

CONCLUSION

To conclude this chapter, I have provided an account for the scope properties of embedded wh in terms of the phrase structure of Hindi. Non-finite complements, being gerunds, typically appear in positions directly selected by the verb and yield wide scope readings. Finite complements may be generated in the preverbal argument position from which extraction is possible. However, they must appear right adjoined to IP or CP at S-structure due to the CRP. Neither successive cyclic nor long wh movement is possible from these positions. Successive cyclic movement is blocked because adjoined positions are barriers for government, as standardly assumed. The impossibility of long wh movement, however, forces us to recognize that subjacency is operative at LF in Hindi. In the next two chapters I look at two cases in which wh in-situ inside finite complements appear to have matrix scope. Taking the facts discussed in this chapter as a guide I argue that locality in scope assignment must be maintained and provide alternative accounts of the facts considered there.

CHAPTER III

LOCALITY IN SCOPE MARKING

INTRODUCTION

We saw in Chapter II that Hindi finite complements constitute strong islands for wh extraction at LF. In this chapter I want to turn to scope marking, a structure which seems to defy this generalization. Briefly, a scope marking structure contains a wh in the matrix clause and a wh in the embedded clause but answers to the question specify values only for the embedded wh. It is generally believed that an answer specifies values for a wh expression only if it has matrix scope. Answers to scope marking structures are therefore taken to indicate that the scope of the embedded wh is extended by the matrix wh. Under this view the LF representation of scope marking is identical, in essential respects, to that of extraction. In this chapter I point out that the facts of Hindi preclude a syntactic analysis of scope marking in terms of extraction. I also show that scope marking and corresponding extraction structures are semantically distinct. The analysis I develop maintains the syntactic distinction between the two structures at all levels of syntactic representation. The matrix wh in a scope marking structure is interpreted as a regular wh quantifier and the embedded wh is interpreted in its own clause. The two are connected by the fact that the embedded clause serves as the restriction for matrix quantification. The considerable overlap in meaning between scope marking and extraction structures is captured without losing crucial distinctions. This approach to scope marking suggests that the diagnostic of using specification of values in the answer as an indicator of matrix scope is flawed.¹

¹ The analysis of scope marking structures I present here is essentially that of Dayal (1994b). It, however, includes new data and discussion of subsequent analyses. I would like to thank Christiane Fellbaum and Beatrice Santorini for discussion of the German data in Dayal (1994b). I am also grateful to Josef Bayer, Peter Hook, Anna Szabolcsi and two NALS reviewers for comments on an earlier draft of that paper. Thanks also to Dana McDaniel for some very important questions and to Miriam Butt and Sigrid Beck for an extensive set of comments. I am grateful to have had so much feedback in such a short time.

1. THE SYNTAX OF SCOPE MARKING

1.1. *Scope Marking as Extraction*

It was noted by Davison (1984) that Hindi employs a special strategy, generally known as scope marking, for questioning out of embedded finite complements. The example in (1) illustrates its basic features:

- (1) jaun kyaa soctaa hai ki merii kis-se baat karegii
 John what think-PR that Mary who-INS talk do-F
 "What does John think, who will Mary talk to?"

Though there are two wh expressions, one in the matrix and one in the embedded clause, the question is answered by giving values for the embedded wh expression only:

- (2) jaun soctaa hai ki merii raam-se baat karegii
 John think-PR that Mary Ram-INS talk do-F
 "John thinks Mary will talk to Ram."

It is standard practice to analyse questions in terms of the answers they allow (see, for example, Belnap and Steel 1963). It is assumed, in particular, that answers to questions specify values for wh expressions that have matrix scope. The appropriateness of answers like (2) would imply, then, that (1) must have an LF like (3):

- (3) [_{CP}who_i [_{IP}[_{IP}John *t_j* think] [_{CP}_jMary will talk to *t_j*]]]

Here the embedded wh has matrix scope while the matrix wh has been deleted. One might argue that the matrix wh is an expletive which is replaced at LF by the wh which has semantic content. In other words, at the level at which interpretation takes place a Hindi scope marking structure would have essentially the same representation as the corresponding extraction structure in languages like English:

- (4) Who_i does John think Mary will talk to *t_j*?

In fact, the connection between scope marking and extraction was made explicitly by van Riemsdijk (1983) who noted that in certain dialects of German either strategy can be used to express long-distance wh dependencies. The following examples illustrate the two strategies in German:

- (5) a. Mit wem glaubst du dass Maria gesprochen hat
 with whom think you that Maria spoken has

- b. Was glaubst du, mit wem Maria gesprochen hat
 what think you with whom Maria spoken has
 "Who do you think Maria has spoken to?"

(5a) instantiates the standard extraction structure where the wh expression in Spec of matrix CP *mit wem* signals that it is a direct question and identifies what the question is about. (5b) instantiates the scope marking structure in which a wh expression in Spec of matrix CP *was* signals that it is direct question, but it is the wh expression in Spec of embedded CP *mit wem* that provides semantic content. According to van Riemsdijk, the sole function of *was* is to extend the scope of *mit wem*, hence the name scope marker.² The German scope marking structure in (5b) and the Hindi scope marking structure in (1) seem quite parallel. Given the intuitive correlations with extraction, it seems quite plausible to assign both of them LF representations like (3).

Using a semantics for questions such as Hamblin (1973), for example, LF's like (3) would be interpreted as (6):

- (6) $\lambda p \exists x[\text{person}'(x) \wedge p = \text{'think}'(j, \text{'talk-to}'(m, x))]$

(6) denotes a set of propositions, each one of which constitutes a possible answer to the question. In this way of interpreting questions, wh expressions are existential quantifiers whose restriction is either implicit or provided by the common noun inside the wh expression. The wh expression crucially determines the set of individuals who can be specified by the answer. The fact that scope marking and extraction allow the same answers thus follows straightforwardly under an approach that assigns the same LF representations to both.

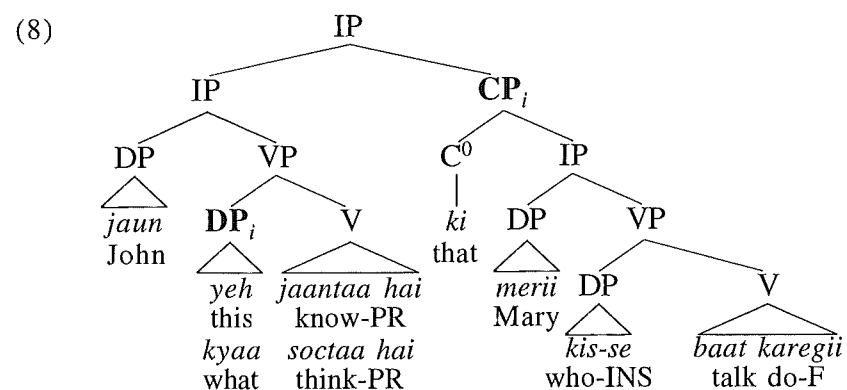
There are two problems, however, with this approach to the phenomenon of scope marking. One, given what we know about the scope of Hindi wh in-situ it does not seem possible to derive the LF representation in (3) from (1) in a principled manner. Two, scope marking structures are semantically distinct from extraction structures so that some difference between them needs to be maintained at LF. Let me illustrate these two points before suggesting an alternative analysis of scope marking.

² Some languages have a structure in which the wh expression in the embedded clause is repeated in the higher clause, something like *Who does John think Mary will talk to who?* As McDaniel (1989:569, ft. 5) notes, these are not identical to scope marking.

1.2. Problems for Hindi

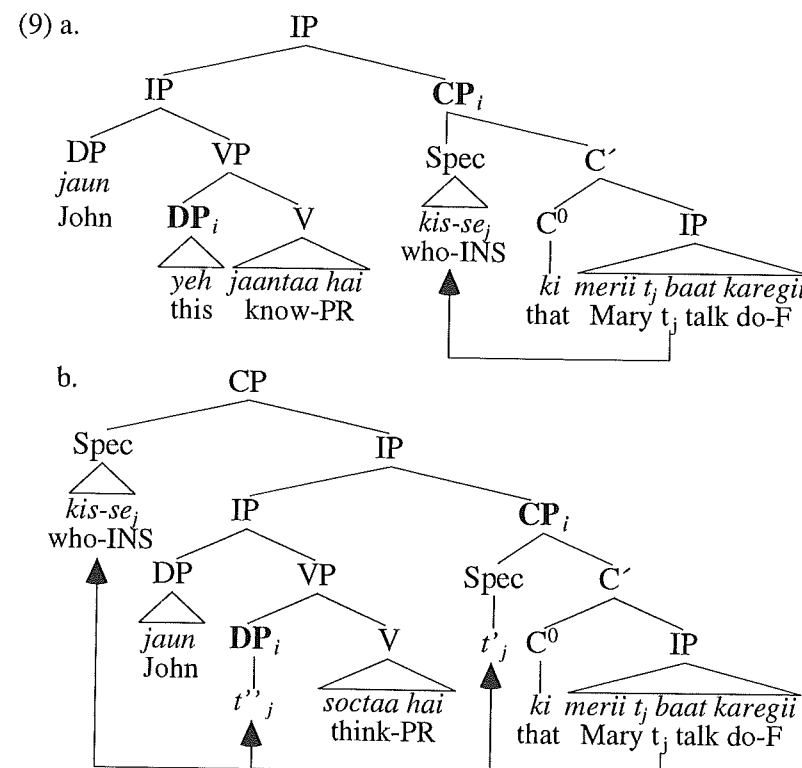
Let us make the straightforward assumption that (1) instantiates the standard complementation structure for Hindi. The matrix wh occupies the matrix object position and the finite complement is generated adjoined to IP.³ That is, one might think of (1) as a wh counterpart of *yeh* complementation structures, discussed in Chapter II and illustrated in (7) below. Since (1) and (7) are only minimally different, one might plausibly assign them the same S-structure representations, as shown in (8):

- (7) *jaun yeh jaantaa hai ki merii kis-se baat karegii*
 John this know-PR that Mary who-INS talk do-F
 "John knows it who Mary will talk to."



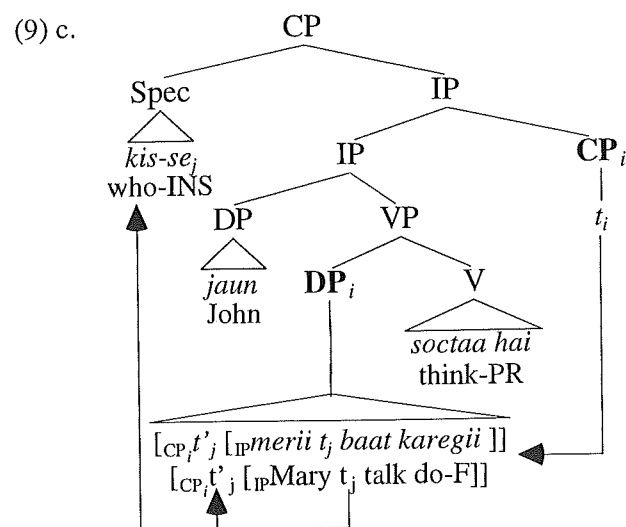
The difference between (1) and (7) would be at the level of LF, where wh expressions obligatorily move to Spec position. (7) would have an LF like (9a), and (1) would have an LF like (9b):

³ There is, of course, the option of adjoining to CP but it would not allow the kind of movement processes being considered at this point. CP-adjunction would place the embedded clause higher than the matrix Spec position.



Consider the derivation in (9b). Here the embedded wh first replaces the expletive matrix wh and then moves to matrix Spec. There are some obvious problems with this move. We have seen that all LF movement out of CP_i is impossible in Hindi. This is shown by the impossibility of a direct question reading for structures like (7). An independent problem is that movement from embedded Spec to the preverbal position would result in an ungoverned trace.

Secondly, the preverbal DP_i is coindexed with the adjoined CP_i so it is unclear how a wh expression inside CP_i can by itself replace DP_i. A more plausible alternative, perhaps, would be to have the whole CP_i participate in expletive replacement followed by standard wh movement. Under this view, the LF for (1) would be as in (9c):



Here CP_i replaces the expletive *wh* and comes to be in argument position. *Wh* movement of the embedded *wh* to matrix Spec is now possible since there are no government or binding barriers. While this seems reasonable enough, the problem of the missing reading for (7) once again rears its head. If adjoined CP's participate in expletive replacement, a similar process should render the embedded clause transparent for LF *wh* movement in (7) as well. As far as I can see, there is no way of allowing wide scope for embedded *wh* in one case and not the other. I therefore take it that an LF in which the embedded *wh* moves to matrix Spec is impossible in Hindi.⁴

1.3. Some Semantic Distinctions

It might be argued, of course, that the problems for Hindi arise only if scope marking is considered parallel to *yeh* complementation. If the scope marker were an expletive but the pronoun were not, there would be no expectation that the possibility of wide scope readings for one should correlate with the possibility of wide scope readings for the other. I would like to show here that independent of this issue, an analysis of scope marking in terms of extraction is undesirable on semantic grounds. If interpretation is defined on LF representations,

⁴ As mentioned in Chapter II, I take the meaning of the adjoined CP to combine with the meaning of the preverbal position via functional application. I do not assume any syntactic reconstruction for right-adjoined complements.

two structures with the same LF will have the same interpretation regardless of derivational history. That scope marking structures are not identical to extraction structures at LF is evidenced by the fact that they are not truly equivalent.

Rizzi (1992), for example, notes that matrix negation is acceptable in German extraction structures but not in German scope marking structures:

- (10) a. Mit wem glaubst du nicht, dass Maria gesprochen hat
with whom think you not that Maria spoken has
"Who don't you think maria has spoken to?"
b. *Was glaubst du nicht, mit wem Maria gesprochen hat
what think you not with whom Maria spoken has
"What don't you think, who has Maria spoken to?"

The same contrast can also be demonstrated by adding negation to Hindi (1) and to the English example in (4). The negated scope marking structure is ungrammatical but the negated extraction structure is acceptable:

- (11) a. *jaun kyaa nahiiN soctaa hai, merii kis-se baat karegii
John what not think-PR Mary who-INS talk do-F
"What doesn't John think, who will Mary talk to?"
b. Who doesn't John think Mary will talk to?"

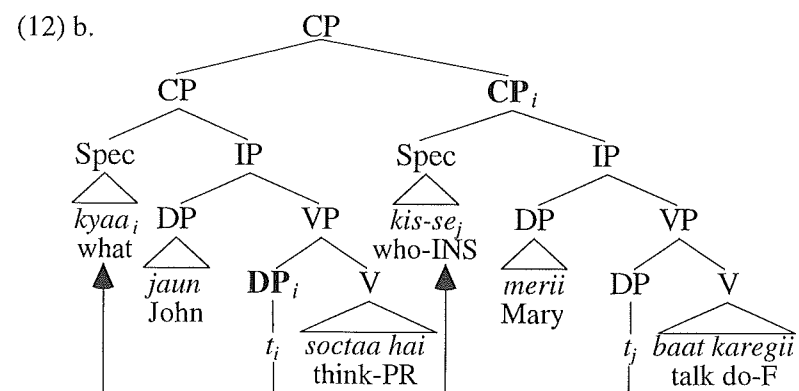
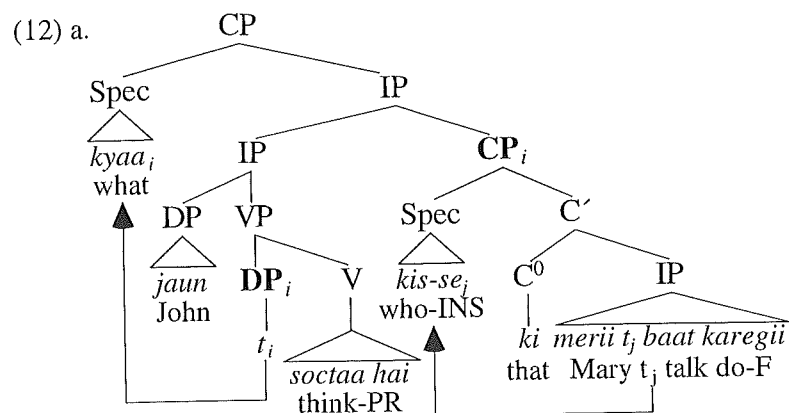
Deferring discussion of Rizzi's account of these facts till section 2.2, let me simply note that the impact of negation on scope marking is very sharp. It certainly warns us against taking scope marking to be a simple variant of extraction.

A second difference between scope marking and extraction is pointed out in Herburger (1994). She notes that in a scope marking structure the embedded clause is necessarily interpreted *de re* while in an extraction structure it may be interpreted *de re* or *de dicto*. This contrast can be illustrated with reference to the questions we have been looking at. In scope marking structures such as (1) or (5b), the presupposition behind the embedded clause is part of the questioner's beliefs. A faithful translation would be something like the following *Mary will talk to someone, who does John (or you) think it will be?* In extraction structures like (4) or (5a), on the other hand, it is left open whether the questioner believes Mary will talk to someone or not. It is quite possible that the questioner considers it a figment of John's (or the addressee's) imagination that Mary will engage in conversation with anyone. These intuitions are sharp and, it seems to me, dispel any hope of providing a uniform analysis of the two structures.

In the next subsection, then, I present a syntactic analysis of Hindi scope marking that follows from the interaction of Hindi phrase structure and general principles of wh movement. That the LF representation of scope marking we get is substantially different from extraction, I hope to have shown, is not in itself undesirable.

1.4. Scope Marking as Indirect Wh Dependency

As noted in section 1.2, a simple and straightforward S-structure analysis of Hindi scope marking would be something like (8). Scope marking is simply another instantiation of finite complementation, with the complement generated adjoined to IP or CP and co-indexed with a wh in preverbal position. Assuming that the matrix wh is not an expletive but a substantive wh expression, at LF it will move to Spec position just like any other wh expression. Given the facts of Hindi, both matrix and embedded wh expressions will move to local Spec positions for interpretation. Depending on the level at which the complement is adjoined, we get the following LF representations for (1):



The basic syntactic claim here is that the wh expressions do not enter into a direct relationship. They enter into two local dependencies and are indirectly connected by the fact that the trace of the scope marker is coindexed with the CP_i that dominates the embedded wh. Note that Davison (1984) and Mahajan (1990) hold similar views on finite complementation in Hindi and posit similar S-structure representations for scope marking structures. The crucial difference between their approaches and mine is that I maintain the syntactic distinction between scope marking and extraction structures at all levels of syntactic representation, while they eliminate it at the level which feeds into the semantics.

To sum up this section, I have argued that scope marking structures and extraction structures are not identical. The dependency between matrix Spec and embedded wh is indirect in scope marking whereas in extraction this dependency is direct. This fits in with independently established facts about Hindi phrase structure and LF wh movement. The task now is to show that standard procedures of interpretation can be applied to these structures so that appropriate meanings can be derived. I use CP-adjoined structures like (12b) in developing the semantics for scope marking. It will become clear in the course of the discussion that complements adjoined at the IP level, though syntactically well-formed, are not semantically interpretable.

2. THE SEMANTICS OF SCOPE MARKING

2.1. *The Semantics of Indirect Wh Dependency*

In this section I will show that an adequate semantics can be defined quite straightforwardly on structures like (12b) if we adopt a theory of questions such as Hamblin (1973). The only challenge posed by the structure is in defining the right interpretation for the relation between the preverbal argument position and the adjoined CP. I will first demonstrate why answers to scope marking structures give values for the embedded wh, showing its connection with extraction structures and then explain the negative island effects and *de re* readings which separate the two.

Let us begin by considering the translation of an ordinary extraction structure instantiated by the English question in (13a). Under Hamblin's approach, (13a) translates as (13b), yielding sets such as (13c). Each member of this set constitutes a possible answer to the question:

- (13) a. Who does John think Mary will talk to?
 b. $\lambda p \exists x [p = \text{think}'(j, \text{will-talk}'(m, x))]$
 c. $\{\text{John thinks Mary will talk to Bill, John thinks Mary will talk to Sue...}\}$

As mentioned earlier, the wh expression is interpreted as an existential quantifier, with the quantification here being (covertly) restricted to animate individuals.

Turning to scope marking structures, the first issue to be settled is what the scope marker quantifies over. Examining other contexts in which the Hindi wh expression *kyaa* "what" occurs, we can determine that it can quantify over propositions, as well as ordinary inanimate objects. This is shown by possible answers to (14a) and (15a):

- (14) a. jaun kyaa soctaa hai
 John what think-PR
 "What does John think?"
 b. jaun soctaa hai ki vo tez hai
 John think-PR that he smart be-PR
 "John thinks that he is smart."

- (15) a. jaun kyaa khaa rahaa hai
 John what eat-PROG-PR
 "What is John eating?"

- b. jaun phal khaa rahaa hai
 John fruit eat-PROG-PR
 "John is eating fruit."

Here we focus on the quantification in (14). Applying Hamblin-type semantics to (14a) gives us (16a) as its denotation and the resulting sets are as in (16b):

- (16) a. $\lambda p \exists q [p = \text{think}'(j, q)]$
 b. $\{\text{John thinks that he is smart, John thinks that Mary will talk to Bill, John thinks that Mary will talk to Sue...}\}$

Now, this is a completely standard analysis of questions like (14a). The point I want to draw attention to is that the matrix clause of the scope marking structure in (12b) is identical to this question. The null hypothesis, then, would be that they have the same denotation. Let us explore this hypothesis further.

Let us assume that the matrix clause of (12b) is interpreted as (16a). We know, of course, that (12b) should not allow the first proposition in (16b) since it does not deal with John's knowledge about who Mary will talk to, so clearly something more needs to be said. Consider now the complement clause. This too is a question so it is going to denote a set of propositions. In this case it will denote (17a), resulting in sets like (17b):

- (17) a. $\lambda p' \exists x [p' = \text{will-talk}'(m, x)]$
 b. $\{\text{Mary will talk to Bill, Mary will talk to Sue, Mary will talk to Jane}\}$

Intuitively, what we want to do is to combine the denotations of the two questions in such a way that we end up with (18a). This will give us sets such as (18b) as an answer for (12b):

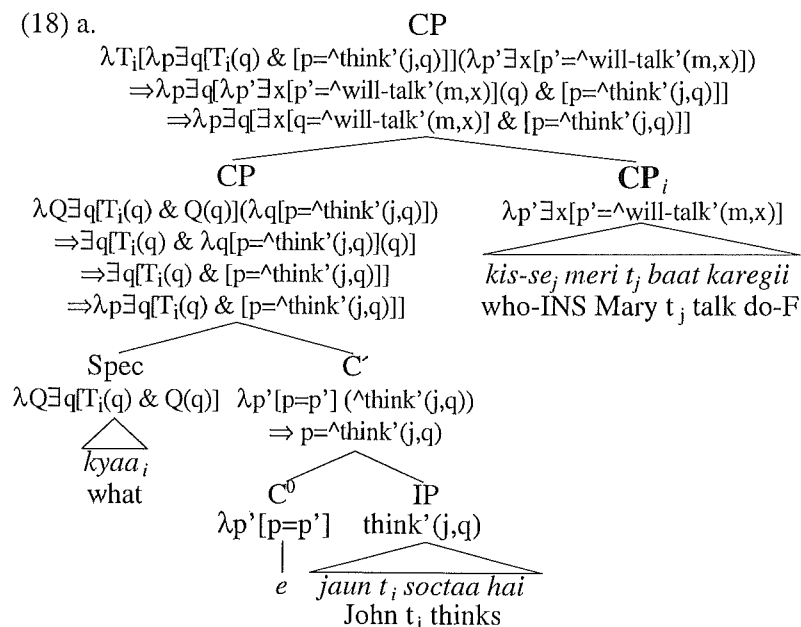
- (18) a. $\lambda p \exists q [\lambda p' \exists x [p' = \text{will-talk}'(m, x)](q) \wedge p = \text{think}'(j, q)]$
 $\Rightarrow \lambda p \exists q [\exists x [q = \text{will-talk}'(m, x)] \wedge p = \text{think}'(j, q)]$
 b. $\{\text{John thinks that Mary will talk to Bill, John thinks that Mary will talk to Sue}\}$

(18a) says that the scope marking structure denotes the set of propositions p of the form *John thinks q*, where q is an answer to the question *Who will Mary talk to?* That is, q is a proposition of the form *Mary will talk to x*, for some person x . The first condition in the formula, we see, excludes all propositions that are not possible answers

to the complement set. The set of propositions that the scope marking structure allows, then, is the same as the set of propositions that the corresponding extraction structure would allow.

Let us now try to achieve this in a principled manner. In order to do so, let us step back a bit and focus afresh on simple questions involving quantification over propositional variables. The English question corresponding to (14a), *What does John think?* is adequate for sharpening our intuitions. This question asks for the set of propositions that John stands in the *think'* relation to, but it doesn't really seem as if the questioner is interested in every proposition that John thinks. I'm not even sure that it is possible to list the full set. Of course, in a given context, the question is generally understood to be something like *What does John think about X?* where *X* provides a reasonable delimitation on the set of propositions that are in consideration. This would make the question computable. One way of thinking about this delimitation is as the topic of the question. Now, it is simple enough to build this into the denotation. We treat the wh expression *kyaa* in the standard way as an existential quantifier over propositional variables. Since natural language quantification is known to be restricted, one expects there to be a restriction in this case also. We may therefore posit a covert restriction on the variable *q* that the existential binds, say *T* (for topic) whose type is $\langle\langle s, t \rangle, t \rangle$, i.e. a set of propositions. Thus the denotation of such questions contains a condition $T(q)$. This would be fully parallel to the restriction to the set of inanimate individuals in the case of questions with *what* such as (15a). The difference between questions over propositions and those over individuals is that in the former case there is no basic lexical item that can give overt realization to *T*, while in the latter case common nouns can be used to spell out the restriction, as in *which thing* or *which fruit*.

Now, let us carry this intuition over to the scope marking structure in (1) and its syntactic analysis in (12b). In demonstrating how the semantics can be defined on this structure, I will adopt the fundamentals of the semantics for questions proposed in Bittner (1994a, 1994b). The key idea, for our purposes, is that the essential interrogative operation of taking a proposition and turning it into a set of propositions is located in C_{+wh}^0 . It provides a compositional way of incorporating Hamblin's treatment of questions into the syntactic framework adopted here. A similar proposal has also been made by von Stechow (to appear) who bases it on unpublished work by Irene Heim:



- b. $\{\text{John thinks that Mary will talk to Bill, John thinks that Mary will talk to Sue}\}$

Let us consider the interpretation of the matrix clause first. I take the denotation of *kyaa*, the scope marker, to be an existential wh quantifier over propositions, $\lambda Q \exists q[T_i(q) \ \& \ Q(q)]$. The variable T_i represents the covert restriction on *q*, the variable bound by the scope marker. The trace of the wh phrase is interpreted as a variable and the IP as the open sentence $\text{think}'(j,q)$. The interrogative C^0 introduces the variable *p* which is to be identified with the IP denotation and denotes a function from propositions to propositions $\lambda p'[p=p']$. Applying this function to the IP denotation yields $p=\text{think}'(j,q)$ as the meaning of C' . Once the variable *q* is abstracted over it can combine with the wh operator via functional application. Finally, the free variable *p* is abstracted over, resulting in the question denotation $\lambda p \exists q[T_i(q) \ \& \ p=\text{think}'(j,q)]$. The derivation of the subordinate clause $\lambda p' \exists x[p'=\text{will-talk}'(m,x)]$ is quite straightforward and I will omit the steps here.

Turning now to the highest CP node we see that there is a simple way for the subordinate clause meaning to combine with the main clause meaning. Note that the variable T_i in the wh expression of the matrix spec, with which the subordinate clause is coindexed, is free at this level. It is therefore possible to abstract over T_i , giving us a

function from question denotations to question denotations $\lambda T_i[\lambda p \exists q [T_i(q) \wedge p = \text{think}'(j, q)]]$. The subordinate clause being a question, and therefore of the right semantic type, can combine with it through functional application, giving us $\lambda p \exists q [\exists x [q = \text{will-talk}'(m, x) \wedge p = \text{think}'(j, q)]]$, as we had wanted.⁵

To verify that this works, consider the proposition $\text{John thinks that he is smart}$. Here q would be *that he is smart*. This will not be included because there is no individual x , such that q is identical to $\text{Mary will talk to } x$. But when we consider the proposition $\text{John thinks that Mary will talk to Sue}$, we have the value of q set at *that Mary will talk to Sue* and, indeed, there is an x (namely, Sue) such that q is identical to *that Mary will talk to } x. The interpretive procedure includes all and only the propositions that it should.*

Before concluding this subsection, I want to draw attention to the fact that scope marking can also involve adjunction at the IP level, as in (12a). However, that structure does not translate into the formula in (18a) but yields something like (19):

$$(19) \quad \lambda p \exists q [p = \text{think}'(j, q) \wedge \exists x [q = \text{will-talk}'(m, x)]]$$

Whatever it denotes, it clearly does not denote the same set of propositions that (18a) denotes.⁶ I therefore take it that though IP adjointed structures are syntactically well-formed, they are

⁵ What we have, in effect, is an analysis of the scope marking structure as *What does John think about who Mary will talk to?* Interestingly, McDaniel (1989: 570, ft.6) considers this possibility but dismisses it as counterintuitive. She also points out a construction parallel to scope marking in Romani relative clauses to which her account for questions is intended to extend. I have not had the opportunity to test whether the present theory would extend to the kinds of relative clauses McDaniel mentions, though I think it could be done given an appropriate semantics. I simply note here that Hindi lacks such relative clauses.

⁶ Irene Heim and Angelika Kratzer point out (personal communication) that this denotation could be considered acceptable if one appealed to the pragmatics of question-answer dialogues. The key observation is that the condition $\exists x [q = \text{will-talk}'(m, x)]$ in (19) is not a contingent one since for any given value of q it is either true in all worlds or false in all worlds. In the former case, this proposition would have no effect, in the latter it would let into the set the contradictory proposition. One could argue that the contradictory proposition is simply ignored and is therefore irrelevant. This suggestion, if correct, would make IP adjunction syntactically and semantically acceptable. I do not adopt this suggestion here since I hope to exploit the supposed uninterpretability of IP adjointed structures to explain cross-linguistic differences in scope marking structures. I owe the solution I adopt to Maria Bittner and Arnim von Stechow.

semantically deviant. Scope marking structures can only be attested in a language if a wh expression in argument position is coindexed with a question adjoined to CP.

To wrap up the discussion of the semantics of scope marking, I have proposed that there is always a covert restriction in the case of questions involving quantification over propositions. This restriction is a variable over sets of propositions and provides the means by which an adjoined complement clause denotation can combine with the main clause denotation. The procedure outlined here takes as input a representation where the scope of wh expressions is strictly local and interprets it compositionally, assigning as it does a determinate meaning to every lexical item and every phrasal category. In doing so, it derives the fact that the propositions denoted specify values for a wh expression that does not have matrix scope.

2.2. Semantic Distinctions Explained

I have shown above how an indirect dependency approach captures the semantic overlap between scope marking and extraction while maintaining distinctions in scope assignment. Let us see now how it accounts for semantic differences between the two.

As Herburger (1994) points out, the difference between scope marking and extraction with respect to *de re* and *de dicto* readings falls out from the analysis just presented since the restrictions of quantifiers generally contribute to the presuppositions of the sentence. Note that the embedded clause in scope marking structures, unlike the embedded clause in the extraction structures, is not in the scope of the non-factive matrix verb. Its presuppositions are therefore inherited by the whole structure.

Let us turn now to the negative island effects noted by Rizzi (1992). The relevant example is repeated below, with the translation it would have in the present approach:

- (20) a. *Was glaubst du nicht, mit wem Maria gesprochen hat
 what think you not with whom Maria spoken has
 “Who don’t you think Maria has spoken to?”
 b. $\lambda p \exists q [\exists x [q = \text{talk}'(m, x)] \wedge p = \text{not-think}'(\text{you}, q)]$

As it stands, the indirect dependency approach cannot account for the ungrammaticality of (20a). The translation in (20b) shows that the question simply looks for those propositions that the addressee does not stand in the *think* relation to that also happen to belong in the indirect question denotation.

This suggests that perhaps the negation facts are best handled in the syntactic component, as claimed by Rizzi. Let me summarize Rizzi's explanation for the facts. Briefly, he draws a parallel with adjunct extraction, which is known to be sensitive to negation. This is shown in the contrast below:

- (21) a. Who do/don't you think Mary will hire?
 b. How do/*don't you think Mary will behave?

In terms of relativized minimality, arguments carry a referential index and can therefore enter into binding relations. The presence of an intervening negation does not matter. Affirmative and negative versions of (21a) are licit. Adjuncts, on the other hand, cannot carry a referential index and need to antecedent govern their trace. The presence of a potential A' negative operator blocks the relevant government relation in (21b). Rizzi's account of the effect of negation on scope marking is tied to an analysis of German scope marking to be discussed in section 3.2. The crucial aspect of that analysis is that the matrix *wh* is treated as an A' expletive which forms a chain with the embedded *wh* (McDaniel 1989). Being an A' expletive the scope marker does not carry a referential index. The presence of the A' negative operator in the matrix blocks government and leads to ungrammaticality.

Note though that Hindi shows quite clearly that the matrix *wh* is not an A' expletive but an argument since it occurs in argument position. One might argue, of course, that it does not have semantic content so that it could not be expected to carry referential indices, resurrecting Rizzi's proposal. But Rizzi's account of the negative island effect is not uncontroversial. A problem that Rizzi himself addresses is that it requires negation to be analysed as an A' specifier, while many recent studies claim that it is a functional head (Pollock 1989).⁷ One way to apply Rizzi's proposal within the present analysis

⁷ In fact, Dwivedi (1991) claims that Hindi negation is a functional head. It may, however, be the case that Hindi has two negations. The functional head is the one that takes a complement to its left and yields a contrastive reading for it, as claimed by Dwivedi. Sentential negation, which seems to be relevant to the scope marking facts, may be a verbal modifier that modifies the element to its right. Some support for this distinction comes from the following paradigm:

- (i) anu-ne ravi-ko kitaab dii nahiiN, balki pheNkii
 Anu-E Ravi-D book give-P not but throw-P
 (ii) *anu-ne ravi-ko kitaab nahiiN dii, balki pheNkii
 Anu-E Ravi-D book not give-P but throw-P
 "Anu didn't give the book to Ravi, she threw it."

is provided by Herburger who suggests that the scope marker is a D⁰ element that cliticizes on to C⁰. This movement, she argues, is blocked by the presence of negation, under the view that negation is a head.

I hope to have shown by these brief comments that a syntactic account of the negation facts, along the lines envisaged by Rizzi, is not incompatible with the analysis of scope marking presented here. However, it still remains an open question whether the negative island effect is semantic or syntactic (see, for example, Szabolcsi and Zwarts 1993). I will present here an account of the negative island effect in scope marking which is neutral with respect to the the proper treatment of the argument-adjunct asymmetry associated with the negative island effect. Towards this end, consider the difference between simple affirmative and negative questions like (22) and the contexts in which they could be uttered:

- (22) a. What did John buy?
 b. What didn't John buy?

Suppose the questioner sees several items, say a_1, a_2, a_3 that were purchased but she does not know which of the items were bought by John. She could ask either (22a) or (22b). Though the presuppositions behind the two questions may differ, they would both denote sets in which it would be listed for each of the three items whether John bought it or not.

Now, take a context where the questioner only knows that John went shopping but does not see any of the items purchased nor has any notion what things were on the shopping list. That is, there is no pre-established domain of quantification. Here, the affirmative question (22a) is possible but the negative question in (22b) is ruled out. This is presumably because it would be impossible to give an exhaustive list of all the things John did not buy. There are several important issues connected to this, discussed most recently in Lahiri (1991) and Szabolcsi and Zwarts (1993) but I will not go into them. What is relevant for present purposes is the rather uncontroversial intuition that negative questions are possible only with D-linked domains, i.e. domains whose members are known to the interlocuters.⁸

If this distinction is real, it may be possible to maintain an explanation for the scope marking facts in terms of relativized minimality.

⁸ Note that negative questions like *Why didn't John fix the car?* are not restricted to D-linked interpretations. The non-D-linked reading, however, is only allowed with *why* interpreted outside the scope of negation as in *Why is it the case that John did not fix the car?*

Turning now to questions which quantify over propositional variables, we see that the requirement of a negative question for a D-linked domain is, if anything, stronger. Compare (22a) and (22b):

- (22) a. What does John know?
b. What doesn't John know?

The negative question in (22b), unlike the affirmative question in (22a), has an echo, a rhetorical or a D-linked interpretation. Crucially, it lacks the normal open-ended interpretation. To see this, consider the following contexts of use.

A context that supports the D-linked interpretation would be something like the following. Suppose students in Linguistics 101 are being evaluated with respect to a set of core facts, namely *that language is innate, that language is systematic, that all dialects of a language are equally good*. Now, while grading Bill's paper one T.A. notes that he knows the first fact but not the other two. When she comes to John's paper, her friend might easily ask *And what doesn't John know?* However, take a situation where people are simply discussing the relative merits of job candidates without having a fixed set of facts against which to evaluate them. One can ask the affirmative question (22a) but not the negative question (22b).

Now, putting the generalization that negated questions require D-linked domains of quantification with the analysis of scope marking structures presented here, we have a straightforward explanation for the negation facts. In a D-linked context, the restriction *T* on the propositional variable has its value determined by context. Since *T* is not free, the complement denotation cannot be substituted for it via functional application. We therefore end up with a violation of the principle of Full Interpretation (Chomsky 1986b).

To sum up, I have connected the possibility of negation in questions with D-linking. I have also connected the possibility of interpreting the complement in a scope marking structure with a free variable in the main clause. Under the assumption that *T* can either refer to the D-linked set of propositions or be available for combining with the complement propositional set, the impossibility of negation in scope marking is predicted.⁹

⁹ Szabolcsi and Zwarts (1993) give some examples of scope marking structures in Hungarian in which negation is at least marginally acceptable. At this point, I do not have a full understanding of what may be at issue in these cases and will settle for accepting the explanation in terms of expletive replacement that they provide. I do not consider Hungarian scope marking in the discussion here since I take negation to be a key test for the kind of structures under consideration.

This approach to the negation facts makes another prediction. Affirmative questions, we know, are compatible with D-linked as well as non-D-linked domains. In our terms, this means that the value of *T* may or may not be contextually determined. However, scope marking structures will only be licit if *T* is free, i.e. when the domain is not D-linked. It seems to me that the prediction is borne out. Scope marking structures never have a D-linked interpretation. Also predicted is the fact that scope marking structures do not have echo question interpretations. Since echo questions pick their value from alternatives to the previous utterance, the complement cannot provide the value of *T* and remains uninterpreted (see Chapter IV, section 2.4 for discussion of echo questions).

We see, then, that taking locality in scope assignment as a goal and working close to S-structure representations we have come up with an analysis of scope marking structures that makes the right distinctions between scope marking and extraction. The two overlap but do not converge. In the next subsection I will discuss several other properties of Hindi scope marking structures that follow from the present analysis.

2.3. Other Properties of Scope Marking

One interesting characteristic of Hindi scope marking structures is that the scope marker is always the same but there is no restriction on the type of wh expression that can occur in the embedded clause. The following are fully acceptable:

- (23) a. ravi-ne kyaa kahaa ki anu aayegii yaa nahiiN
Ravi-E what say-P that Anu come-F or not
"What do you think, will Anu come or not?"
b. $\lambda p \exists q [q = \text{'will-come'}(a) \vee q = \text{'will-come'}(a)] \wedge$
 $p = \text{'said'}(r, q)$
- (24) a. jaun kyaa soctaa hai merii kahaaN jaayegii
John what think-PR Mary where go-F
"What does John think, where will Mary go?"
b. $\lambda p \exists q [\exists x [p \text{'place'}(x) \wedge q = \text{'will-go-to'}(m, x)] \wedge$
 $p = \text{'think'}(j, q)]$

Under the present approach, the matrix wh is the lexical item used to question over propositional variables, namely *kyaa*. It is therefore invariant. The embedded clause forms the restriction on the propositional variable so its semantic type must be a set of

propositions, a question. The choice of wh expression in the embedded clause plays no particular role. Any wh expression ensures the right interpretation, as the translations demonstrate. In (23a) the embedded wh is a yes/no operator. Possible answers to the question are of the form *Ravi said Anu will come* or *Ravi said Anu won't come*.¹⁰ In (23b), the embedded wh is an adjunct and possible answers are of the form *John thinks Anu will go to Paris* or *John thinks Anu will go to India*.

It is also predicted that there will be no restriction on the number of wh expressions in the embedded clause. In the examples so far there was one such expression but in (25a) we see two embedded wh expressions and a possible answer specifies values for both of them. In fact, there can be as many wh expressions in the embedded clause as the language allows in multiple wh questions. The answer would specify values for all of them:

- (25) a. *jaun kyaa soctaa hai kaun kahaan jaayegaa*
 John what think-PR who where go-F
 "What does John think, who will go where?"

$$b. \lambda p \exists q [\exists x \exists y [\text{person}'(x) \wedge \text{place}'(y) \wedge q = \text{'will-go-to'}(x, y)] \wedge p = \text{'think'}(j, q)]$$

Since a scope marking structure is itself a question, it follows that it can form the restriction on a propositional variable in a higher clause, giving the effect of unbounded wh dependencies. The coindexing between each complement clause and the object position in the clause above it, eliminates from the higher clause denotation the propositions that do not belong in the complement. An example like (26a) is interpreted as in (26b):

- (26) a. *jaun kyaa soctaa hai, anu kyaa kahegii,*
 John what think-PR Anu what say-F
meri kis-se baat karegii
 Mary who-INS talk do-F
 "What does John think,
 what Anu will say, who will Mary talk to?"

$$b. \lambda p \exists q [\exists r [\exists x [r = \text{'will-talk'}(m, x)] \wedge q = \text{'will-say'}(a, r)] \wedge p = \text{'think'}(j, q)]$$

¹⁰ Note that under an expletive replacement strategy we would get the incorrect reading given in (i):

(i) $\lambda p [p = \text{'said'}(r, \text{'will-come'}(a)) \vee p = \text{'said'}(r, \text{'will-come'}(a))]$

Let us demonstrate informally how this works. Suppose, for example, that the unrestricted matrix clause question denotes sets like $X = \{\text{'John thinks he is smart, 'John thinks Mary will talk to Bill, 'John thinks Anu will say Mary will talk to Sue...}\}$, the unrestricted intermediate clause denotes something like $Y = \{\text{'Anu will say Mary will talk to Sue, 'Anu will say Mary will talk to Bill, 'Anu will say that Bill is smart...}\}$ and the lowest clause something like $Z = \{\text{'Mary will talk to Bill, 'Mary will talk to Sue, 'Mary will talk to Harry...}\}$. As the interpretation proceeds and the lowest CP combines with the intermediate clause, Z fills in for the restriction on Y and we get $(Y \cap Z) = \{\text{'Anu will say Mary will talk to Sue, Anu will say Mary will talk to Bill}\}$.¹¹ When this combines with the matrix, $(Y \cap Z)$ will fill in for the restriction on X and we get $(X \cap (Y \cap Z)) = \{\text{'John thinks Anu will say Mary will talk to Sue...}\}$. Of course, there are many more propositions in each set but the schema should make it clear that classes of propositions are excluded as each clause provides the restriction for the one immediately above it.

It is worth pointing out that in the case of multiple embeddings every intermediate clause must have a scope marker in order for it to be interpreted as a question. Thus, (27) is ungrammatical:

- (27) **jaun kyaa soctaa hai, anu kahegii,*
 John what think-PR Anu say-F
meri kis-se baat karegii
 Mary who-INS talk do-F
 "What does John think,
 Anu will say, who will Mary talk to?"

The reason for this is that the complement of a scope marking structure must be of the same type as the variable T , i.e. a set of propositions. In (27) the intermediate clause is not a question but a proposition. Since it is not of the same type as the variable T in the higher clause, it cannot combine with it. The structure is ruled out as a violation of Full Interpretation (Chomsky 1986b).

Finally, the distribution of scope marking is restricted. Though the matrix verb must be able to take -wh complements, the actual complement must be +wh. In (28a) the complement is not +wh and in (28c) the matrix verb cannot take -wh complements. They are both

¹¹ $Y \cap Z$ is, of course, \emptyset . What we really want here is $\{p \in Y : \exists q (q \in Z) \wedge p = \text{'will-say'}(a, q)\}$. I leave the demonstration with this inaccuracy in the interests of exposition.

unacceptable. The acceptable case is (28b) which has a matrix verb that selects a -wh complement but the complement itself is +wh:

- (28) a. *jaun kyaa jaantaa hai merii ravi-se baat karegii
 John what know-PR Mary Ravi-INS talk do-F
 b. jaun kyaa jaantaa hai merii kis-se baat karegii
 John what know-PR Mary who-INS talk do-F
 c. *jaun kyaa puuchtaa hai merii kis-se baat karegii
 John what ask-PR Mary who-INS talk do-F

Once again, the theory of semantic types provides a simple explanation. In (28a) *T* is of type $\langle\langle s,t \rangle, t \rangle$ while the complement is of type $\langle s,t \rangle$. Functional application is not possible and we end up with a violation of Full Interpretation. In (28b) *T* is of type $\langle\langle s,t \rangle, t \rangle$ and so is the complement and interpretation proceeds smoothly. In (28c), the matrix verb *ask* allows only for sets of propositions in its answer. The variable *q* that the scope marker binds is thus of type $\langle\langle s,t \rangle, t \rangle$. *T* therefore has to be of a higher type, $\langle\langle\langle s,t \rangle, t \rangle, t \rangle$. The complement is of type $\langle\langle s,t \rangle, t \rangle$ (but see section 4.1). This blocks functional application and results in ungrammaticality due to the violation of Full Interpretation.

We see, then, the extreme simplicity and generality of the indirect dependency approach to Hindi scope marking. Each wh expression in Spec position at LF is treated as an operator, a standard practice in the analysis of ordinary questions. The effect of wide scope is created by interpreting the complement as a restriction on the variable in the higher clause. A host of facts about the interpretation and distribution of scope marking follows from the interaction of these notions with general principles of grammar. In the next section I will try to explore the possibility of extending the analysis developed for Hindi scope marking to other languages.

3. SCOPE MARKING ACROSS LANGUAGES

3.1. *Properties of German Scope Marking*

Since van Riemsdijk's (1983) original observation, scope marking structures have been attested in a number of languages. In addition to Hindi and German, they have been noted for Bangla (Bayer 1990), Romani (McDaniel 1989) and Iraqi Arabic (Wahba 1991, Basilico

1995). Below I give examples from Bangla, Romani and Iraqi Arabic, in that order:¹²

- (29) a. tumi ki bhebe-cho ke baaRi kore-che
 you what think who house built
 "What do you think, who built the house?"
 b. So o Demiri mislinol kas i Arifa dikhla
 what the Demir thinks whom the Arifa saw
 "What does Demir think, who did Arifa see?"
 c. sh-tsawwarit Mona Ali raah weyn
 what thought Mona Ali went where
 "What did Mona think, where did Ali go?"

Bangla is like Hindi in that it has wh in-situ, overt wh movement being limited to scrambling. The scope of wh in-situ inside postverbal finite complements is necessarily local so that scope marking is the primary strategy for questioning out of them. Romani is like German in having overt wh movement. It also allows for both the scope marking and the extraction structure. Iraqi Arabic has optional wh movement in the syntax but appears to disallow extraction. Scope marking is thus needed to question out of subordinate clauses. The question is whether the analysis developed for Hindi scope marking can be applied to other languages. I will focus mainly on German scope marking in discussing this question, since it has been extensively analysed, in independent terms as well as in relation to the indirect dependency approach. I will first point out the similarities and the differences. I will then sketch an alternative analysis that has been proposed for German, pointing out some theoretical and empirical problems with it. I will conclude by suggesting how cross-linguistic variation may be accommodated within the indirect dependency approach and noting some cross-linguistic predictions made by it.

As in the case of Hindi, the German scope marker is the lexical item used to question over propositions. The embedded question can have any number of wh expressions. These wh expressions can be any argument or adjunct wh phrase. Some examples that illustrate these facts are given below:

- (30) a. Was glaubst du wo Maria getanzt hatte
 what think you where Maria danced has
 "What do you think, where did Maria dance?"

¹² In Dayal (1994b) I had made some errors in glossing the Romani data, which are corrected here. Thanks to Dana McDaniel for pointing this out.

- b. Was glaubst du,
 what think you
 wann Hans an welcher Universität studiert hat
 when Hans at which University studied has
 "What do you think,
 when did Hans study at which university?"

Further, German scope marking structures can be used to express unbounded dependencies, as shown in (31a). van Riemsdijk (1983), McDaniel (1989) and Herburger (1989) report that in such cases each intermediate clause needs to have a scope marker:

- (31) a. Was glaubst du, was Peter meint,
 what think you what Peter believes
 mit wem Maria gesprochen hat
 with whom Maria spoken has
 "What do you think, what does Peter believe,
 with whom has Maria spoken?"
- b. *Was glaubst du, dass Peter meint,
 what think you that Peter believes
 mit wem Maria gesprochen hat
 with whom Maria spoken has
 "What do you think, that Peter believes,
 with whom has Maria spoken?"

The distribution of scope marking fits in with the generalization that the matrix verb must be able to take -wh complements but the actual complement must be +wh:

- (32) a. *Was glaubst du, dass Maria mit Hans gesprochen hat
 what think you that Maria with Hans spoken has
- b. Was glaubst du, mit wem Maria gesprochen hat
 what think you with whom Maria spoken has
- c. *Was fragst du, mit wem Maria gesprochen hat
 what ask you with whom Maria spoken has

Add to these the negative island effects and obligatory *de re* readings which were first observed for German. It seems to me that these facts squarely align German scope marking with Hindi.

In spite of the similarities, there are some differences that need to be taken into account. One, the status of (31b) seems subject to dialect variation. Beck (to appear) credits Hohle (1991) with the observation that unbounded dependencies can be expressed without a

scope marker in every clause. That is, (31b) is acceptable for some speakers and unacceptable for some. Two, while it is true that all wh phrases are allowed in the embedded question, the yes/no operator is not. The following example is clearly bad:

- (33) *Was glaubst du, ob die Maria mit dem Hans gesprochen hat
 what believe you if the Maria with the Hans spoken has
 "What do you believe,
 whether Maria has spoken with Hans or not."

Three, the class of verbs that are compatible with scope marking is less restricted in Hindi than in German. Factive verbs, for example, are perfectly acceptable in Hindi, as shown in (34). German scope marking, however, does not occur with factives (Joseph Bayer, personal communication). Sigrid Beck and Miriam Butt (personal communication) suggest that only bridge verbs participate in scope marking. (35) brings this out:

- (34) a. jaun kyaa jaantaa hai merii kis-se baat karegii
 John what know-PR Mary who-INS talk do-F
 "What does John know, who will Mary talk to?"
- b. tum-ko kyaa pataa calaa merii kyuun nahiiN aayegii
 you-D what discover-P Mary why not come-F
 "What did you discover, why won't Mary come?"
- (35) a. *Was weiss Otto, wer da war
 what knows Otto who there was
 "What does Otto know, who was there?"
- b. Was sagt Otto, wer da war
 what says Otto who there was
 "What does Otto say, who was there?"

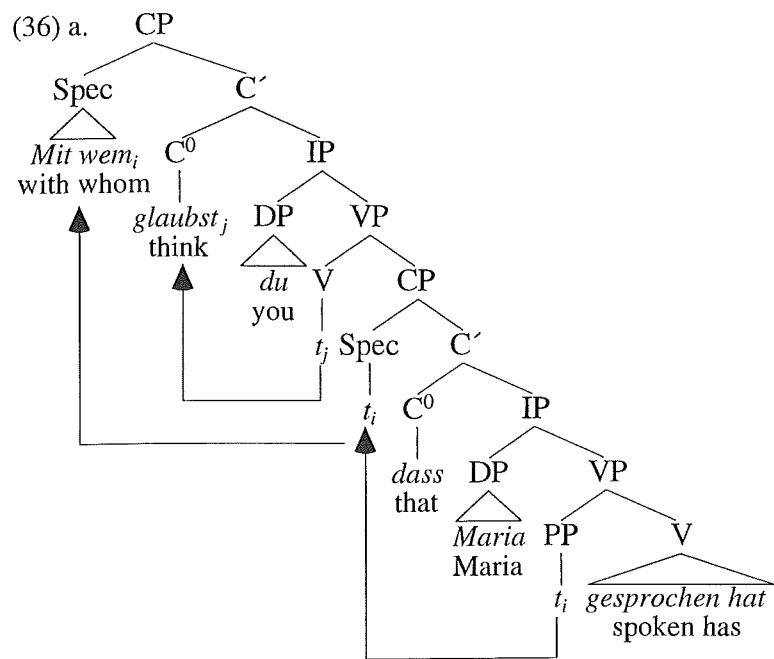
Before attempting to reconcile the differences between German and Hindi within the indirect dependency approach, I would like to outline an alternative approach to scope marking that has been proposed on the basis of German data.

3.2. The Scope Marker as Expletive

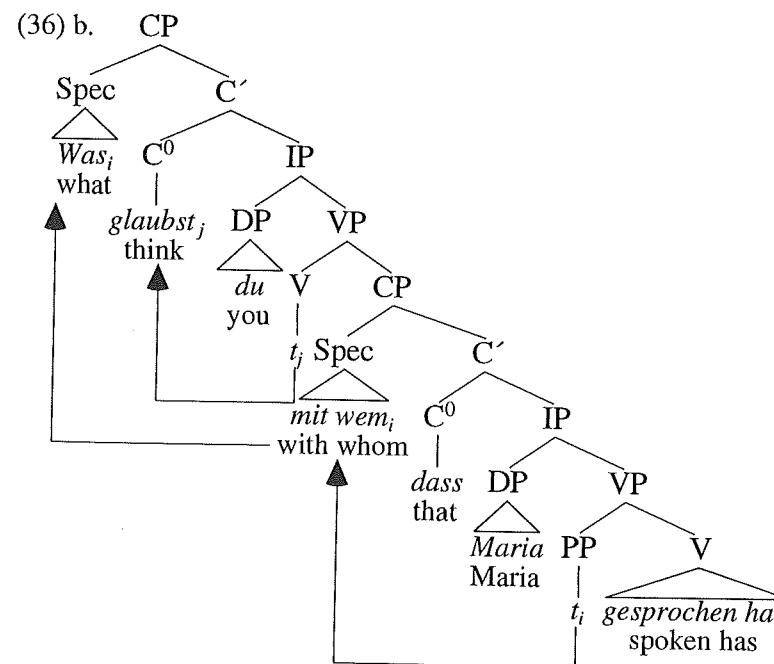
A predominant view of scope marking, stemming from van Riemsdijk's work, is that it is an expletive whose only contribution is to extend the scope of the embedded wh. In spite of individual differences in the overall analysis, this view is shared by McDaniel

(1989), Bayer (1990), Mahajan (1990), Davison (1984), Wahba (1991), Müller and Sternefeld (1994) and Beck (to appear).¹³ I will adopt the version in McDaniel (1989) to illustrate the approach here.

Using the apparent synonymy with extraction, McDaniel claims that the scope marker is base generated in spec of matrix CP and forms a chain with the wh expression in the embedded CP. The representations of (5a)-(5b), under her analysis, are as in (36):



¹³ Wahba's terminology is somewhat different in that the scope marker is referred to as a Quantifier Phrase but I think the idea is the same. Similarly, Bayer's is a parsing account of the phenomenon but it essentially treats the scope marker as an expletive.



The only difference between extraction and scope marking is in the source of the wh dependency. In extraction structures it results from movement, in scope marking structures from coindexing. In either case, a direct wh dependency is established between the position where theta role is assigned (i.e. the embedded argument position) and the position where scope is fixed (i.e. the matrix spec position). Scope markers in this view, then, are just a special type of wh operator that some languages may employ, but the relationships they enter into are standard.

This approach goes some way in accounting for the characteristics of scope marking structures noted above but there are some non-trivial problems with it. For example, embedded questions with more than one wh expression pose a serious challenge to it since the wh chain would have one head and two tails. Note that the solution proposed by McDaniel that the two embedded wh's undergo absorption after the wh in-situ moves to Spec at LF is problematic. Absorption, in the sense of Higginbotham and May (1981), creates an operator which cannot be an intermediate link of a chain. Thus McDaniel is forced to suggest that the absorption in the complement of scope marking structures differs from the standard type of absorption in that it does not create an operator. But this means that a

more substantive difference between (36a) and (36b) has to be brought into the picture.

A second non-trivial problem with this account is that it does not allow for a compositional mapping from LF representations to meaning. Since the scope marker has no semantic content and there are no restrictions on the type and number of wh expressions in the embedded clause, what kind of quantification is involved in a particular scope marking structure cannot be determined at the point where the scope marker has to be interpreted. Thus, in a structure like (36b), in order to ensure that the quantification is over animate individuals (not inanimate objects), the scope marker should not directly contribute to meaning by providing an existential quantifier. Or perhaps, it could provide an existential quantifier, but the restriction on the quantifier has to come from the wh expression in the lower spec. That is, the meaning of the scope marker is underdetermined. At the same time, the meaning of the embedded wh has to be kept in store, so to say, till the scope marker is reached in order to fill in the missing element in the quantification. This is particularly obvious when one considers that the embedded wh may have semantically relevant material as in the case of DP's like *which girl* or *which girl's book* etc.

Clearly, the assumption that the relevant coindexing guarantees a systematic mapping to semantics is not well-founded. It cannot be implemented without compromising compositionality. A way of maintaining compositionality would be to posit successive operations to replace the scope marker with the embedded wh expression(s). Some versions of this approach have been developed by Müller and Sternefeld (1994) and Beck (to appear). They do not face the problems with respect to embedded multiple wh questions or compositionality, as pointed out to me by Miriam Butt and Sigrid Beck. Note, however, that actual movement renders scope marking structurally isomorphic to extraction at LF. The challenge, then, is explaining the negative island effect and obligatory *de re* readings in scope marking. In Beck (to appear) a solution in terms of barriers specific to LF movement is proposed to derive the negative island effect. As far as I can see though, the second problem remains unaddressed. If only the embedded wh phrase moves at LF to the matrix Spec it is incorrectly predicted that only the content of the wh expression will be presupposed. In point of fact, the whole embedded clause contributes to the presupposition.

Recall also that an approach in terms of long distance LF movement simply does not extend to in-situ languages like Hindi and

Bangla in a perspicuous manner.¹⁴ There the scope marker occupies the preverbal position which we know to be the canonical position for direct objects. As we saw in section 1.2, long-distance movement is not tenable under an analysis of the scope marker as argument of the matrix verb. We are led to the inevitable conclusion that if the right account for German scope marking is in terms of an A' expletive, an entirely different account is needed for Hindi and Bangla. Given the number of similarities, however, this seems to me an undesirable consequence. I would therefore like to make some speculative remarks on how the indirect dependency approach developed for Hindi might be applied to German.

3.3. The Scope Marker as Argument

The view that the German scope marker *was* is an argument is not *a priori* implausible. As would be obvious by now there are striking similarities between the phrase structure of German and Hindi. They both have SOV order with nominal complements but SVO with clausal complements. In the latter case, there may be an optional pronoun *es* in preverbal position coindexed with the adjoined clause. This is analogous to Hindi *yeh* complements discussed in section 1.2:¹⁵

- (37) Ich habe es nicht behauptet, dass er gewonnen hatte
I have it not asserted that he won had
"I haven't asserted it that he had won."

Cardinaletti (1990) argues that finite CP's in German may either be complements of V or IP adjuncts coindexed with the expletive *es*, which is in complement of V position. One might then propose that the scope marker *was* originates in the same position as *es*, (i.e. as complement of V) and is coindexed with the adjoined finite clause.

¹⁴ McDaniel's account specifically is geared to the existence of overt wh movement so it is not clear to me whether she would even predict the existence of scope marking in in-situ languages and if so what the predictions would be. See Srivastav (1991a) for an attempt to tease out the issues.

¹⁵ I have changed my mind about the syntactic realizations of scope marking across languages, based on ideas presented at the Workshop on the Syntax and Semantics of Partial Wh Movement, Universities of Tuebingen and Stuttgart in Nov. 1995. Particularly influential was the talk by Marga Reis. Unfortunately, it is not possible to include these changes here. I refer the reader to Dayal (to appear) for what I think is a more promising approach to the problem than the one presented here.

Under this view, German scope marking determines at S-structure the indirect wh dependency that Hindi has at LF.^{16,17}

The question we must answer, of course, is why there should be any difference between German and Hindi scope marking. Consider first the fact that German scope marking is not acceptable with a yes/no complement. Interestingly, this correlates with the fact that German yes/no complements do not occur with preverbal *es*. In Cardinaletti's approach this would imply that the complement itself is generated in argument position. The impossibility of scope marking follows from the fact that there is no position for the scope marker to originate in.

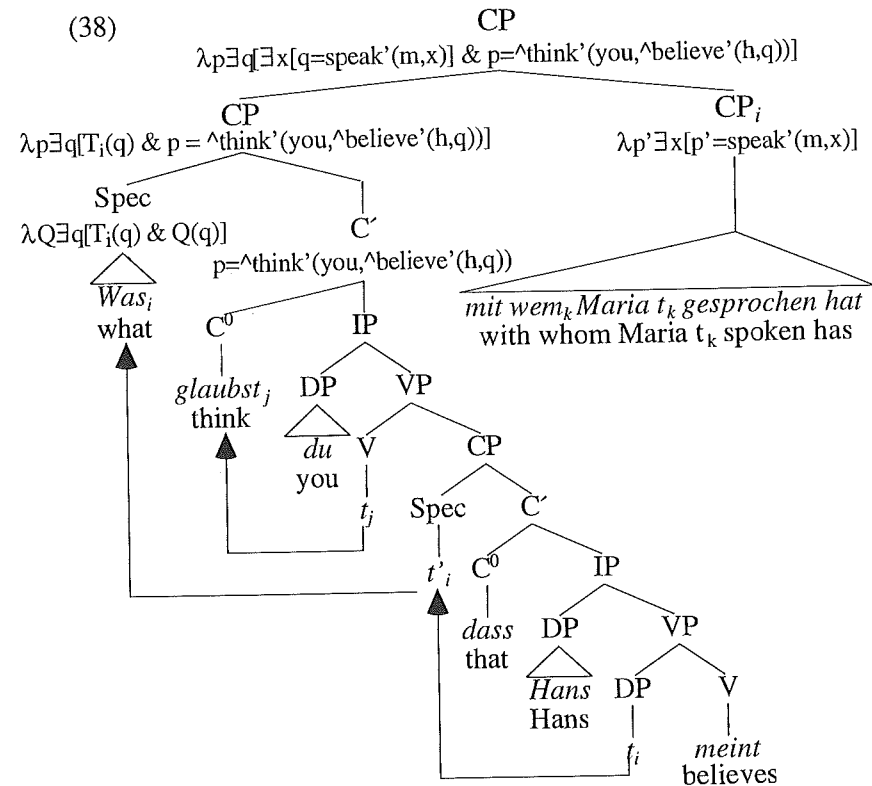
Next consider the fact that German scope marking is not acceptable with factive verbs. Recall that for a scope marking structure to be interpretable, the complement must be adjoined to CP. That is, it must be outside the scope of the propositional variable introduced by the matrix C⁰. Now, Cardinaletti notes that German does not allow factive complements to be adjoined higher than VP. If this is so, the fact that scope marking is not possible with factive complements follows from syntactic constraints on adjunction.

Let us now turn to the fact that there are dialects of German in which a scope marker need not be repeated in every clause. The acceptability of a question like (31b) appears problematic under the present account since the intermediate clause is a proposition and not an appropriate restriction for the matrix wh. Note, however, that under theories like Guéron (1980), Guéron and May (1984) and May (1985) the adjunction site of right-adjoined elements is free. The right roof effect comes from the independent requirement that the DP the extraposed element is construed with govern it at LF. Under this view of adjunction, dialects that allow long-distance extraction of the matrix wh could have the complement adjoined at the matrix CP level.¹⁸

16 Note that wh extraction out of *es* complements is not possible, just as topicalization out of *yeh* complements is not possible in Hindi. See Hartmann and Büring (1994) for an analysis of German wh extraction along lines that are remarkably similar to the one argued for in Chapter II in relation to Hindi.

17 In Dayal (1994b) I had mistakenly thought that pronouns inside *es* complements cannot be bound by elements in the matrix clause. I became aware of the problem on reading Hartmann and Büring (1994). It was also brought to my attention by Miriam Butt and Sigrid Beck (personal communication). See Chapter II, fn. 22 for an approach to binding facts that would be compatible with the proposed account of complementation. See also Dayal (to appear) for a solution.

18 Thanks to Andy Barrs for a pointed question about adjunction sites that led me to rethink this aspect of my earlier analysis.



The variation between different dialects of German with respect to extraction and scope marking are extremely intricate and I do not, of course, have more than a cursory knowledge of it. What I merely wish to point out here is that variation in extraction is an independent phenomenon to which the scope marking fact can be correlated. As such, it does not particularly argue against the indirect dependency approach.

There is, however, data that argues more directly against the applicability of the present approach. The following contrast was brought to my attention by Josef Bayer and has also been noted by Müller and Sternefeld (1994):

- (39) a. *wer hat was gedacht wen wir anrufen sollten
 who has what thought whom we call-up should
 b. was hat wer gedacht wen wir anrufen sollten
 what has who thought whom we call-up should
 "Who thinks what, who should we call up?"

If the scope marker were to originate in object position it is unclear why it should take precedence over the subject *wh* in terms of overt movement. But the facts are expected if it is an expletive base generated in Spec position. I do not have a firm answer to this but Herburger (1994) argues that the scope marker cliticizes onto C⁰. Some independent evidence for this is provided by the Iraqi Arabic scope marker which is obligatorily contracted, as shown in (29c). If this is true, then the presence of *was* in clause-initial position may have an explanation that is still compatible with the present account. Dayal (to appear) takes a different approach to the issue of syntactic realization of scope marking and presents further arguments showing how these data may fit into an indirect dependency approach.

The remarks I have made here are admittedly speculative but my goal was to show that the differences between German and Hindi with respect to scope marking may be due to differences in their phrase structure. Positing fundamentally different analyses for scope marking in the two languages, in my opinion, would leave their overwhelming similarity completely unexplained. I have therefore tried to show how an indirect dependency approach may apply to German.

3.4. Some Cross-Linguistic Predictions

Let me end this section by making a few cross-linguistic predictions. Perhaps the most substantive empirical prediction of the indirect dependency approach is that the scope marker in every language will correlate with the lexical item used in question-answer pairs like (14), i.e. the *wh* expression that analogously to English *what* allows quantification over propositions. As pointed out to me by Ken Hale and Maria Bittner (personal communication), this prediction can be tested in a language like Walpiri which uses different lexical items for questioning the object position of a verb like *eat*, which requires quantification over inanimate individuals, and the object position of a verb like *think*, which requires quantification over propositions. (40a) quantifies over individuals and has *nijiya* while (40b) quantifies over propositions and has *nyarrapa*. (40c), a scope marking structure, uses the latter:

- (40) a. *nijiya ka nga-rnu*
 what Pres.3s.3s. eat-nPast
 "What is he eating?"
 b. *nyarrapa-rlu O-ngku yimi-ngarru-rnu*
 how-ERG PRF-2o speech-tell-PST
 "What did he tell you?"

- c. *nyarrapa-rlu O-ngku yimi-ngarru-rnu kuja-pala*
 how-ERG PRF-2o speech-tell-PST COMP-3ds
kurdu-jarra nyarrapara-kurra ya-nu
 child-DUAL where-ABLATIVE go-PST
 "What did he tell you, where did the two children go?"

Another prediction is that scope marking will not be possible with verbs that take expletive arguments, in the sense of Rothstein (1995). The following examples in Hindi serve to illustrate the point:

- (41) a. *yeh sambhav hai ki merii aayegii*
 this likely be-PR that Mary come-F
 "It is likely that Mary will come."
 b. **kyaa sambhav hai ki kaun aayegaa*
 what likely be-PR that who come-F
 "What is likely, who will come?"

This is because only substantive *wh* expressions can be questioned. *kyaa sambhav hai*, like its English counterpart, *What is likely?*, can only have an echo interpretation. Since the matrix clause is not an open-ended question over propositions, the complement cannot serve as a restriction. We end up with a constituent that cannot be interpreted.

Finally, note that the availability of scope marking in a language is tied to two syntactic factors. One, the language must allow pronouns in argument positions coindexed with a complement. Two, this complement must be adjoined higher than IP. At the same time, the semantics is general enough that it can work across sentences. This predicts that scope marking of the kind we have been looking at will be restricted to languages that allow the appropriate adjunction. However, scope marking of some kind should be universally available with a sequence of questions of the right types. English, for example, has pronouns coindexed with CP's adjoined to VP's or IP's and therefore does not allow syntactic scope marking, as shown by the unacceptability of (42a). Now, compare this to the sequence of questions in (42b):

- (42) a. *What do you think who Mary will see?
 b. What do you think? Who will Mary see?
 c. *What don't you think? Who will Mary see?
 d. *What did you ask? Who will Mary see?

(42b) has essentially a scope marking interrogative pattern. The second question restricts the range of the answers allowed by the first question. As (42c) and (42d) show, such sequences display the by now familiar constraints. The sequence does not allow negation or verbs selecting +wh complements in the first question.

Recall that the indirect dependency approach makes a distinct prediction from other accounts with respect to the scope of yes/no operators in scope marking structures. In the cases under consideration, if the second question is a yes/no question the answer chooses between alternatives in the denotation of the second question, not those of the first. (43b) is an acceptable answer to (43a). (43c) is an acceptable answer under a neg-raised reading only:

- (43) a. What do you think? Will Mary come?
 b. I think Mary will not come.
 c. I don't think Mary will come.

This fact is explained if the yes/no operator has scope over the embedded clause, and the whole embedded clause restricts the matrix wh. It cannot be explained by extraction of yes/no operator, even granting the possibility of extracting across sentences.¹⁹

And finally, the indirect dependency approach predicts a difference in presuppositions between extraction and scope marking. (42b), for example, presupposes that Mary will see someone, the *de re* reading identified by Herburger (1994). This is unlike the corresponding extraction structure.

To sum up this section, I have taken German scope marking structures and listed the points of similarity and difference with Hindi scope marking. I have argued that in spite of some differences there are enough similarities that a uniform account for both languages is desirable. I then tried to show that the indirect dependency approach can be extended to the German case, but not the other way around. Finally, I noted some cross-linguistic predictions of the indirect dependency approach.

¹⁹ Thanks to Miriam Butt and Sigrid Beck for bringing this out.

4. IMPLICATIONS FOR THE SEMANTICS OF QUESTIONS

4.1. Questions as Sets of Propositions

If the indirect dependency approach to scope marking has any cross-linguistic applicability it has some interesting implications for the semantics of questions. In particular, it suggests that questions denote sets of propositions, as originally argued by Hamblin (1973). The key observation here is that scope marking structures are available only with those embedding verbs that select -wh complements, for example *think* and *know* but not *ask*. At the same time, the complement itself has to contain a wh expression. The explanation for this seemingly odd distributional requirement is that scope marking structures involve quantification over propositional variables, so that the question must denote a set of propositions. Alex Grosu (personal communication) has brought to my attention the fact that Hungarian scope marking structures are possible with verbs like *ask*. Interestingly, this is possible also in Hindi. (44a) is acceptable, but only if the embedded wh *kis-se* "who" is stressed. It then allows for answers like (44b):

- (44) a. jaun kyaa puuchh rahaa thaa
 John what ask-PROG-P
 ki merii kis-se baat karegii yaa nahiiN
 that Mary who-INS talk do-F or not
 "What was John asking,
 whether Mary will talk to who or not?"
 b. jaun puuchh rahaa thaa
 John ask-PROG-P
 ki merii ravi-se baat karegii yaa nahiiN
 that Mary Ravi-INS talk do-F or not
 "John was asking whether Mary will talk to Ravi or not."

The explanation for this turns on the right interpretation of a question with the stress pattern of the embedded clause. Although the embedded clause *merii kis-se baat karegii yaa nahiiN* "will Mary talk to who?" is not normally interpretable by itself, it does allow for an echo question interpretation. In these cases, possible answers are themselves questions. Such questions will be discussed at greater length in Chapter IV. Let me simply point out here that since the embedded clause in (44a) can denote a set of questions it is an appropriate restriction for the object of the matrix verb *ask*. It seems to me that the distribution of scope marking structures provides an excellent diagnostic for determining the semantic type of the

complement. The evidence so far suggests that non-echo questions denote sets of propositions as suggested by Hamblin (1973), not propositions as claimed by Groenendijk and Stokhof (1984). In the next subsection I will argue that the set of propositions denoted by a question is not the set of true propositions, as argued by Karttunen (1977). The discussion leads to some modifications in the semantic theory of questions that will be particularly significant for the discussion in Chapter IV.

4.2. The Truth Requirement for Questions

It was pointed out by Karttunen (1977) that the valid inference from (45a-b) to (45c) is not explained in the theory of questions proposed by Hamblin (1973):

- (45) a. John told Sue who came.
 b. Bill came.
 c. John told Sue that Bill came.

Since *tell* does not entail the truth of its complement, Karttunen concluded that the validity of the inference must be due to the semantics of the embedded question and he therefore imposed a truth requirement for the propositions included in the question denotation.

Adopting Karttunen's modification, however, gives the wrong results for scope marking structures. To see this, consider (46b), the denotation of (1) under the indirect dependency approach with the truth requirement added to it:

- (46) a. jaun kyaa soctaa hai ki merii kis-se baat karegii
 John what think-PR that Mary who-INS talk do-F
 b. $\lambda p \exists q [\exists x [\forall q \wedge q = \text{will-talk}'(m,x)] \wedge \forall p \wedge p = \text{think}'(j,q)]]$

Now, take a situation in which Mary does not, in fact, talk to Bill, but John thinks she does. Intuitively, we want the proposition $\text{John thinks that Mary will talk to Bill}$ to be allowed into the denotation of the question but the truth conditions in (46) rule it out. Here, *that Mary will talk to Bill* will be assigned as the value of the variable *q*, bound by the scope marker. Now, there are two places where truth will be checked. The truth requirement in the matrix clause will be satisfied since it is the truth of *p*, *that John thinks q*, that will be checked. The complement too will only include those propositions that are true and so here, *that Mary will talk to Bill* will not be in the

complement propositional set. Thus *q* will not satisfy the first condition and the proposition *John thinks Mary will talk to Bill* will be prevented from entering the denotation of the question, an incorrect result. Given the soundness of Karttunen's motivation for including truth into the semantics of questions and the results of the semantics for scope marking we have seen, there is clearly a need to reconcile the two.

Let us take the meaning of questions to be the set of possible answers to it, as proposed by Hamblin. We can easily define the notion of the true answer to a question as a function from the set of possible answers denoted by the question to that subset of propositions in it that are true:²⁰

$$(47) \quad \text{Ans}(Q) = \lambda p [p \in Q \wedge \forall p]$$

It seems plausible enough to suggest that to wonder about a question is really to wonder what the answer to that question is. To tell a question is to tell the answer to that question. For one question to depend on another is really for the answer to one question to depend on the answer to the other question. And so on, for all the cases discussed by Karttunen. That is, we maintain all of Karttunen's results but by assuming that the shift from the set of possible answers to the set of true answers is licensed by being in the scope of certain verbs. In particular, intensional verbs will not license this shift while extensional verbs will. Thus *John wondered who came* will translate as *wondered'(j, $\text{Ans}(\lambda p \exists x [p = \text{came}(x)])$)* which will not entail that if Bill came, John wondered whether Bill came. *John told Sue who came*, on the other hand, will translate as *told'(j, s, $\forall \text{Ans}(\lambda p \exists x [p = \text{came}(x)])$)*. Since *tell* is extensional, the members of the answer set in the actual world will be accessible, accounting for the inference in (45).

Turning now to scope marking structures, we can see that nothing special need be said about them. Since the actual complement is not embedded under the verb, it will always denote the set of all possible answers, not just the true ones.²¹ Since the set of true answers is

²⁰ The answerhood condition will be revised in Chapter IV. The revised version will be shown to be compatible with the view that questions denote propositions rather than sets of propositions (Groenendijk and Stokhof 1984 and Jacobson 1995).

²¹ I thank Irene Heim and Angelika Kratzer for pointing out that once Karttunen's truth requirement is built into the embedded position rather than into the question denotation, the problem with scope marking is resolved automatically.

relevant only in embedded contexts, the availability of the set of all possible answers in the case of scope marking simply follows from the syntactic representation of scope marking.

In this subsection I have argued for the need to reconcile the Hamblin-style semantics required for scope marking structures with the Karttunen-style semantics required for cases like (45). One way of doing this, I have suggested, is by making a distinction between a question, which determines the set of possible answers, and an answer, which includes only the true propositions. Although the definition of $Ans(Q)$ will be modified in Chapter IV, the basic idea that question-embedding predicates uniformly denote relations mediated by $Ans(Q)$ will be maintained.

CONCLUSION

In this chapter I have analysed scope marking structures as a standard instantiation of finite complementation in Hindi. Although answers to scope marking structures specify values for the embedded wh, I have demonstrated that a principled way of assigning wide scope is not tenable. I have further argued that wide scope assignment leads to the incorrect prediction that scope marking and extraction structures are equivalent. Defining a compositional semantics on LF representations that respect locality in scope assignment, I have shown, derives the right distinctions between scope marking and extraction. The analysis of scope marking as indirect wh dependency shows that the right account of the semantics of questions is the one presented in Hamblin (1973). The insights in Karttunen (1977) about the truth requirement in questions is built into the answerhood conditions. In the next chapter we turn to another phenomenon that seems to challenge the claim of locality in assignment of scope to Hindi wh in-situ.

CHAPTER IV

LONG-DISTANCE LIST ANSWERS

INTRODUCTION

In this chapter I focus on the availability of long-distance list answers in Hindi. Such answers are normally analyzed as involving scope interaction between a matrix and an embedded wh. Since LF wh movement out of finite complements is blocked in Hindi, an explanation along these lines is obviously not feasible for it. I show that there are two distinct sources for long-distance lists, neither of which require us to compromise locality in scope assignment. They can arise when the embedded wh is D-linked, in the sense of Pesetsky (1987). However, they display locality effects that cannot be captured in a treatment of D-linking as unselective Q-binding. The alternative I propose treats the finite complement as a quantificational expression that interacts scopally with the matrix wh. The selectional properties of question embedding verbs and the semantic type of the indirect question, I show, account for a number of facts that would otherwise be problematic. Long-distance answers also have a second source which is dependent on plurality. In these cases, long-distance lists represent a cumulative reading of the question and there is no issue of scope interaction. The alternatives developed for Hindi, I argue, are applicable cross-linguistically since they do not appeal to aspects of grammar that are subject to parametric variation. This claim is of particular significance since the possibility of long-distance list answers has proved a powerful diagnostic for LF movement out of wh-islands. The alternatives presented here undermine conclusions based on this diagnostic since they show that answers can list values for matrix and embedded wh while assigning local scope to each.