

13

Wh-dependencies

13.1 Introduction

We noted in chapter 8 that *wh*-questions provide an important example of sentences involving a noncanonical complement or a noncanonical subject. *Wh*-questions are in fact one of a number of sentence-types in which a complement or a subject is missing and in which there is a specific type of higher structure often but not always containing a *wh*-element. This was first emphasized in Chomsky (1977b). I will call the relation between the missing complement or subject and the higher structure a *wh*-dependency, and I will call the constructions *wh*-dependency constructions. We can look first at the basic properties of *wh*-questions. Then we can consider how they can be analysed, first within P&P and then within HPSG. Finally, we can look at other *wh*-dependency constructions.

13.2 Wh-questions

The central feature of *wh*-questions is that they are much more varied than the other examples of sentences involving noncanonical complements and subjects that we have considered. One aspect of this is that the *wh*-phrase can have a variety of functions. In passives, the subject functions as the first complement of the passive participle or as the subject of an infinitival complement of the passive participle. (In the latter case, it functions as the first complement as well on PSG analyses.) In raising sentences, the subject functions as the subject of an infinitival complement of the raising verb or adjunctive. In *wh*-questions, the *wh*-phrase can function as a noncanonical complement or a noncanonical subject of various kinds. We can illustrate with the following:

- (1) Who did Hobbs see?
- (2) Who did Hobbs give the book to?

- (3) Who did Hobbs consider to be a fool?
- (4) Who do you think saw Hobbs?

In (1), *who* functions as the object of a verb in much the same way as the subject of a passive does. In (2), *who* functions as the object of a preposition in a way that is not possible with the subject of a passive. In (3), *who* functions as the subject of an infinitive, again like the subject of a passive. Finally, in (4), *who* functions as the subject of a finite VP, again in a way that is not possible with the subject of a passive. We have similar data with subordinate *wh*-questions, as the following illustrate:

- (5) I asked who Hobbs saw.
- (6) I asked who Hobbs considered to be a fool.
- (7) I asked who Hobbs gave the book to.
- (8) I asked who you thought saw Hobbs.

A second aspect of the varied nature of *wh*-questions is that whereas the subjects of passives and raising sentences are normally NPs, *wh*-phrases can be a variety of categories. The following examples, in which the *wh*-phrases are bracketed, illustrate this:

- (9) [Which man] did you talk to?
- (10) [To which man] did you talk?
- (11) [How ill] has Hobbs been?
- (12) [How frequently] did Hobbs see Rhodes?

In (9) the *wh*-phrase is an NP, in (10) it is a PP, in (11) it is an AP, and in (12) it is an AdvP (Adverb Phrase). The fact that a *wh*-phrase can be both an NP and a PP means that there are often two different *wh*-questions that are equivalent. (9) and (10) illustrate this. The following provide a further illustration:

- (13) Who does he rely on?
- (14) On whom does he rely?

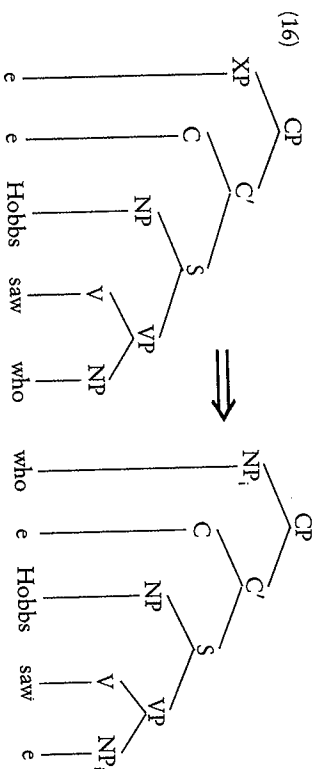
A further point that we should note is that there are both simple *wh*-questions involving a single clause and complex *wh*-questions involving more than one clause. In the complex cases, at least in English, any number of clause boundaries can intervene between the *wh*-phrase and the associated word level head or predicate. The following illustrate:

- (15)a. Who do you think Hobbs saw?
- b. Who do you think Hobbs said he saw?
- c. Who do you think Hobbs said he imagined that he saw?

In (15a) we have one clause boundary between the *wh*-phrase and the associated verb, in (15b) we have two, and in (15c) we have three. Clearly, we could have even more complex examples. Because of this *wh*-dependencies are standardly known as unbounded dependencies within PSG.

13.3 The P&P approach

We can now consider how *wh*-questions can be analysed within P&P. Within a transformational framework, the ordinary obvious structure of a *wh*-question will be derived from a more abstract structure by a movement process. This process is standardly referred to as *wh*-movement. If we assume that *wh*-movement is movement to the CP specifier position and that movement processes leave behind traces, we might have the following derivation for the subordinate clause in (5):



We noted in chapter 9 that examples like *What is Hobbs doing?* provide support for the idea that initial *wh*-phrases are in the CP specifier position if we assume that pre-subject auxiliaries are in C. Further support for this idea comes from various languages in which a *wh*-phrase can be followed by an overt complementizer. The following illustrate:

- (17) Es is no ned g'wief wea daß kummt.
it is yet not sure who that comes
'It is not yet sure who will come.'
(Bavarian – Bayer 1983, p. 25)
- (18) Ce al dhiol an domhan?
who COMP sold the world
'Who sold the world?'
(Modern Irish – McCloskey 1979, p. 52)
- (19) Jeg lurar pa hvem som ser mest svensk ut.
I wonder who that looks most Swedish
'I wonder who looks most Swedish.'
(Norwegian – Taraldsen 1978, p. 633)

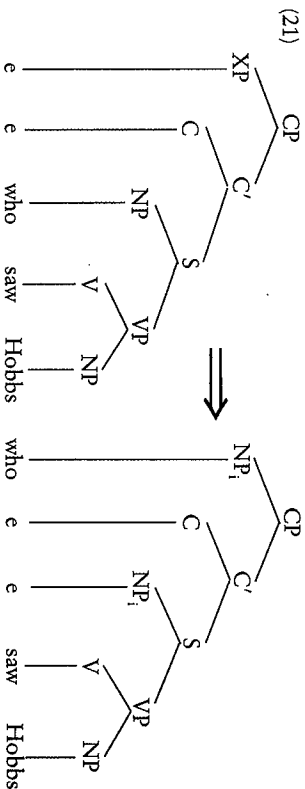
Thus, the idea that *wh*-phrases are in the CP specifier position seems quite plausible.

A further point we should note here is that it seems reasonable to assume that there is no θ -role associated with the CP specifier position. Given this assumption, *wh*-movement will not give rise to an NP with more than one θ -role and hence will not violate the principle discussed in chapters 10 and 11 that no NP can have more than one θ -role.

One question we should ask here is what happens with examples like the following:

- (20) Who saw Hobbs?

It looks as if *who* is just an ordinary subject here. It is generally assumed, however, that the *wh*-phrases in such examples are moved just like the *wh*-phrases in the kind of example we considered earlier. Given P&P assumptions, this means that we will have derivations like the following:



Here, we have a movement process which changes the structure of the sentence but does not change the linear order of the words it contains. Such movement is termed 'vacuous movement'.

Another question that we should consider is: how should complex examples like those in (15) be analysed? There are two possibilities. Either the *wh*-phrase is moved directly to its surface position, or it is moved via the CP specifier position in each containing clause. In the case of (15a), the two possibilities can be represented as follows:

- (22) Who_i do [_{CP} [_S Hobbs saw e_i]]]
 (23) Who_i do [_S you think [_{CP} e_i [_S Hobbs saw e_i]]]]

Which is the right analysis? For various reasons, one of which we will highlight in the next chapter, it is assumed within P&P that the second analysis is the right one. This is standardly known as the successive cyclic analysis.

A final question that we should ask is: what is the status of the traces in *wh*-questions? We saw earlier that traces in passives and raising sentences, which are known as NP-traces, are analysed as anaphors. It is clear that the traces in *wh*-questions, which are known as *wh*-traces (or variables), cannot be anaphors. This is because they are not A-bound in their binding domain, as anaphors are required to be. In (16), the trace is in object position. Hence the minimal S is its binding domain. In (21), the trace is in subject position in a finite clause. Here too, then, the minimal S is its binding domain. Thus, in both (16) and (21), the trace is not A-bound in its binding domain. In fact, in both examples, it is not A-bound at all. In both, the trace is coindexed with

h-phrase, but the *wh*-phrase is not in an A-position. Rather, it is in what we call a non-A- or A' (pronounced A-bar) position.

wh-traces are not anaphors, what are they? The following point to answer to this question:

- 1) Who thinks he is clever?
- 2) Who does he think is clever?

4), *who* and *he* can be the same person, but *who* and *he* cannot be the same person in (25). The impossibility of interpreting the *wh*-word and the same person in examples like (25) is commonly referred to as strong crossover phenomenon. Notice that the *wh*-word has been moved to the pronoun. These examples will have the following structures:

- 6) Who_i [_{CP} [_S e_i thinks [_{CP} [_S he_i is clever]]]]
- 7) Who_i does [_S he_i think [_{CP} [_S e_i is clever]]]]

where the trace is coindexed with the pronoun which it c-commands, is possible, but (27), where the trace is coindexed with the pronoun which c-commands it, is unacceptable. It seems, then, that a *wh*-trace cannot be A-bound. In other words, it must be A-free. We saw in chapter 7 that this is a property of non-pronominal NPs, which are referred to as R-expressions in (2). It is illustrated by the fact that *Hobbs* and *he* can be the same person in (29) but not in (28).

- 28) Hobbs thinks he is clever.
- 29) He thinks Hobbs is clever.

As, if we assume that *wh*-traces are R-expressions, they will be required to be A-free, and we will rule out (27).

With the introduction of *wh*-trace, we now have four different empty categories: *PRO*, NP-trace, *PRO* and *wh*-trace. These can be classified in terms of features *p* (pronominal) and *a* (anaphoric), as follows:

(30)

	+p	-p
+a	PRO	NP-t
-a	<i>pro</i>	<i>wh</i> -t

The point we should note is that all these empty NPs except *PRO* have overt counterparts. The overt counterparts of NP-trace are reflexives, the overt counterparts of *pro* are ordinary pronouns, and the overt counterparts of *wh*-trace are non-pronominal NPs.

There is one further matter that we should highlight here. This is that *wh*-movement is only possible from positions in which Case is licensed. The following illustrate:

- (31) Who_i was e_i arrested e_i?
- (32) Who_i e_i seemed e_i to be best?

- (33) * Who_i was it arrested e_i?
- (34) * Who_i did it seem e_i to be best?

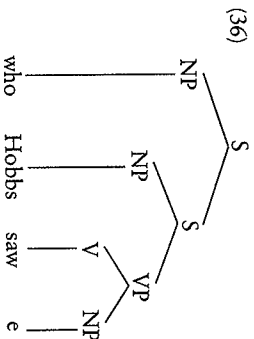
In (31) and (32), we have NP-movement and then *wh*-movement from a position where Case is licensed. In (33) and (34), we have just *wh*-movement from positions where no Case is licensed. Why is this impossible? The obvious suggestion is that it is a consequence of the Case filter, discussed in chapters 10 and 11. This requires an NP with phonetic content to have Case. Suppose now that we make the following assumption:

- (35) A *wh*-NP inherits Case from its trace.

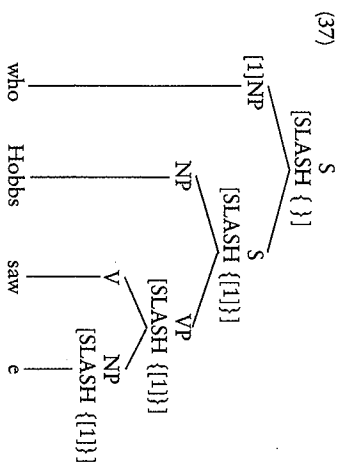
Given this, the *wh*-NPs in (31) and (32) will have Case since their traces are in positions where Case is licensed, but those in (33) and (34) will not since their traces are in positions to which no Case is licensed and will therefore violate the Case filter. Here, then, we seem to have a straightforward account of the restriction of *wh*-movement to positions to which Case is assigned. We will see, however, in section 5 that this is not entirely satisfactory.

13.4 The PSG approach

Within PSG, sentences have only the ordinary obvious structure. But what exactly is the ordinary obvious structure of a *wh*-question? It is not generally assumed in PSG that *wh*-questions contain empty complementizers. However, it has generally been assumed that they involve empty categories like the traces in P&P. Given these assumptions, we will have something like the following structure for the subordinate clause in (5):



Assuming such a structure, we somehow need to make the empty category sensitive to the presence of the *wh*-phrase higher up the tree. Within both versions of PSG, a feature called SLASH is employed for this purpose. (The name arises from the fact that early work uses categories of the form *XY* in this context.) It indicates that a constituent contains an empty category of some kind which is not licensed within that constituent. We will assume that its value is a set of categories. Assuming this feature, we can expand the above tree as follows:

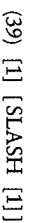


Here, we have a chain of SLASH feature specifications linking the *wh*-phrase with the associated empty category. One point to note is that it is not only the constituents that contain an empty category that are marked [SLASH {NP}]. The empty category itself is also marked in this way. Another point to note is that the topmost node has the feature specification [SLASH {}]. This is because although it contains an empty category the empty category is licensed within it by the *wh*-phrase.

How can we allow structures like (37)? It is quite easy to provide for the top and bottom of the chain of SLASH features. For the top of the chain, all we need is the following rule:

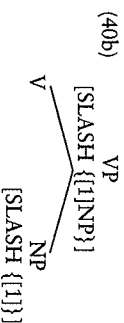
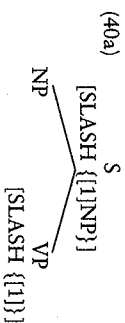


This is somewhat like the rule proposed in chapter 6 for subject–predicate structures. Notice that the non-head daughter is identified as a FILLER. For the bottom of the chain, we can assume that the lexicon contains an empty category of the following form:

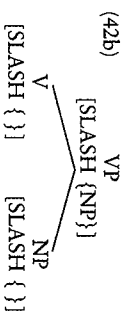
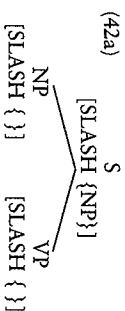
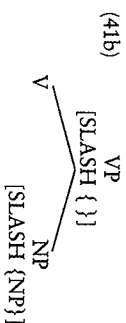
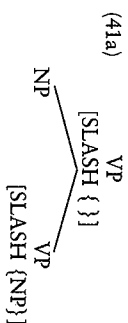


This will allow not just empty NP's but also empty PP's, AP's and AdvP's, which are necessary for examples like (10)–(12).

The middle of the chain of SLASH features is a more complex matter. Here, we have the following local trees:



We need to allow trees like these but we need to rule out trees like the following:

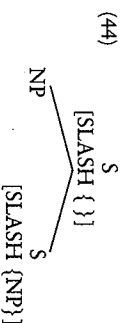


In (41a) and (b), a daughter is identified as containing an empty NP but the mother is not identified as containing an empty NP. In (42a) and (b), the mother is identified as containing an empty NP but none of the daughters is identified as containing an empty NP. We can rule out structures like these by adopting the following principle:

- (43) a. If a SLASH feature specification appears within some category, then it must also appear within its mother.
 b. If a SLASH feature specification appears within some category, then it must also appear within one of its daughters.

(43a) rules out trees like those in (41) while (43b) rules out trees like those in (42).

As it stands, however, the principle is not satisfactory. The first clause rules out the topmost local tree in (37), which is the following:



How can we allow this while ruling out the trees in (41)? We will assume that heads can be marked as blocking the duplication of a SLASH feature

specification on a mother, and that the head in (38) is marked in this way. Given this marking we can allow (44) while ruling out the trees in (41) if we revise the first clause of (43) as follows:

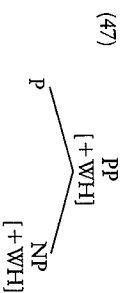
- (45) If a SLASH feature specification appears within some category, then it must also appear within its mother unless this is blocked by the head.

With the first clause revised in this way, the principle provides a largely satisfactory account of the distribution of SLASH feature specifications.

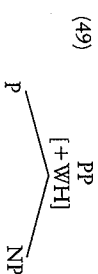
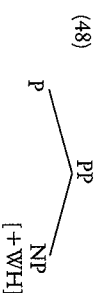
An obvious question here is: is there any other feature that behaves like SLASH? The answer to this is yes. The evidence comes from *wh*-phrases. We can look at the following:

- (46) To whom did you talk?

The *wh*-phrase is *to whom* and it is a *wh*-phrase because it contains the *wh*-word *whom*. If we mark *wh*-elements as [+WH], it will contain the following local tree:



We need to allow this but not trees like the following:

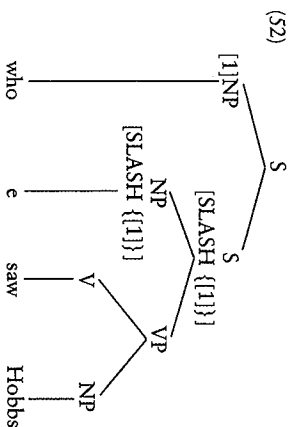
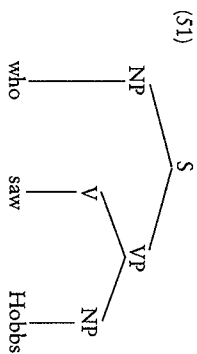


With trees like (48) we would be failing to identify phrases that contain a *wh*-element as *wh*-phrases, and with trees like (49) we would be identifying phrases that do not contain a *wh*-element as *wh*-phrases. We can allow trees like (47) while ruling out trees like (48) and (49) if we extend the principle to WH. It is quite easy to do this. We can call SLASH and WH NONLOCAL features. We can then reformulate the principle as follows:

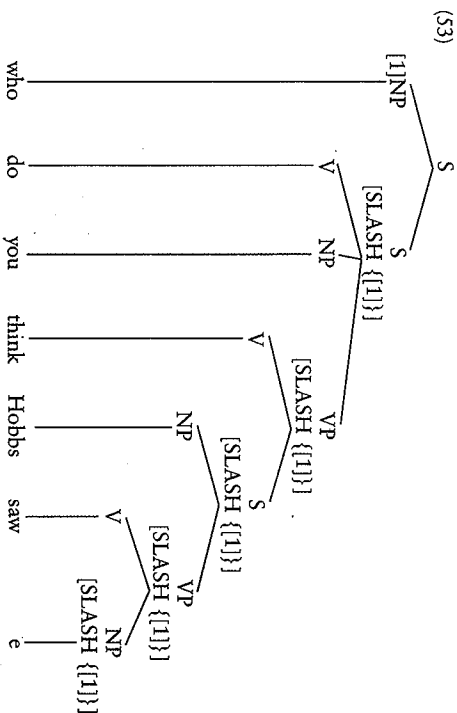
- (50) a. If a NONLOCAL feature specification appears within some category, then it must also appear within its mother unless this is blocked by the head.
- b. If a NONLOCAL feature specification appears within some category, then it must also appear within one of its daughters.

We can call this the NONLOCAL Feature Principle.

There are two further points that we should note about the PSG approach to *wh*-questions. The first concerns examples like (20), which involve vacuous movement in P&P. In PSG, it has generally been assumed that these do not involve an empty category, that is, that we have structures like (51) and not structures like (52).



The second point concerns examples like those in (15). For PSG, there are no intermediate empty categories in such examples. (15a) will involve something like the following structure:



13.5 Other *wh*-dependency constructions

We noted at the outset that *wh*-questions are just one of a number of what can be called *wh*-dependency constructions. We can turn now to some other examples.

We can look first at relative clauses and in particular at the bracketed strings in the following:

- (54) the man [who Trumper saw]
 (55) the man [who Trumper considered to be a fool]
 (56) the man [who Trumper gave the book to]
 (57) the man [who I thought saw Trumper]

These examples are identical to the subordinate *wh*-questions in (5)–(8). As in the *wh*-questions, we have a *wh*-element with a variety of functions. Within P&P, the natural assumption is that they involve movement in just the same way as *wh*-questions. Within PSG, the natural assumption is that they involve a chain of SLASH feature specifications just like *wh*-questions.

We can look next at the bracketed strings in the following:

- (58) the man [that Trumper saw]
 (59) the man [that Trumper considered to be a fool]
 (60) the man [that Trumper gave the book to]
 (61) the man [that I thought saw Trumper]

In these examples, there is no *wh*-element. *That* appears to play the same role here as the *wh*-element in (54)–(57). There is evidence, however, that it is a rather different element. A *wh*-word can be part of a larger *wh*-phrase, as the following illustrate:

- (62) the man [to whom we talked]
 (63) the man [on whose help we relied]

This is not possible with *that*, as the following show:

- (64) * the man [to that we talked]
 (65) * the man [on that's help we relied]

Because of such contrasts, it is widely accepted that *that* in relative clauses is not an element like *who* but a complementizer, in other words, that it is the same element as *that* in an example like (66).

- (66) I think that Trumper saw him.

If this view is accepted, then the examples in (58)–(61) do not involve any overt element that functions as a noncanonical complement or a noncanonical subject.

How, then, should these examples be analysed? Within P&P, it is proposed that such examples involve movement of an empty *wh*-element (often referred to as an empty operator). Thus, (58) has the S-structure in (67).

- (67) the man [_{CP} e_i [_S Trumper saw e_i]]

Within PSG, there is no need for a specific category to appear at the top of the chain of SLASH feature specifications. Hence, there is no need to assume that there is an empty *wh*-element in these examples.

A further type of relative clause is exemplified by the following:

- (68) the man [Trumper saw]
 (69) the man [Trumper considered to be a fool]
 (70) the man [Trumper gave the book to]
 (71) the man [I thought saw Trumper]

These are just like (58)–(61) except that they lack *that*, and they can be analysed in the same way.

Other sentences that involve a *wh*-dependency are clefts and pseudo-clefts. The following are typical clefts:

- (72) It is Trumper [who she loves]
 (73) It is Trumper [that she loves]
 (74) It is Trumper [she loves]

The bracketed strings in these examples are identical to relative clauses. Within P&P, we will have movement of an overt *wh*-element in (72) and movement of an empty *wh*-element in (73) and (74). Within PSG, we will have a chain of SLASH feature specifications, with a *wh*-element at the top in (72) but not in (73) and (74). The following is a typical pseudo-cleft:

- (75) [What she likes] is beer.

The bracketed string in this example is identical to a subordinate *wh*-question. Again, then, the obvious assumption within P&P is that we have movement of a *wh*-element, and the obvious suggestion in PSG is that we have a chain of SLASH feature specifications.

A final class of sentences that we can consider are what are known as 'tough' sentences since they involve one of a small class of adjectives, including *tough*. The following illustrate:

- (76) Trumper is easy to like.
 (77) Trumper is easy to talk to.

In (76), the complement of *like* is missing, and in (77), *to* has no complement. The following show that not just any adjective can appear in this construction.

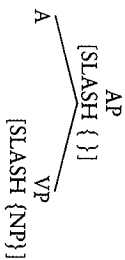
- (78) * Trumper is certain to like.
 (79) * Trumper is certain to talk to.

Again within P&P we will have movement of an empty *wh*-element giving us the following S-structures:

- (80) Trumper is easy [_{CP} e_i [_S PRO to like e_i]]
 (81) Trumper is easy [_{CP} e_i [_S PRO to talk to e_i]]

Again within PSG, we will have a chain of SLASH feature specifications. There is one minor complication here. At the top of the chain, we will have the following local tree:

(82)



To allow this, the lexical entry for *easy* must incorporate the information that it blocks the duplication of the SLASH feature specification on its mother.

There is a further matter that we should consider here. We noted in our discussion of the P&P approach in section 3 that *wh*-movement is only possible from positions to which Case is assigned, and we showed that the Case filter seems to offer a simple explanation for this fact. We can now see that this is too simple. Consider the following:

(83) the man [_{CP} e_i that [_S e_i was arrested e_j]](84) the man [_{CP} e_i that [_{CP} e_i seemed e_i to be best_i]](85) * the man [_{CP} e_i that [_S it was arrested e_j]](86) * the man [_{CP} e_i that [_S it seemed e_i to be best_i]]

For P&P, these examples involve movement of an empty *wh*-element. In (83) and (84) we have NP-movement and then *wh*-movement from a position to which Case is assigned, while in (85) and (86) we have just *wh*-movement from positions to which no Case is assigned. Since the moved element is empty, the contrast between (83) and (84) and (85) and (86) cannot be a consequence of the Case filter. How, then, can we explain the contrast? One possibility is that the Case filter should be reformulated as follows:

(87) An NP with a θ -role must have properly licensed Case.

If the empty *wh*-element in various constructions has a θ -role, then it must have Case even though it has no phonetic content. Hence, (87) will account for the contrast between (83) and (84) and (85) and (86). On some analyses, an example like (88) is problematic for (87).

(88) Trumper tried to please Foster.

The infinitive here will have a PRO subject. In some P&P work it is assumed that PRO has no Case. Hence, it will be an NP with a θ -role and Case. However, in more recent work, it is assumed that PRO has null Case, and there is no problem. Consider now the following:

(89) * It seems it to be raining.

Here, the second *it* is a dummy *it* in a position to which no Case is assigned. Since dummy *it* does not have a θ -role, the revised Case filter will not require it to have Case. Hence, it will fail to rule out this example. It seems, then, that this is something of a problem area.

13.6 Summary

We have been concerned in this chapter with *wh*-questions and more generally with what we have called *wh*-dependency constructions. We began in 13.2 by looking at the basic properties of *wh*-questions. Then, in 13.3, we looked at the P&P approach, highlighting in particular the successive cyclic analysis of complex *wh*-questions and the assumption that *wh*-traces are R-expressions. Next, in 13.4, we considered the PSG approach. Here, we introduced the SLASH feature and the NONLOCAL Feature Principle which governs its distribution. Finally, in 13.5, we looked at some other *wh*-dependency constructions and discussed how they could be handled in both P&P and PSG.

Notes

An important feature of some *wh*-dependencies in some languages are what are known as resumptive pronouns, pronouns occupying positions where one would expect a gap. They play a limited role in English, but the following example, in which the resumptive pronoun is italicized, is acceptable for some speakers.

- (1) That is a problem which we wondered whether *it* would ever be solved.

Resumptive pronouns play a much fuller role in some other languages. Thus, the following, in which the resumptive pronoun is again italicized, is an ordinary Welsh example:

- (2) *y dyn na welais i ef*
 the man NEG saw-1SG I he
 'the man that I didn't see'

See McCloskey (1990) for discussion of resumptive pronouns in Irish, and Shlonsky (1992) for discussion of resumptive pronouns in Hebrew and Arabic.

A number of arguments for successive cyclicity are summarized in Radford (1988, 10.8). Postal (1972) argues against successive cyclicity on the grounds that it predicts that sentences like (5) should be possible as well as sentences like (3) and (4).

- (3) Who do you think they talked to?
 (4) To whom do you think they talked?
 (5) * Whom do you think to they talked?

In (3) we have moved *who* to clause-initial position, and in (4) we have moved *to whom*. On the successive cyclic analysis, both have been moved via initial position in the subordinate clause. Postal points out that it is not clear why it should not be possible to move *to whom* to initial position in the subordinate clause and then to move just *whom* to initial position in the main clause,

leaving *to*. For one possible response to this argument, see Hornstein and Weinberg (1981).

The term 'crossover', introduced in 13.3, originates in Postal (1971), in which a variety of ungrammatical strings were ruled out by a principle restricting the movement of certain phrases over certain other phrases.

Although it is not generally assumed in PSG that *wh*-questions contain empty complementizers, Borsley (1989) shows that the P&P view of clause structure, in which C is the head of an extended clause and clause-initial *wh*-phrases occupy a pre-COMP specifier position, can be incorporated into a version of HPSG. An analysis of relative clauses involving this assumption is developed in Pollard and Sag (1994, 5).

Within HPSG the value of SLASH is not a set of categories but a set of LOCAL feature structures, combinations of basic syntactic and semantic information. In GPSG, the value of SLASH is a single category.

SLASH and WH are called FOOT features in GPSG, and the principle that governs their distribution is called the Foot Feature Principle. They are called BINDING features in Pollard and Sag (1987) and the principle is called the Binding Inheritance Principle. The HPSG approach to *wh*-dependencies is set out in detail in Pollard and Sag (1994, 4). See also Borsley (1996, 9) and Sag and Wasow (forthcoming, 15).

Ginsburg and Sag (forthcoming) provide a detailed HPSG analysis of the syntax and semantics of *wh*-questions.

The LFG approach to *wh*-dependencies is discussed in Kaplan and Zaenen (1989).

For detailed discussion of relative *that*, see Van der Auwera (1985).

Two other important *wh*-dependency constructions are topicalization sentences and comparative and equative complements. (6)–(8) illustrate the former, and (9)–(12) illustrate the latter:

- (6) That man nobody can stand.
- (7) That man nobody will talk to.
- (8) That man nobody thinks will do it.
- (9) He is more intelligent [than she was]
- (10) He is more intelligent [than they say she was]
- (11) He is as intelligent [as she was]
- (12) He is as intelligent [as they say she was]

'Tough' sentences differ from other *wh*-dependency sentences in important ways. Most notably, the dependency cannot cross the boundary of a finite clause. Thus, while (13) and (14) are fine, (15) and (16) are ungrammatical:

- (13) Who do you think that Rhodes likes?
- (14) Who do you think likes Rhodes?
- (15) *Hobbs is easy to think that Rhodes likes.
- (16) *Hobbs is easy to think likes Rhodes.

The P&P approach to 'tough' sentences is subjected to critical scrutiny in Jones (1983).

For discussion of the attempt to link Case with θ -roles introduced in 13.5, see Bouchard (1984) and Davis (1986).

Exercises

Exercise 1

Provide P&P derivations with D-structures, S-structures and intermediate structures for the following examples:

- (1) Who did you say reported the crime?
- (2) Which book do you think that he looked at?
- (3) What do they expect that he will do?

Exercise 2

Provide PSG trees involving the feature SLASH for each of the following examples:

- (1) Who is she talking to?
- (2) What are you trying to do?
- (3) What did he give to her?
- (4) How long do you think the book is?
- (5) What did he expect to break?

Exercise 3

We assume in chapters 10 and 11 that the P&P condition on anaphora applies at S-structure. Show how the following example poses a problem for this assumption:

- (1) Which picture of himself does Trumper like most?

Exercise 4

The following Polish examples contain relative clauses introduced by a word which we can translate as 'what'. Discuss how these relative clauses differ from English relative clauses introduced by a *wh*-expression, and consider whether they should be analysed in terms of *wh*-movement.

- (1) ten student, co pojechał do Warszawy
the student what went to Warsaw
'the student who went to Warsaw'
- (2) ten student, co go wszyscy bardzo lubią
the student what him everyone much likes
'the student that everyone likes'
- (3) ten student, co o nim wszyscy rozmawiali
the student what about him everyone talked
'the student that everyone talked about'
- (4) ten student, co go chce spotkać
the student what him want-1SG meet
'the student that I want to meet'