first wh-word. As Richards notes, multiple-fronting-languages provide strong empirical argument against the claim in Chomsky (1995c) that each overt operation must extend the tree at its root.

Given that Richards argues for ‘tucking in’ of wh-expressions, the issue of Superiority violations under D-linking becomes relevant. He posits a Topic phrase above CP and allows D-linked wh-expressions to optionally have matching morphological features. This makes it possible for a D-linked object to move to the left of a subject. Picking up on these issues, Pesetsky (2000) proposes further refinements in the theory. According to him, wh-expressions may undergo three distinct types of movement: overt phrasal movement, covert phrasal movement, and feature movement. Adopting a single output syntax, Pesetsky locates the difference between overt and covert movement in pronunciation rules which target either the head or the tail of a movement chain. Feature movement, on the other hand, is the attraction of a morphological feature from within a phrase by some category. The full phrase, because it does not undergo any movement, is necessarily pronounced in situ. Crucial evidence from ACD phenomenon is presented for this three-way distinction but for reasons of space I will not go into those arguments here, confining myself to demonstrating how typological variations in multiple-wh-questions are derived under this approach. There are two other pieces that play a role in the explanation. Languages can differ in having multiple- or single-Spec Complementizers; only phrasal movement can satisfy multiple-Spec requirements. In multiple interrogatives with D-linked wh-words, this requirement is suspended or, alternatively, D-linking is compatible with single-Spec Complementizers. Pesetsky leaves this open.

Superiority effects in non D-linked questions and their absence in D-linked questions are explained as follows:

(81)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Who C\textsubscript{m-SPEC} [_ _ saw whom] \textit{phrasal movement of who} due to C\textsubscript{m-SPEC}</td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Who whom C\textsubscript{m-SPEC} [_ _ saw _ _] \textit{phrasal movement of whom} due to C\textsubscript{m-SPEC}</td>
</tr>
<tr>
<td>c.</td>
<td>Pronunciation in English: S V O</td>
</tr>
<tr>
<td>d.</td>
<td>Pronunciation in Bulgarian: S O V</td>
</tr>
</tbody>
</table>

(82)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C\textsubscript{1-SPEC(f)} [f-which woman saw which man] \textit{feature movement of which woman} due to C\textsubscript{1-SPEC}</td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Which man C\textsubscript{1-SPEC(f)} [f-which woman saw _ _] \textit{phrasal movement of which man} due to C\textsubscript{1-SPEC}</td>
</tr>
<tr>
<td>c.</td>
<td>Pronunciation in English: O S V</td>
</tr>
<tr>
<td>d.</td>
<td>Pronunciation in Bulgarian: O S V</td>
</tr>
</tbody>
</table>
In (81) phrasal movement of both *wh*-words is forced by the multiple-Spec requirement. This is suspended in the case of D-linking (82), making it possible for the subject to undergo feature movement. As would be obvious, the explanation for the absence of Superiority effects turns on the role of D-linking in allowing multiple *wh* interrogatives with single-Spec Complementizers. As noted by Pesetsky himself, one weakness in the proposal is that the crucial connection between the semantic property of D-linking and syntactic scope mechanism remains as elusive as in earlier accounts of the phenomenon.

Pesetsky also accounts for the fact that Superiority effects disappear in the presence of extra *wh*-words even without the benefit of D-linking. The relevant steps for a representative case are as follows:

(83)

| a. C_m-SPEC(f)[f-who put what where] feature movement of *who* due to C_m-SPEC |
| b. What C_m-SPEC(f)[f-who put ___ where] phrasal movement of *what* due to C_m-SPEC |
| c. What where C_m-SPEC(f)[f-who put ___ ___ ] phrasal movement of *where* due to C_m-SPEC |
| d. Pronunciation in English: What did who put where? |

Crucially, there are two other *wh*-expressions that can undergo phrasal movement to satisfy the C_m-Spec requirement, leaving the subject *wh* to undergo feature movement.

More work has been done on multiple-fronting languages, such as Grewendorf (2001), that is worth exploring, but in the interest of space I will end my discussion here and turn briefly to a different problem having to do with the cross-linguistic applications of explanations for Superiority.

### 2.3.2 Languages without Superiority effects

As would be obvious, the new typology of *wh*-movement opens up new ways of explaining typological variation, and in this concluding subsection I will outline how languages which do not show Superiority effects are accounted for. One such case, mentioned in section 1, is the class of languages classified −MFS by Rudin; another is German. For a −MFS language like Polish, Richards (1997) takes Rudin's general approach that they do not involve movement to Spec of CP. In Richards’s terms, this means that multiple specifiers at CP level, with their characteristic ‘tucking in’ effect, are not created in languages like Polish. Instead, apparent cases of multiple-*wh*-fronting are essentially movement to multiple specifiers of IP. Since each such position is equidistant to C, Attract Closest is satisfied by movement of any *wh* to [Spec, CP] position.

German displays a different paradigm in that both SVO and OVS order are acceptable, with S and O as *wh*-expressions, without the benefit of D-linking. Pesetsky explains this by locating the difference between English and German in the possibility of C_m-SPEC. According to him, German lacks this possibility. Then it follows that in a multiple-*wh*-question, only one *wh*-word needs to move to fulfill the requirements of C_1-SPEC. The other *wh*-word necessarily undergoes feature movement, making a derivation analogous to (82) acceptable.

This account of the absence of Superiority effects presents an alternative to an earlier proposal by Fanselow (1991, 1997). His basic idea was that the apparent Superiority violation in German OSV is preceded by scrambling of O to pre-S position. *Wh*-movement from a scrambled structure will respect economy only if the Object is moved. Fanselow
draws on the following contrast as further evidence:

(84)

<table>
<thead>
<tr>
<th>Wer</th>
<th>glaubte,</th>
<th>daß</th>
<th>der</th>
<th>Peter</th>
<th>ihr</th>
<th>wen</th>
<th>vorstellte.</th>
</tr>
</thead>
<tbody>
<tr>
<td>who-ACC</td>
<td>believed</td>
<td>that</td>
<td>the</td>
<td>Peter-NOM</td>
<td>her-DAT</td>
<td>whom-ACC</td>
<td>introduced</td>
</tr>
</tbody>
</table>

a. ‘Who believed that Peter introduced whom to her?’

b. *?Wen glaubt wer, daß der Peter ihr vorstellte?

In (84b) the embedded object cannot occur to the left of the matrix subject. This is because to do so would first require the object to scramble long-distance to the pre-subject position and then the $wh$-element to move to [Spec, C]. Fanselow shows that such long-distance scrambling is not available out of finite clauses, providing independent evidence for the proposed reliance of Superiority violations on scrambling possibilities. This proposal has been critiqued by Pesetsky, to which I refer the reader.

We have seen that fronting possibilities in multiple-$wh$-questions have played a critical role in the development of syntactic theory. Within the Principles and Parameters model they provided evidence for the ECP and within Minimalism and Optimality Theory they are shaping the view of economy/optimality in language. While the issues touched upon in this section raise further questions worthy of exploration, we will conclude our survey of the theoretical issues related to the Superiority phenomenon and turn to the Subjacency phenomenon in the next section.

3 Subjacency and $wh$-in-situ

1 Introduction 2 Superiority effects 4 Conclusion NOTES REFERENCES

3.1 The diagnostic of possible answers

3.1.1 Single- vs. multiple-pair answers

In moving from a survey of issues surrounding Superiority to a survey of issues surrounding Subjacency, we shift from direct evidence in the form of grammaticality judgments about fronting to indirect evidence about intuitions regarding possible answers. It would, therefore, be appropriate to begin by taking a closer look at the diagnostic of possible answers. As mentioned in section 1, a standard assumption in the literature is that possible answers specify values for all and only those $wh$-expressions that take matrix scope. In the case of simple single-$wh$-questions, the answer specifies values for one expression, in the case of multiple-$wh$-questions for two or more, as the case may be. Given this assumption, the fact that questions like (15) and (17), repeated below, give values for more than one $wh$-expression is indirect evidence that the $wh$-expression inside the island is able to take matrix scope in violation of Subjacency:

(85)

<table>
<thead>
<tr>
<th>a.</th>
<th>Which person knows the man who wrote which book?</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>Bill knows the man who wrote Aspects.</td>
</tr>
</tbody>
</table>
Dayal (2002) notes that although both allow a paired answer, the form differs. (85a) lends itself only to a single-pair answer; (86a) can readily allow a multiple-pair. (It may be possible to force a multiple-pair answer to (85a) by constructing specific contexts, but nothing particular needs to be done to get such answers for (86a).) Similar scope taking mechanisms violating Subjacency could not be involved in both constructions. Before looking at the Subjacency cases, however, we will examine the distinction between single- and multiple-pair answers in the basic cases.

Multiple-\textit{wh}-questions have been said to have three different readings: a list reading, a REF-Q reading, and an echo-Q reading. These readings were identified by Bolinger (1978), Wachowicz (1974, 1975), and Pope (1976), under various terms. The summary here is taken from Dayal (1996a), which relies on their observations as well as on the discussion in Comorovski (1989). To see the difference between the three, consider three situations in which the multiple-\textit{wh}-question \textit{Who cooked what?} can occur and the answers it admits in those situations.

Let us demonstrate the list reading first. Take a context in which there are several dishes on the table and the questioner knows several people who have cooked dishes. She asks (87a) and gets the response in (87b):

\begin{quote}
(87)
\begin{enumerate}
\item Who cooked what?
\item John cooked the meat, Bill cooked the rice, and Sue cooked the vegetables.
\end{enumerate}
\end{quote}

As Wachowicz puts it, the information the questioner is interested in is the proper pairing between two given sets. This reading crucially presupposes that there will be at least two pairs in the list. This is what we are calling the multiple-pair reading.

Now, let us turn to the echo reading of the question. An appropriate context is one where the questioner only hears part of an utterance and wishes the utterance to be repeated. In the following, subscripting is supposed to indicate a string that is phonetically unclear:

\begin{quote}
(88)
\begin{enumerate}
\item John cooked the meat
\item Whó cooked whát?
\item John cooked the meat.
\end{enumerate}
\end{quote}

Echo questions can be distinguished from ordinary ones by their rising intonation.

Finally, consider REF-Questions, which ask for the identity of a unique pair of individuals, as opposed to a list of
pairs. (88b), uttered in response to (88a), would have a REF-Q reading:

(89)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>He cooked something</td>
</tr>
<tr>
<td>b.</td>
<td>Who cooked what?</td>
</tr>
<tr>
<td>c.</td>
<td>John cooked the meat.</td>
</tr>
</tbody>
</table>

REF-Questions were classified by Wachowicz as a type of echo question but Pope shows that though they are similar to echo questions they are intonationally distinct. The *wh*-expressions do not need emphatic stress and are uttered with the same fall in intonation as ordinary questions. Further, they are not requests to repeat the information already provided in the discourse, but rather for an elaboration.

That REF-Questions differ from echo questions can also be shown by cases that are clearly not triggered by previous utterances. The questions in (89a) and (89b) can be asked without a particular context and be answered with just a single pair of individuals. All that is required is that the questioner know that only a single pair can be named in the answer. Question (90a), for example, pragmatically rules out a multiple-pair answer. Similarly, if there are only two individuals, only one of them can be the first to hit in (90b):

(90)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Who killed Robert Kennedy when?</td>
</tr>
<tr>
<td>b.</td>
<td>OK, who hit who first?</td>
</tr>
</tbody>
</table>

There are two approaches that have been taken to the distinction between single- and multiple-pair answers. One is to treat it as a pragmatic effect. Under this view, questions are able to yield multiple-pair answers but they are not restricted to them. Single-pair answers are simply a sub-case of the larger possibility. The other approach is to take this distinction as arising from the semantic representation of the question and in the next subsection we will look at the various proposals that have been made to derive this distinction. The reason for taking the semantic approach to this phenomenon seriously is that there are empirical effects that cannot be handled in a pragmatic approach. We have already seen evidence from two different domains about the nature of restrictions governing possible answers. In section 2.2.3 we saw that proponents of the functional *wh*-approach have appealed to the intuition that in a multiple-*wh*-question only one *wh*-expression, the superior one, is exhaustively listed and at the beginning of this section we saw that there are constructions where a pair answer is possible, but not a multiple-pair answer. Once we understand the semantic moves involved in deriving the two possibilities, we will re-examine the phenomenon of Subjacency violations with *wh*-in-situ.

### 3.1.2 Deriving single- and multiple-pair answers

Higginbotham and May (1981) were the first to attempt an account of pair-list answers by proposing a semantic operation they termed ‘absorption’. The goal of this operation was to provide a transition from uniqueness effects in single-*wh*-questions like (91a) to multiple-pair answers in (91b). Although their proposal has been widely accepted in the syntactic literature, the details of the semantic operation are somewhat difficult to decipher:

(91)
In this section I will present the account of the switch from uniqueness to list answers proposed in Dayal (1996a), which has the advantage of being embedded in the propositional theory of questions introduced in section 1.

Dayal based her account on the paradigm below, where (92a) requires a unique individual to be named in the answer, (92b), a plurality of individuals, while (92c) is neutral in this regard:

\[(92)\]

<table>
<thead>
<tr>
<th>a.</th>
<th>Which man came to the party?</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>Which men came to the party?</td>
</tr>
<tr>
<td>c.</td>
<td>Who came to the party?</td>
</tr>
</tbody>
</table>

\[(93)\]

<table>
<thead>
<tr>
<th>a.</th>
<th>$\lambda p \exists x [\text{man/men}(x) \land p = x \text{ came to the party}]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>${a \text{ came}, b \text{ came}, c \text{ came}}$</td>
</tr>
<tr>
<td>c.</td>
<td>${a \text{ came}, b \text{ came}, c \text{ came}, a+b \text{ came}, a+c \text{ came}, b+c \text{ came}, a+b+c \text{ came}}$</td>
</tr>
<tr>
<td>d.</td>
<td>$\text{Ans}(Q) = {p \in Q \land \forall p' \in Q \left[\forall p' \rightarrow p \subseteq p'\right]}$</td>
</tr>
</tbody>
</table>

Adopting the view that the domain of individuals includes atomic entities as well as their sums, she makes the existential wh-quantifier sensitive to number morphology. Now, in the singular case, the question denotes the set in (93b), in the plural case the set in (93c). Further, she defines the Answerhood operator, as shown in (93d), to pick out the maximally informative true proposition in the set, namely the one that entails all the others. In the singular case, there can be no entailment relation between the various members of the set so the question can be answered only if a unique proposition is true. In the plural case, however, there can be more than one true proposition since their conjunction can satisfy (93d). Although the semantics allows there to be only one true proposition in the set, say $a \text{ came}$, there is assumed to be an implicature that a plurality of individuals have the property in question. $Who$ is taken to be like the plural case minus the plurality implicature.

Turning to multiple-wh-questions, it should be obvious that (93d) – if applied to the Hamblin sets – presented in section 1, for example – will yield single-pair answers. In section 2.2.3 we discussed the functional approach to multiple-wh-questions advocated by Hornstein (1995), Dayal (1996a), and Comorovski (1996). As argued by Dayal (1996a), the functional approach derives the intended effects only if two conditions are added to the proposal of Chierchia (1993). One is the Answerhood operation introduced above, the other is the requirement that each proposition in the set be a full graph of the function. Let us consider this with the help of a concrete example:
The question is analyzed as involving a functional dependency respecting WCO, as in (94a). At LF we take the \textit{wh}-in-situ to undergo A' movement to [Spec, CP] and the logical representation is as given in (94c). Without going into the details of the derivation, a functional dependency is posited whereby the subject term sets the domain of the function, the object term its range and the propositions relate individuals in the domain set with some functionally dependent entity in the range set. Crucially, each proposition in the denotation of the question is a conjunction of the atomic propositions obtained by varying the values of \(x\) and its dependent element \(f(x)\) in the IP denotation. If the set of men = \{a,b\} and the set of women = \{c,d\}, the question denotes the set of four propositions in (94d), where each proposition is the graph of a function relating the domain and the range sets. Although the particulars of this operation differ from that proposed by Higginbotham and May, this too can be thought of in terms of Absorption of two \textit{wh}-operators.

The Answerhood operator in (93d), when applied to sets derived via Absorption, picks out a unique maximally true proposition from the question denotation. As would be obvious, each possible answer ensures that the domain set is exhaustively paired and that the pairings are not one–one or many–one. This is because although \(a\) and \(b\) both like \(c\) is acceptable as an answer to (94a), \(a\) likes \(c\) and \(d\) is not (see Engdahl 1986 and Dayal 1996a for further discussion of this issue). The ambiguity of multiple-\textit{wh}-questions in allowing single pair vs. multiple-pair answers, on this account, rests on the lexical ambiguity of \textit{wh}-expressions in being ordinary individual quantifiers, or expressions that can enter into functional dependencies.\textsuperscript{22}

Note that there are two key factors in deriving the desired effects, each proposition in the set must represent the full graph of the function and only one proposition must be picked out as a possible answer. As shown in Dayal (1996a), Chierchia's analysis of questions with quantifiers is unable to derive appropriate answers because it allows atomic propositions in the set and takes the conjunction of any subset of the question as a possible answer. This problem is inherited by Comorovski (1996), who applies Chierchia's analysis to multiple-\textit{wh}-question:

\begin{align*}
\text{(95)} \\
a. \quad & \lambda p \exists x \exists f_{<e,e>} [\text{man}(x) \& \text{Range}(f) = \text{woman} \& p = x \text{ like } f(x)] \\
b. \quad & \{a \text{ likes } c, a \text{ likes } d, b \text{ likes } c, b \text{ likes } d\}
\end{align*}

Comorovski's account, like Chierchia's and Engdahl's, yields sets of atomic propositions no different from ordinary Hamblin sets and does not impose restrictions on how many of them would enter into a possible answer. This predicts,
in the case of (95), for example, that a likes c and d will be a possible answer, contrary to the stated goals of the analysis.

Recall that Hornstein's functional account differs from Comorovski's in not requiring covert movement of wh-in-situ. It is a bit hard to see what question denotations are at issue since he does not give a semantics for the structures. However, let me highlight a point that may be crucial in evaluating Hornstein's account. As we saw in (94), the relevant operation that delivers multiple-pair answers is possible only if both wh-expressions take scope outside C0, where the propositional variable is introduced. That is, the LF representation of the multiple-wh-question must be as given in (94b). In this respect, his syntax for multiple-pair answers is no different from the syntax proposed for deriving standard Hamblin sets. Single-pair answers arise when the Answerhood operator applies to question denotations derived from wh-expressions interpreted as ranging over individual variables, multiple-pair answers from its application to question denotations where wh-expressions encode a functional dependency. For Hornstein's account to be complete, a semantics deriving the intended answers has to be given, which at this point has not been done.

3.2 Pair answers across islands

3.2.1 Single-pair answers across islands

In this section we will summarize the proposal in Dayal (2002), which is partially based on Dayal (1996a), for deriving the difference between the types of pair answer possible when the wh-expressions are separated by an island. The primary empirical generalization there is that multiple-pair answers are restricted to wh-islands that conform to a particular format dubbed the wh-triangle, with single-pair answers available in the other cases. We will begin by summarizing the account for single-pair answers across islands before considering the role of the wh-triangle.

It might be worth recalling that the possibility for whs-in-situ to take scope outside islands has been explained in a number of ways; to mention just a few, by taking Subjacency to be inapplicable at LF (Huang 1982a), by unselective binding of D-linked wh-expressions (Pesetsky 1987a), and by existential closure involving a choice function interpretation for wh-in-situ (Reinhart 1997). None of these proposals, however, have taken the distinction under discussion into account, so it may be worth demonstrating this explicitly. While (96b) is a perfectly acceptable answer to (96a), (96c) is at least an awkward, if not a clearly unacceptable answer to it:

(96)

| a. Which linguist will be offended if we invite which philosopher? |
| b. Professor Smith will be offended if we invite Professor Brown. |
| ** [#/*Professor Smith will be offended if we invite Professor Brown, and Professor King will be offended if we invite Professor Matthew. ] #/* |

This also holds of multiple-wh-questions such as the following, cited commonly in the literature as showing wide scope of wh-in-situ:

(97)

| a. Which student read the book that which professor wrote? |
b. Which student got a headache after she read which book?

In order to account for this fact Dayal (2002) notes that the operation for forming multiple-pair answers given in section 3.1.2 must be blocked from holding across islands. She constrains the Absorption associated with functional dependencies from holding across islands by requiring movement at any level to obey standard constraints. Since the wh-in-situ cannot move to matrix Spec, it cannot fix the value for the range of the function and its trace cannot be functionally bound by the matrix wh. The question then arises how the single-pair answer can be derived without actual movement. Here Dayal appeals to Reinhart's choice-function analysis, which is designed for this very purpose:

(98)

a. [Which linguist if we invite which philosopher]]

b. ∃x∃f[linguist(x) & p = x will be offended if we invite f(philosopher)]

c. {a will be offended if we invite c, b will be offended if we invite d, a will be offended if we invite d, b will be offended if we invite c}

As shown above, at the matrix level there is existential quantification over functions that yield an arbitrarily chosen entity out of the set they are applied to. Since the LFs of such questions do not have two wh-operators that can undergo Absorption, we get as the denotation of the question a set of atomic propositions. The Answerhood operator, when applied to such question denotations, yields single-pair answers. The choice function approach, then, derives what could be described as a non-quantificational or referential interpretation of the wh-in-situ (see Saddy 1991 for a similar characterization of wh-in-situ).

It may be worth noting that choice functions are not blocked from applying to wh-in-situ in simple questions or in the wh-island cases to be discussed below. The claim is that they cannot be used to derive multiple-pair answers. Since a Ref-Q reading is always possible, either choice functions or ordinary existential quantifiers can be used to derive sets of atomic propositions. The usefulness of choice functions surfaces when islands are involved by providing an alternative to covert movement. Covert movement, if allowed, would open up the way for Absorption and incorrectly yield multiple-pair answers across the board.

3.2.2 Multiple-pair answers across islands

Turning to cases in which multiple-pair answers are possible across islands, Dayal notes two properties that the structure must have. One, the embedded wh-word whose value is given must be in a multiple-wh-question. Two, this multiple-wh-question must be a complement of the matrix verb. These two conditions result in a wh-triangle construction that is met in the well-known example in (99a). Sentences like (99b) – attributed by Mahajan 1990 to David Pesetsky – with an intervening clause do not allow the relevant answers, even though the intervening clause does not introduce an island, as shown by (100). Sentence (99c) is somewhat marginal since the wh in the embedded clause is not fronted and English does not allow wh-in-situ in single-wh-questions. Be that as it may, it still does not allow a multiple-pair answer:

(99)
<table>
<thead>
<tr>
<th></th>
<th>(100) Which book does Bill believe (that) John knows Mary bought?</th>
</tr>
</thead>
<tbody>
<tr>
<td>b.</td>
<td>Which student believes (that) John knows where Mary bought which book?</td>
</tr>
<tr>
<td>c.</td>
<td>Which student knows that Mary bought which book?</td>
</tr>
</tbody>
</table>

**Dayal (1996a)** treats the multiple-pair answer as relating the matrix *wh*-word to the multiple-*wh* complement rather than to the embedded *wh*-in-situ:

(101)

Here the embedded multiple-*wh*-question is interpreted as a second order question – that is, a set of questions rather than a set of propositions. Since the matrix verb is defined for questions, not sets of questions, the complement QRs take clausal scope. Semantically, it denotes the set of questions in (101b) and the full question is interpreted as a relation between the members of this set and individual students who know the answer to them.

Given the local nature of QR, this explains why the intervening clause in (99b) effectively blocks the multiple-pair answer. The explanation for the second property, the requirement that the complement question be a multiple-*wh*-question, shown by the contrast between (99a) and (99c), turns on the possibility of a second-order interpretation for it. Independent evidence that multiple-*wh*-questions, but not single-*wh*-questions, can denote sets of questions can be seen by examining possible answers to the following echo questions:

(102)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Mary bought what at the store?</td>
</tr>
<tr>
<td>b.</td>
<td>{Mary bought a book at the store, Mary bought a pen at the store . . . }</td>
</tr>
</tbody>
</table>

(103)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Where did Mary buy what?</td>
</tr>
<tr>
<td>b.</td>
<td>{Where did Mary buy the book? Where did Mary buy the pen? . . . }</td>
</tr>
</tbody>
</table>

Extrapolating from echo questions to the multiple-*wh*-questions under issue, Dayal proffers a type-theoretic account of the multiple-*wh* complement requirement for multiple-pair answers across islands. Single-*wh* complements can be interpreted in situ and do not involve semantically driven QR.

One point that should be noted is that the proposed functional dependency in (101a) appears to be in violation of
WCO. Dayal suggests that this is perhaps due to the D-linking of the embedded *wh*-word, are like questions with the universal *each N* rather than those with the universal *every N* in not displaying subject–object asymmetries. We will return briefly to the role of D-linking in multiple-pair answers in section 3.3.2.

To sum up, regardless of whether the particular proposals for deriving single- vs. multiple-pair answers hold up, the general point that the diagnostic of paired answers cannot be used as a simple indicator of wide scope has to be recognized. The distinction in the types of paired answers admitted by questions with *wh*-in-situ inside Complex Noun Phrases and those inside *wh*-islands shows that a uniform account of their interpretation is difficult to maintain.

### 3.3 Reassessing Subjacency at LF

#### 3.3.1 The evidence for and against Subjacency

In the previous subsections the view that *wh*-in-situ have exceptional scope properties has been subjected to close scrutiny by drawing a distinction between two types of paired answers and relating this distinction to explicit claims about the semantics of questions and answers. Let us return now to the empirical motivation behind claims about the scope of *wh*-in-situ and re-examine the data which have provided the basis for those claims from the present perspective. As we will see, while some data provide definitive evidence in favor of one position, some can be shown to be consistent also with the opposite position. The three language groups which will be relevant in this process are East Asian languages, South Asian languages, and the Slavic/Balkan languages. Though the last group does not have *wh*-in-situ they provide crucial evidence on the issue under discussion.

Chinese, Japanese, and Korean, all *wh*-in-situ languages, have been key players in the debate about subjacency at LF. The earliest claims for the absence of subjacency at LF was based on the interpretive properties of embedded questions in Chinese (Huang 1982a). And one of the earliest challenges to this position was made by Nishigauchi (1986, 1990), Choe (1984), and Pesetsky (1987a) on the basis of Japanese and Korean data. The core facts were introduced already in section 1 but I will repeat some of them to make the discussion here self-contained.

Chinese *wh*-in-situ shows neither CNPC nor *wh*-island effects:

(104)

<table>
<thead>
<tr>
<th>Ni</th>
<th>zui</th>
<th>xihuan</th>
<th>[piping]</th>
<th>shei</th>
<th>de</th>
<th>shu?</th>
</tr>
</thead>
<tbody>
<tr>
<td>you</td>
<td>most</td>
<td>like</td>
<td>criticize</td>
<td>who</td>
<td>REL</td>
<td>book</td>
</tr>
</tbody>
</table>

a. ‘For which x, you like the book that criticizes x?’

<table>
<thead>
<tr>
<th>Ni</th>
<th>xiang-zhidao</th>
<th>[Lisi</th>
<th>zeme</th>
<th>mai-le</th>
<th>sheme?</th>
</tr>
</thead>
<tbody>
<tr>
<td>you</td>
<td>wonder</td>
<td>Lisi</td>
<td>how</td>
<td>bought-ASP</td>
<td>bought</td>
</tr>
</tbody>
</table>

b. ‘For what object x, you wonder how Lisi bought x?’

In contrast, Nishigauchi describes Japanese as immune to CNPC alone:

(105)
Deguchi and Kitagawa (2002) challenge the judgment for (104a), however, arguing that this reading is available under an appropriate prosodic rendering of the question. Japanese would then be like Chinese, as described by Huang.

Hindi seems to fall at the opposite end of the spectrum in displaying no wide-scope effect, at least in standard cases of relativization and complementation (Davison 1984; Gurtu 1985; Mahajan 1990; Srivastav 1991c; Dayal 1996a). With non-finite complements, Hindi patterns with Chinese and Japanese:

Although the effects noted here are not specific to multiple-\textit{wh}-questions – they apply more generally to the scope of \textit{wh}-expressions in these languages – the following data are critical in evaluation of specific claims. In all these languages, multiple-pair answers are readily available in the typical Baker configuration involving a \textit{wh}-triangle:23
In fact, Dayal (1996a) notes that this configuration is sufficient to yield multiple-pair answers, even in languages like Bulgarian where both embedded wh-expressions have undergone overt movement, as in (107c).

Turning now to claims about Subjacency at LF emanating from such facts, both positions have been successfully defended. One way of categorizing the analyses that have been proposed is to use assumptions about the specification of values as a guide. Among those who take specification of values as evidence of matrix scope are Watanabe (1992a), Richards (1997), and Deguchi and Kitagawa (2002) in addition, of course, to Huang. Those who take pair answers to under-determine scope are Kim (1991) and Mahajan (1990), in addition to Dayal (1996a, 2002). The challenge for the first group is to find a principled explanation for why a single wh-word may be blocked from taking wide scope in some languages while the addition of an extra wh-word makes that option available in those languages. The challenge for the second group is to find principled reasons for enforcing local scope and finding plausible ways of deriving paired answers without wide scope.

Starting with the first group, Watanabe (1992a) reconciles the Japanese facts with Huang's view that wh-in-situ are exempt from Subjacency by arguing that Japanese, contrary to appearances, is in fact a fronting language. The distinctive feature of Japanese is that fronting involves a phonetically invisible operator, not the full phrase. This derives the absence of any phonetic impact of movement while preserving the constraints on movement typical of fronting. In order to account for paired answers in (106), then, he appeals to the fact that overt movement is restricted to one wh-operator, as in many languages with standard fronting. The invisible operator associated with the embedded indirect object undergoes local fronting to satisfy the Q-morpheme in embedded Comp, leaving the direct object to undergo full-scale LF movement in violation of Subjacency. With regard to cases like (104b) he assumes pied-piping, along the lines of Nishigauchi's proposal.

Recall from the previous section the proposal in Richards (1997) that constraints only have to be met once per cycle, encoded in the Principle of Minimal Compliance. Under this view, the contrast between (105a) and (107a) can be explained in the following way. In the case of (107a), the matrix wh-word moves into matrix Spec in accordance with Subjacency and by ‘paying the Subjacency tax’ now allows the embedded wh-word to move to matrix Spec in violation of Subjacency. In contrast, (105a) is a structure in which the matrix Spec does not have a wh-word which could pay the tax, with the effect of barring the embedded wh-word from moving into that position. Richards's proposal, then, differs crucially from Huang and Watanabe in maintaining the relevance of Subjacency for covert as well as overt movement. He agrees with them, however, in his assumption that when pair answers are available they are due to scope in violation of Subjacency.

Although these approaches are extremely innovative in resolving the apparent paradox presented by these data, it might be worth noting that they are subject to the criticism levelled by Mahajan (1990) and Dayal (1996a) against Huang's original account that they do not explain the loss of that reading when a clause intervenes between matrix and embedded wh-word (cf. (99b)). This is, of course, due to the fact that pair answers are tied to wide scope for the embedded wh-in-situ and the intervening clauses under discussion do not introduce any barrier to movement. Further,
they are also open to the criticism in Dayal (2002) that they cannot distinguish between single-pair answers that hold for questions with one matrix \(wh\)-word and one \(wh\)-word inside Complex NPs or conditionals and multiple-pair answers for questions where the embedded \(wh\)-word is in a \(wh\)-island. Finally, they do not address the possibility of multiple-pair answers to cases like (107c) where the operators are moved to embedded scope positions in overt syntax.

An alternative proposal, due to Kim (1991) and Mahajan (1990), aligns \(wh\)-expressions with quantifiers and treats \(wh\)-movement as an instance of Quantifier Raising. Taking QR to be a local operation, this in effect enforces locality in the interpretation of \(wh\)-in-situ and the issue of Subjacency effects becomes moot. The question, of course, arises how wide-scope effects for \(wh\)-in-situ inside islands are to be explained. The natural move to derive such effects is to treat the containing clause as having scope, allowing pair answers to cases like (107) while still blocking them in cases like (105) and (106). The QR approach to \(wh\)-in-situ is very similar to the position advocated by Dayal (1996a, 2002), discussed in sections 3.1 and 3.2, but there are differences between the two positions that may be worth bringing out here.

One problem pointed out by Dayal (1996a) is that the syntactic domain of \(wh\)-movement and quantifier scope, in Hindi at least, are not identical. In particular, a quantifier inside a gerund cannot take matrix scope while a \(wh\)-expression in the same position is forced to take scope at the matrix level. Other, more substantive differences, have to do with semantic assumptions about \(wh\)-expressions. If \(wh\)-movement is like QR it would be to a position inside \(C^0\). It follows, then, that the relevant semantic interpretation for \(wh\)-expressions would have to involve choice functions. As we saw in sections 3.1 and 3.2, it is not a straightforward matter deriving the switch from uniqueness in ordinary single-\(wh\)-questions to multiple-pair answers in multiple-\(wh\)-questions. And we also saw that the distinction between single-pair and multiple-pair answers in the more complex cases is intractable for any theory that takes a uniform approach to all \(wh\)-expressions. These authors do not provide explicit discussion of the semantics of QR'd \(wh\)-expressions, and it is possible that they do not intend the co-relation between quantifiers and \(wh\)-expressions to be taken literally. If so, they might consider acceptable the idea proposed in Dayal (1996, 2002) that \(wh\)-movement is distinct from QR in terms of the landing site, but akin to it in being a semantically driven local operation.

Before concluding, I should note that the recalcitrant problem for approaches positing locality at LF is the possibility of wide scope for embedded \(wh\)-questions in Chinese, exemplified in (104). However, given our refined understanding of the diagnostic of possible answers the possibility of wide scope for Chinese and Japanese \(wh\)-in-situ should be evaluated against further data. Some of the relevant cases would be the Chinese counterparts of the examples in (108):

(108)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Who knows how Mary bought what?</td>
</tr>
<tr>
<td>b.</td>
<td>Who believes that John knows where Mary bought what?</td>
</tr>
</tbody>
</table>

If the embedded \(wh\)-word can indeed move to matrix Spec, we expect questions like (108b) to allow multiple-pair answers. If they do not allow such answers, it would indicate that non-local movement is not possible even in Chinese. As far as I am aware, these cases have not been discussed in the literature but the predictions of the various approaches summarized here are clear enough. We see, then, that although positing absence of Subjacency at LF provides a simple explanation for some cases, it runs into serious problems when tested across a wider set of facts. In general, it predicts a large number of unavailable readings. As highlighted in sections 3.1 and 3.2, positing mechanisms for assigning wide scope without movement, such as choice functions and deriving pair answers from them, overgenerates in the same way. The most restrictive approach consistent with the data surveyed seems to be one in which covert movement is restricted essentially to local positions, and a distinction made between questions with \(wh\)-expressions in Spec positions and those with \(wh\)-in-situ at LF. As discussed here, there are problems in this approach as well that need further exploration.
3.3.2 Specification, scope, and D-linking

As would be clear from the discussion so far, broadly speaking there are two approaches one might take in analyzing questions with *wh*-in-situ in embedded clauses. One is to take specification of values in the answer for that *wh*-word as evidence of wide scope. In the kinds of examples we have been looking at, this has the consequence of making Subjacency potentially irrelevant at LF. The other is to deny that specification of values in the answer is an absolute indicator of scope. This allows for the preservation of Subjacency at LF, requiring of course an auxiliary explanation for the form of the possible answers. Here I would like to mention some facts that bear on this issue.

Kuno and Robinson (1972) challenged Baker's account of multiple-pair answers in cases like (109a) by pointing to the fact that the version in (109b) with no *wh*-in-situ also allows such answers:

(109)

| a. Who knows where Mary bought what? |
| b. Who knows where Mary bought these books? |

Since questions like (109b) could not involve LF wide scope of the embedded definite, an alternative pragmatic approach must be available for such cases. But if such an account exists, why would it not extend to the cases involving *wh*-in-situ? This challenge was never answered and the status of (109b) and its implications was simply set aside during the eighties when the theory of LF was being elaborated. In fact, even in current literature the importance of these examples remains underappreciated.

Dayal (1996a) notes that, in fact, Kuno and Robinson's point gains further weight when the following paradigm is taken into account. The question in (110a) does not allow a multiple pair reading, while (110b) does:

(110)

| a. Which woman knows where Mary bought these books? |
| b. Which woman knows where Mary bought which book? |

Changing the matrix *wh*-word to a singular, which we have seen in section 3.1.2 to impose uniqueness requirements in single-*wh*-questions, leads to loss of multiple-pair answers in questions with embedded plural definites (110a). This suggests that the list answer to (109b) derives from an individual answer like *John and Bill know where Mary bought these books*. It is just a more informative rendering of this statement, as claimed by Kuno and Robinson. However, one cannot conclude the same for questions with embedded *wh*-expressions. As (110b) shows, when the *wh* is D-linked, inherently or in a given context, the possibility of multiple-pair answers survives even with a matrix singular. This raises two questions, namely, What is the structural and semantic properties at issue in such cases? and Why should D-linking make a difference? The approaches surveyed above have all been attempts to provide an account of pair answers that is not based on pragmatics. With regard to the second question, beyond an intuitive co-relation between familiarity with the set of entities at issue, however, there is no formal characterization of the semantics of D-linking. The data presented here show quite clearly that if the diagnostic of possible answers is to be used seriously, more work needs to be done on the topic.
4 Conclusion

1 Introduction 2 Superiority effects 3 Subjacency and wh-in-situ NOTES REFERENCES

We have seen in this survey that questions in general, and multiple-wh-questions in particular, have been an extremely important phenomenon in the development of linguistic theory. Typologically, they are diverse enough to raise interesting questions about the nature of Universal Grammar and the ways in which individual languages can differ. Further, they lie at the interface between syntax and semantics and provide a unique window into the principles governing the assignment of scope. A particular feature of questions is that they can be analyzed on the basis of two types of evidence, direct evidence in the form of acceptability judgments about fronting and indirect evidence in the form of possible direct answers admitted by them. In doing this survey, I have tried to highlight the relevant conclusions drawn on the basis of multiple-wh-questions as well as to refine our understanding of the nature of the diagnostics used in arriving at those conclusions.

NOTES

1 Introduction 2 Superiority effects 3 Subjacency and wh-in-situ 4 Conclusion REFERENCES

I am grateful to Chris Barker and Satoshi Tomioka for very useful comments, and to Heather Robinson and Scot Zola for help with the preparation of the manuscript.

1 Karttunen differs from Hamblin in restricting the set of propositions denoted by the question to those that are true. This difference affects the precise way in which questions are related to their answers but does not affect the general point being made here. In section 3, however, the importance of using Hamblin sets as question denotations and encoding Karttunen's truth requirement in an answerhood operator will be shown to be relevant in making more fine-grained distinctions in pair answers.

2 I ignore intensional operators since they do not affect the issues under discussion.

3 Of course, it should be emphasized that frameworks with or without movement may be combined with other theories of questions, such as Groenendijk and Stokhof (1984), where questions denote propositions rather than sets thereof. The considerations that go into the choice between Hamblin–Karttunen and G&S do not depend on the syntactic properties of multiple-wh-questions. I therefore do not discuss them here.

4 Note that in all models, a further distinction between the scope of wh-in-situ and quantified NPs also has to be made.

5 There is a typologically distinct type of wh-in-situ language, exemplified by many South-Asian languages. See chapter 77 and the discussion in section 3.

6 In Japanese, it is possible to scramble the wh-words into sentence initial positions, but this is an option that is open to all arguments and can be shown not to involve wh-movement.

7 Chinese does not show a subject–object asymmetry in extraction. This is explained as a consequence of the subject position being properly governed in Chinese.

8 As shown by von Stechow (1996), the syntax proposed by Nishigauchi is not adequate and yields incorrect
answers unless obligatory reconstruction of the non-\textit{wh} material is enforced.

9 The status of sentences with \textit{wh}-in-situ in Serbo-Croatian \textit{Ko vidi coga}? and other –MFS languages remains open. There is general unclarity whether \textit{wh}-in-situ is possible, whether they are possible but only under a D-linked interpretation, or ruled out altogether. It can safely be assumed that there is, at the very least, a strong tendency or preference for multiple fronting in these languages.

10 In Romanian it is also possible for multiple extraction to take place from different clauses. That is, questions with the schema \[\text{CP } \text{WH}_i \text{WH}_j \text{[IP } \ldots \text{t}_i \ldots \text{t}_j \ldots \text{]}\] are considered acceptable.

11 It should be obvious how multiple adjunction to Spec would account for \textit{wh}-island violations of the kind seen in (26a).

12 It is generally accepted that this follows from the semantics of focus and questions. See \textit{Rooth (1992)} for an explicit statement of the correlation between question denotations and focus in answers.

13 Cheng argues that the presence or absence of Q morphemes can be independently established on the basis of how yes–no questions are formed in a given language. Note that optional-fronting languages, as mentioned in section 1.2.4, are argued not to involve \textit{wh}-movement at all, and are therefore not problematic for the Clausal Typing Hypothesis.

14 Adams’s filter applies to COMP, Rudin’s to [Spec, CP]. The differences between the two are not of direct concern here. I should also mention that the discussion of this filter has been somewhat simplified by ignoring differences between relative pronouns and interrogative pronouns and by ignoring the possibility of the constraint applying at PF, a point that is not adequately established.

15 As a consequence of this, Pesetsky argues that Subjacency can be taken to be operative at LF as well as S-structure. Apparent violations of Subjacency would be due to a D-linked \textit{wh}-word being bound long-distance by a Q-operator. Note, though, that Pesetsky’s approach goes counter to Nishigauchi’s claims regarding the scope of Japanese \textit{wh}, an issue we return to in section 3.

16 \textit{Wh}-expressions can also be interpreted via skolem functions, which we discuss in section 2.2.3 under the term ‘functional \textit{wh}’. The functional-\textit{wh} analysis is neutral with respect to whether it applies to fronted \textit{wh} or to \textit{wh}-in-situ.

17 The a-index may be anaphoric instead of pronominal in some languages. It should be noted that Chierchia’s analysis of functional/list answers is not tied to any particular account of WCO. Two proposals treating it in terms of leftness and relating it to functional answers are \textit{Williams (1994)} and \textit{Jacobson (1994)}. The latter argues for a variable-free semantics to get the same results as Chierchia. Other references for WCO are \textit{Koopman and Sportiche (1982)} and \textit{Safir (1986)}.

18 Note that \textit{May’s (1985)} account of this asymmetry does not work for multiple-\textit{wh}-questions. For him, the (im) possibility for scope permutation turns on the landing site of the scopal expressions, rather than on their base positions. Two \textit{wh}-words, unlike a \textit{wh}-word and a quantifier, can form a local relation in [Spec, CP] without violating the PCC. An object \textit{wh}-word is therefore predicted to be able to take scope over the subject and (somehow) be interpreted universally. See \textit{Dayal (1996a)} for discussion.

19 See also \textit{Williams (1994)} for similar ideas and related discussion.
20 See also Krifka (1999) for a similar explanation of the subject–object asymmetry in questions with quantifiers.

21 See Link (1983) and the account of comparable uniqueness and maximality effects with definite determiners. This correlation between \(wh\)-expressions and definites derive from an earlier version of the theory presented in Srivastav (1991c). It has also been proposed by Rullmann (1995b).

22 See also Sharvit (1997b) and Bittner (1998) for further discussion of functional dependencies in questions.

23 Watanabe (1992a) and Richards (1997) discuss differences in acceptability judgments depending on the position of the matrix \(wh\)-word. The examples given here are uncontroversial.

24 For Deguchi and Kitagawa (2002), of course, there is no additional \(wh\)-effect. The perceived contrast between (105a) and (105b) might be due to the fact that the relevant prosody is not as easily available with yes/no questions as with \(wh\)-questions.

25 The correlation between specification of values and scope has played a pivotal role in the analysis of the Partial \(Wh\)-Movement/Scope Marking Construction surveyed in chapter 47.

REFERENCES

1 Introduction  2 Superiority effects  3 Subjacency and \(wh\)-in-situ  4 Conclusion  NOTES


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