

## CHAPTER VII

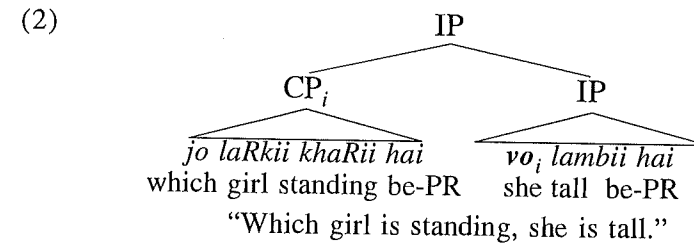
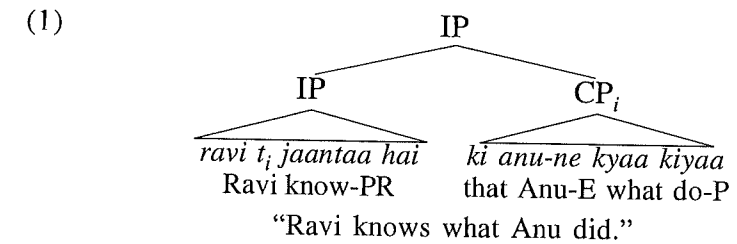
### CONCLUDING REMARKS

In the preceding chapters I have analysed two types of *wh* constructions in Hindi, namely questions and relative clauses. Each of these constructions raises interesting issues about the relation between syntactic structure and semantic interpretation. In each case, I have tried to show that seemingly unusual properties of these constructions are, in fact, amenable to principled explanations which rely on well-motivated applications and extensions of current syntactic and semantic theories. While the idea that surface syntactic structure maps fairly directly onto meaning is the common theme that ties together the investigations of the two topics, the analyses have, to a large extent, been developed independently. In this chapter I will first try to make explicit some connections between Hindi questions and Hindi relative clauses, touching briefly upon the main points of the discussion in each part. I will then draw out what I take to be the most significant theoretical contribution of this study.

#### 1. A SUMMARY

##### 1.1. *Adjunction and Locality*

One important aspect of Hindi phrase structure that emerges from the investigation of questions and relative clauses is the inability of CP's to appear in argument positions. Finite sentential complements as well as finite relative clauses, it is argued, are disallowed in case positions due to the Case Resistance Principle (Stowell 1981). As such, the grammar of Hindi instantiates adjunction structures which may be considered typologically distinct. This study has focused on the following two instances of CP adjunction in Hindi:



In both these structures the argument position is occupied by a syntactic variable, a trace in the first case, the pronoun *vo* “that” in the second. This position is coindexed with a clause in adjoined position, a sentential complement to the right of IP in the first case, a relative clause to the left of IP in the second. At a syntactic level the two structures may be classified together as cases of variable binding. At the semantic level, however, they correspond to two distinct types of relations. In the case of questions, the meaning of the adjoined CP is semantically reconstructed into the base position. That is, it is interpreted as an argument of the matrix verb. In the case of relative clauses, the adjoined CP quantificationally binds the variable which occupies the argument position.

The primary issue raised by the adjunction in (1) has to do with the scope of *wh* expressions inside CP. Since the sentence necessarily has an indirect question reading, it follows that at LF the embedded *wh* takes scope over the embedded clause. That it cannot take scope over the matrix clause is attributed to the fact that the adjoined clause is not directly or indirectly selected by the verb in the canonical direction for Hindi and constitutes a barrier for movement of arguments as well as adjunct *wh* expressions. This fact is particularly interesting because Hindi is an in-situ language and LF *wh* movement is generally supposed to be insensitive to the presence of syntactic barriers. The facts of Hindi show quite clearly that a rethinking of the role of subjacency at LF is required. The adjoined CP in correlatives, on the other hand, has standardly been taken to involve noun modification of an argument inside IP. Given that extraposition to the left is proscribed in natural language, implicit property variables have been used by some authors to derive noun modification meanings for

the structure in (2). This is shown here to result in incorrect predictions in all but a subset of cases, suggesting that the use of implicit variables for purposes of deriving lowered interpretations for modifiers must be restricted. This means that the relative clause has to be interpreted in the position in which it appears. Hindi questions, as well as relative clauses, in different ways force us to interpret expressions more locally than current practice would suggest.

### 1.2. Challenges to Locality

The investigation in this book focused on three challenges that the Hindi adjunction structures pose for a compositional mapping from syntax to semantics. In each case, an appropriate semantics for the adjoined CP and an explication of how it combines with the matrix clause meaning is given. Thus the right interpretation is derived without compromising locality.

Although Hindi questions like (1) can only have indirect question readings, structurally similar scope marking questions allow direct question readings:

- (3) ravi kyaa<sub>i</sub> soctaa hai [<sub>CP<sub>i</sub></sub> ki anu kahaaN gayii]  
 Ravi what think-PR that Anu where go-P  
 "What does Ravi think where did Anu go?"

Answers to (3) specify values for places, a fact generally taken to indicate that the matrix wh has been deleted and the embedded wh given matrix scope. The alternative proposed here interprets the matrix wh as the object of the matrix verb and the embedded clause as its restriction. The matrix wh quantifies over propositional variables, so that the adjoined clause must be interpreted as a set of propositions (a question). This means that embedded wh expressions must be interpreted locally, in keeping with generalizations based on (1). In addition to the fact that this analysis is consistent with other facts in the grammar of Hindi, it is also to be preferred because it maintains crucial distinctions between scope marking and ordinary extraction structures. As Herburger (1994) has pointed out, the presuppositions of questions like (3) are different from those of corresponding extraction structures like the English question in (4):

- (4) Where does Ravi think Anu went?

While a person asking (3) takes it as a fact that Anu went somewhere, a person asking (4) is not committed to Anu's going anywhere. This follows from the analysis of scope marking in which the whole

adjoined CP is interpreted outside the scope of the matrix C<sup>0</sup> in contrast to the analysis of extraction where only the embedded wh is interpreted in this position.

The analysis of Hindi scope marking structures shows that the standard assumption that an answer to a question gives values for all and only the wh expressions which have matrix scope is flawed. Another phenomenon that supports this conclusion is the possibility of long-distance list answers in Hindi. Hindi questions like (5) allow answers pairing individuals and objects:

- (5) kaun *t<sub>i</sub>* jaantaa hai [<sub>CP<sub>i</sub></sub> ki anu-ne kahaaN kyaa khariidaa]  
 who know-PR that Anu-E where what buy-P  
 "Who knows where Anu bought what?"

(5) differs from (1) in having a wh in the matrix and an extra wh expression in the adjoined CP. Neither of these facts can impact on the barrierhood of the adjoined CP, ruling out the possibility of deriving long-distance list answers from LF wh movement of the embedded object. The solution developed here treats question-embedding predicates as combining with objects that denote sets of propositions. It is also shown that the semantic type of a question may vary with the number of wh expressions in it. An embedded multiple wh question, when interpreted as a second order question, cannot be interpreted directly as an argument of the matrix verb. This forces it to QR and the whole structure is interpreted as a multiple wh question pairing individuals and questions about where Anu bought various objects. An advantage of this approach over the standard approaches which pair matrix and embedded wh is that it accounts for the fact, noted by Mahajan (1990), that an intervening clause blocks the possibility of long-distance lists. This is illustrated by the English example in (6):

- (6) Who believes that Bill knows where Anu bought what?

The intermediate clause is not a barrier for wh movement, so the absence of a list answer is unexpected under standard approaches. Under the present approach, however, the embedded clause can only QR to the immediately higher clause. No multiple wh question reading is predicted.

In addition to this, there exists a second source for long-distance list answers which relies on a cumulative reading of the question. This reading is only possible when the matrix wh allows plural individuals to be named in the answer and the embedded question can be partitioned appropriately. This approach explains the possibility of long-distance list answers even when there is no wh in situ in the

embedded clause. English questions like (7a), discussed first by Kuno and Robinson (1972), yield list answers based on a cumulative reading of their individual answers. (7b) does not allow such answers because the matrix *wh* restricts individual answers to singular individuals, thereby ruling out the possibility of cumulative readings:

- (7) a. Who knows where Mary bought these books?  
 b. Which boy knows where Mary bought these books?

If long-distance list answers do not require long-distance LF movement, their existence in Hindi poses no problem for locality in scope assignment. A satisfactory solution follows once the right perspective about the relation between questions and the answers they admit is adopted.

The adjunction structure in correlatives also requires a shift in traditional ways of looking at the relation between the adjoined clause and the main clause meanings. This is particularly so for those correlatives in which a number of *wh* expressions in the adjoined clause are linked to a number of DP's in the main clause:

- (8) jis laRkii-ne jis laRke-ko dekhaa  
 which girl-E which boy-A see-P  
 us-ne us-ko bulaayaa  
 she-E he-A call-P  
 "Which girl saw which boy, she called him."

This sentence contrasts with (2) in the following way. While (2) says of a unique girl who is standing that she is tall, (8) says of pairs of girls and boys such that the girl saw the boy that she called him.

The intuitions about uniqueness and lists in correlatives are shown to be parallel to the shift from uniqueness to list readings in questions:

- (9) a. Which girl is standing?  
 b. Which girl saw which boy?

Making explicit connections with the semantics of questions, the relative clause is analysed as denoting property sets of unique individuals in case there is only *wh* expression. Treating the main clause DP as a variable, the whole sentence is predicted to be true if the property denoted by the IP is a member of the relative clause denotation. In the case of multiple *wh* relatives, a functional dependency is established between the members of the set denoted by the *wh* expressions. The adjoined CP is taken to denote the set of relations between individuals in the domain and range of the function.

The full structure is interpretable if the IP can be interpreted as a relation between individuals. This is the case if the number of *wh* expressions in the relative clause and the number of demonstratives in the main clause match.

An account in terms of generalized quantifiers thus requires no change in the view that the meaning of the adjoined clause combines locally with the meaning of the IP, but it does require us to recognize that relative clauses have more than one type of meaning. Since the correlative structure in (2) is isomorphic to the structures produced at LF by Quantifier Raising of quantified DP's, one might take the semantics to be transparently reflected by the syntax in this case. Once the appropriate meaning is assigned to each clause, standard rules of quantification yield the desired interpretation. Alternative analyses of correlatives are unable to deal with multiple correlatives. Under the view that relative clauses can only be noun modifiers, there is no sensible way to semantically interpret a multiple relative clause as modifying two arguments inside the main clause. A more plausible alternative might be to treat *wh* expressions as free variables that are unselectively bound by an implicit universal quantifier. This analysis, however, does not capture the shift between unique and list readings, nor does it account for the matching requirement between *wh*'s and demonstratives, that the generalized quantifier approach can capture. By relating multiple correlatives to multiple *wh* questions, a range of facts that at first glance appear intractable to a principled explanation are shown to follow from independently motivated principles of grammar.

The three phenomena that seem to pose challenges to locality in scope assignment, then, turn out on closer examination to be better explained by analyses where locality is maintained. In each case, a fuller articulation of the interpretations associated with the adjoined CP and the main clause is required, as well as a crucial rethinking about the ways in which the two can combine.

## 2. THE NATURE OF LOGICAL FORM

### 2.1. *Subjacency at LF*

An important theoretical contribution of the present study is that it brings into the discussion a body of data that bears crucially on the role of LF in mediating between surface syntactic structure and model-theoretic interpretation. The existence in natural language of *wh* expressions that are in-situ is evidence that scope assignment must take place at this level, but whether this is constrained by the same principles that govern movement at S-structure remains an open issue.



The evidence from Hindi suggests that it is, arguing for a more restricted role for LF than generally assumed.

I repeat below the crucial contrasts from Chapter I between English, Chinese and Hindi, in that order. The examples in (10) illustrate the situation with respect to the wh-island constraint, those in (11) with respect to the CNPC:<sup>1</sup>

- (10) a. \*What<sub>i</sub> do you wonder who bought *t<sub>i</sub>*?  
 b. ni xiang-zhidao [shei mai-le sheme]  
 you wonder who buy-ASP what  
 "Who is such that you wonder what s/he bought?"  
 "What is such that you wonder who bought it?"  
 c. anu jaannaa caahtii hai [ki kis-ne kyaa khariidaa]  
 Anu know-INF want-PR that who-E what buy-P]  
 "Anu wants to know who bought what." NOT  
 "What is such that Anu wants to know who bought it?"  
 NOT  
 "Who is such that Anu wants to know what s/he bought?"
- (11) a. \*Who<sub>i</sub> do you like [books that criticize *t<sub>i</sub>*?]  
 b. ni zui xihuan [piping shei de shu]  
 you most like criticize who REL book  
 "Who is such that you like books that criticize him?"  
 c. \*[kitaabeN jo kis-ne likhiiN] mez par rakhii haiN  
 books that who-N write-P table on kept be-PR  
 "Who is such that the books s/he wrote are on the table?"

On the basis of English and Chinese facts, Huang (1982) concluded that subjacency obtains at S-structure but not at LF. Hindi, however, provides clear evidence of subjacency effects at LF suggesting that a different approach to the issue is needed. One might take languages to differ with respect to the existence of subjacency at LF but as Chomsky (1986b:156) notes, "it is difficult to imagine that rules of

<sup>1</sup> I assume that the direct question interpretation of Chinese (i):

- (i) ni zhidao ta zuo-le sheme  
 you know he did what

is due to the presence of a covert Q operator in the matrix. This would make it parallel to Japanese (see Chapter IV, section 1.2) where binding by a matrix Q into the complement is possible as long as there is no Q in the embedded clause.

the LF component are subject to parametric variation, because it is unclear what evidence to fix their character might be available to the language learner". A third possibility is to take subjacency to be universally operative at LF and look for alternative explanations for data that suggest otherwise. This has, indeed, been the thrust of the present study and I will note here some of the assumptions that may have been left implicit in preceding chapters.

The fundamental insight into explaining the apparent absence of subjacency effects in cases like (11b) comes from the work of Nishigauchi (1986, 1990). According to him, long-distance wh movement is ruled out by subjacency. A direct question interpretation is nevertheless possible because the whole complex DP can pied-pipe at LF. The challenge, of course, is in determining the constraints on pied-piping. As Lasnik and Saito (1992) note argument-adjunct asymmetries at LF can be captured in the pied-piping approach as well as in the long-distance LF movement approach. The appeal of the pied-piping approach is that the phenomenon is attested in natural language at the level of S-structure as well, so that the constraints needed for LF pied-piping may have some independent motivation. The difference between Hindi and Chinese with respect to the possibility of pied-piping noun phrases can be explained in terms of connectedness in the sense of Kayne (1983), interacting with the feature percolation crucially required for pied-piping to take effect.<sup>2</sup> Another challenge for the pied-piping analysis is to ensure the appropriate interpretation. von Stechow (to appear) points out that the approach in terms of unselective binding advocated by Nishigauchi makes incorrect predictions about meaning and suggests an alternative. These issues require further exploration but the point I want to emphasize here is that a viable alternative to long-distance LF movement in violation of subjacency exists for the apparent absence of CNPC effects at LF in some languages.

The present study may be seen as extending the pied-piping hypothesis to putative cases of LF movement out of wh islands. In Hindi LF wh movement out of finite clauses is never possible. Long-distance list answers can be explained, however, in terms of scope interaction between matrix wh and the complement clause, not a wh expression contained in it. This account generalizes across languages so that the existence of long-distance lists need not be taken as

<sup>2</sup> Recall that Hindi does allow direct question interpretation in the case of non-finite relativization, which occur in the canonical government direction:

- (i) tum-ko kis-kii likhii kitaabeN pasand haiN  
 you-D who-G write-PCPL books pleasing be-PR  
 "Books written by who are pleasing to you?"

evidence of LF movement in violation of wh island constraint in any language. The possibility of direct question readings for the Chinese question in (10b) remains unexplained but the data here are controversial. Nishigauchi (1990:32, ft. 13) notes that Chinese speakers he has consulted only get an indirect question reading for questions like (10b). My own work with native speakers of Chinese confirms this. It may be worth noting though that a direct question reading for (10b) is possible under an echo question interpretation but, of course, echo questions involve variable binding operations that are insensitive to constraints that apply to movement.<sup>3</sup> In other languages with wh in-situ, such as Japanese and Korean, structures parallel to (10b)-(10c) are reported to yield unambiguously indirect question readings (see Nishigauchi 1990 and references cited there). Thus I take it that there is no evidence to support the view that wh movement at LF violates the wh island constraint.

Pesetsky (1987) argued on theoretical grounds that if LF exists as a level of syntactic representation, subjacency must regulate movement at that level (see also Fiengo et al 1988). The Hindi facts may be seen as providing crucial empirical support for this position.

### 2.2. Locality in Scope Assignment

I have brought LF wh movement in line with S-structure wh movement by showing that the heuristic of possible answers has been misapplied. Values for wh expressions may be specified in an answer not only when the wh expression itself has matrix scope but also when the clause containing that expression has matrix scope. However, there is a substantive difference between wh movement at the two levels that bears mentioning.

Consider the fact that (12a), though it involves a subjacency violation, is marginally acceptable. This has given rise to the view that subjacency violations are weak in some sense. Note, however, that the embedded wh in-situ in (12b) cannot be interpreted with matrix scope, even weakly. Similarly, the Hindi topicalized wh in (13a) involves a weak violation since the structure involves *yeh*-complements. (13b), on the other hand, cannot be interpreted as a direct question at all. Scope assignments at LF seem to yield all or nothing effects:

- (12) a. ?What<sub>i</sub> do you wonder who bought *t<sub>i</sub>*?  
 b. You wonder who bought what?

<sup>3</sup> I am indebted to Chilin Shih, Wang Hong, Hong Feng and Rong Yang for judgments. I thank, in particular, Rong Yang for pointing out the correlation with echo question readings.

- (13) a. ?kis-ko<sub>i</sub> tum yeh jaante ho ki merii-ne *t<sub>i</sub>* bulaayaa hai  
 who-A you this know-PR that Mary-E call-PERF-PR  
 "Who is such that you know it that Mary has called him/her?"  
 b. tum yeh jaante ho ki merii-ne kis-ko bulaayaa hai  
 you this know-PR that Mary-E who-A call-PERF-PR  
 "You know who Mary has called."

If LF wh movement is motivated solely by the need for taking scope, it is expected to be more restricted than S-structure movement. One might hypothesize that wh movement at LF is to the closest scope position that does not involve a subjacency violation. This means that in most cases wh movement at LF will be local. This is what we see in (12b) and (13b). There are other cases where long-distance wh movement may occur. In (14a), for example, matrix scope is assigned to the embedded wh in-situ:

- (14) a. Who<sub>i</sub> do you expect *t<sub>i</sub>* will cook what?  
 b. \*You expect Mary will cook what?

Note though that matrix scope for the wh in-situ is dependent on the fact that its clause mate, in the sense of Kuno and Robinson (1972), is assigned matrix scope at S-structure. Compare this to (14b) where the wh expression is unable to move to matrix Spec even though there would be no subjacency violation involved and selectional restrictions would be satisfied. Instead, movement occurs to the closest scope position. (14b) is ungrammatical because interpreting the wh in this position violates selectional restrictions. This shows that LF wh movement is truly local. S-structure wh movement, on the other hand, is unbounded and may be marginally acceptable even when it violates subjacency.

The view of LF that has emerged from a consideration of wh scope phenomena turns out to be closer to the view of LF based on quantifier scope facts. It is well known that at S-structure quantifiers may undergo long-distance topicalization but at LF their scope is strictly clause-bounded. Thus (15a) is acceptable with the universal quantifier fronted but (15b) cannot be understood with the universal having scope over the existential:

- (15) a. Every student some professor expects will be successful.  
 b. Some professor believes that every student will be successful.

I have argued against conflating QR and wh movement on semantic and syntactic grounds, contra Mahajan (1990) and Kim (1991). It seems to me, however, that to the extent that their properties converge with respect to locality of scope assignment, it leads to a more coherent view of LF. We might conclude that LF differs minimally from S-structure in ensuring that scope-bearing expressions are moved locally to positions where their meaning is defined. If the resulting interpretation can combine with the interpretation of the larger structure in which they occur a reading is obtained. If not, the structure is rejected as uninterpretable.

To conclude, then, in this book I have analyzed some Hindi wh constructions and provided substantive hypotheses about their structure and interpretation. Applying a well-articulated theory of syntax as well as semantics has made it possible to reduce rather complex data to fairly simple principles and to identify key issues in the understanding of how syntax and semantics interact. While many questions remain open, I hope that the analyses presented here lead to further discussion of these issues.

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