clauses that are syntactically higher than the DP they are supposed to modify at D-structure. Hindi correlatives, I have claimed, argue for a more traditional view of restrictive relativization at the NP level. This is contrary to standard assumptions where correlatives are taken as the primary motivation for restrictive relativization at the DP level. It seems to me that the conclusions reached on the basis of empirical considerations allow for a more straightforward mapping from syntax to semantics, and are therefore to be preferred on theoretical grounds as well. Finally, I have shown that the left-adjoined relative enters into an operator-variable relation with the main clause DP and I have presented evidence to show that this relationship respects locality. In the next chapter I take a closer look at the semantics of correlatives, making precise the nature of the particular operator-variable relation argued for here.

CHAPTER VI

RELATIVE CLAUSES AS DEFINITES

INTRODUCTION

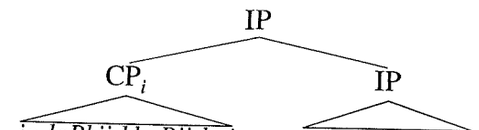
The focus of this chapter is the semantics of correlatives. It takes as its point of departure the claim in Chapter V that a relative clause left-adjoined to IP is coindexed with a DP in the main clause and that this instantiates an operator-variable relation. In this chapter the semantics associated with this relation is made explicit. Treating the relative clause as a generalized quantifier and the main clause DP as a variable, I show how the two combine via standard rules of quantification. I also introduce here the phenomena of multiple wh correlatives, structures in which more than one wh expression in the relative clause is coindexed with the corresponding number of demonstratives in the main clause. I show that single wh and multiple wh correlatives have behavior parallel to single wh and multiple wh questions. By extending the semantics for questions developed in Chapter IV, I account for the uniqueness/maximality effects in single wh correlatives and the functional relations in multiple wh correlatives. I then show how tense and aspect impacts upon these interpretations. Finally, I connect correlatives with relative clauses with similar semantics in other languages. The main point I establish in this chapter is that relative clauses in natural language function not only as noun modifiers and appositives but also as definites. Correlative-like structures, though syntactically unusual, are semantically common across languages. English free relatives and internally-headed relatives in Quechua, Lakhota and Japanese, for example, all display uniqueness/maximality effects.

1. A SEMANTICS FOR CORRELATIVES

1.1. *Quantifier Adjunction in Correlatives*

Let us begin our discussion of the semantics of correlatives by noting that it instantiates a canonical quantificational structure. Consider the structure of correlatives proposed in Chapter V:

(1)



"Which girl is standing, she is tall."

Here the relative clause occurs in the position where quantified noun phrases are interpreted. That is, a correlative instantiates at D-structure the configuration that quantificational structures in other languages are assumed to instantiate at LF. There are two aspects of this structure that I want to briefly comment on. One is the assumption that the relative clause is a CP, as opposed to an IP or DP. The other is the assumption that the relative clause adjoins at the level of IP. The goal of this section is to show that a plausible semantics for correlatives can be given under the view that the relative clause is a generalized quantifier that binds the variable inside IP.

The evidence that the relative clause is a CP rather than an IP comes from the fact that relative wh expressions have the typical behavior associated with operators. In (1), for example, *jo laRkii* "which girl" can be analyzed as originating inside IP where case and theta role assignment are satisfied and raising to spec of CP for interpretation. Since Hindi is an in-situ language, the question that arises in this connection is whether raising occurs at S-structure or LF. Though wh expressions in Hindi do not typically occur clause-initially in questions, they do tend to occur clause-initially in relative clauses. It is not clear, however, whether this S-structure movement is a result of scrambling or an instance of wh movement to Spec of CP. For one thing, the tendency for wh fronting is much weaker in the case of correlatives than in embedded or right-adjoined relatives. That fronting is optional in correlatives is shown by the acceptability of (2):

(2) *raam jis laRkii-se milaa* anu **us**-ko jaantii hai
Ram which girl-INS meet-P Anu her-A know-PR
"Which girl Ram met, Anu knows her."

Since wh fronting is not obligatory, it can plausibly be taken to be an instance of scrambling, that is adjunction to IP, rather than movement to Spec of CP. However, it can be shown that the behavior of wh epxressions in relative clauses is parallel to the behavior of wh expressions in questions. Fronting is obligatory if a wh expression occurring inside a finite complement is required to take scope over a higher clause:

(3) *jis laRkii-se ravi soctaa hai ki raam milaa*
which girl-INS Ravi think-PR that Ram meet-P
anu **us**-ko jaantii hai
Anu her-A know-PR
"Which girl Ravi thinks that Ram met, Anu knows her."

The wh expression *jis laRkii* "which girl" has the postposition *-se* which the object of the verb *milnaa* "to meet" usually has. Moreover, the predicate *socnaa* "to think" has no theta role to assign to it so it must be an argument of the embedded verb. As we saw in Chapter II, Hindi is a language in which a wh expression inside a finite complement can only have narrow scope if it remains in situ but if it is moved at S-structure it may have wide scope. S-structure wh movement in questions is, of course, due to topicalization and involves adjunction to IP. As such, it does not provide direct evidence of movement to Spec position. To the extent that relative clauses pattern with questions, however, we have indirect evidence that wh expressions in correlatives are wh operators that must move to Spec position at LF in order to be interpreted.

I assume, then, that the relative clause is a CP and further that it is not dominated by DP. Presumably, the kind of clausal adjunction we see in correlatives is due to the Case Resistance Principle (Stowell 1981) that disallows CP's from appearing in case positions. A dominating DP would license the occurence of relative clauses in argument positions. We will see some cases of correlatives with a dominating DP in section 2.4 but I want to emphasize here that it is possible for them to be bare CP's.

Consider next the fact that the relative clause is adjoined to IP, rather than CP. This is supported by the order of relative clauses and topicalized sentential objects. Consider (4) in which the sentential object has been topicalized:

(4) kaun aayegaa us-ko maalum hai
who come-F she-D known be-PR
"Who will come, she knows."

Assuming that topicalization involves IP adjunction, we can test where a left-adjoined relative, coindexed with a demonstrative inside IP, would appear. (5a) is entirely natural while (5b) is somewhat marginal:

(5) a. kaun aayegaa *jo* *laRkii vahaaN rahtii hai*
who come-F which girl there live-PR
us-ko maalum hai
she-D known be-PR
"Who will come, which girl lives there, she knows."

b. ?*jo* *laRkii vahaaN rahtii hai* kaun aayegaa
which girl there live-PR who come-F
us-ko maalum hai
she-D known be-PR
"Which girl lives there, who will come she knows."

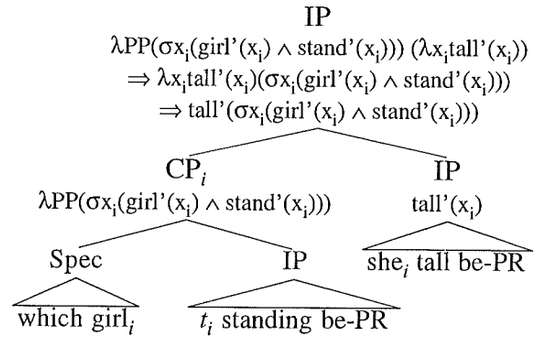
Since the relative clause most naturally occurs after the topicalized phrase, one can conclude that the relative clause in a correlative construction is adjoined to IP and not CP.

I have suggested here that the relative clause has to be a CP, even though Hindi does not have overt wh movement, on the basis of the similarity between questions and relative clauses. And I have shown that the relative clause attaches at the level of IP since it is positioned close to it. Though these facts are not conclusive, the appeal of this proposal is that it posits a structure for correlatives which is very amenable to a semantic analysis in terms of generalized quantifiers, as we will see next.

1.2. *Uniqueness/Maximality in Correlatives*

Let us make the standard assumption that structures of the form [QP_i IP] are translated as [Q(uantifier)$_i$ λx_i IP'] (see Bittner 1994a for discussion). The challenge in interpreting structures like (1) then reduces to deciding what kind of quantifier the relative clause denotes and determining how the right meaning can be derived. The intuition we want to capture here is that the relative clause picks out a unique individual and the main clause asserts something about this individual. The right truth conditions can be derived by treating the relative clause in (1), for example, as the set of properties of the unique individual who satisfies the common noun and the predicate in the relative clause, something like (6):

(6)

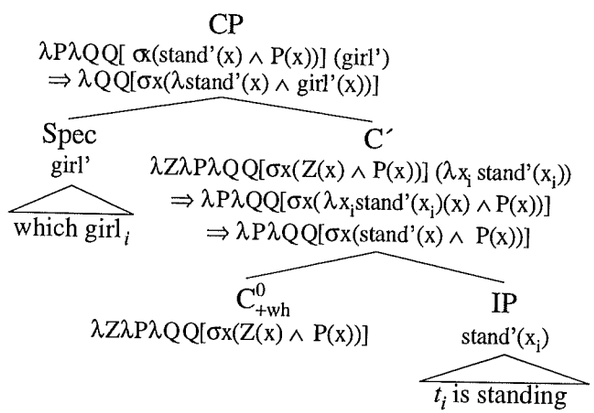


The relative clause in (6) denotes the set of properties of the unique maximal individual who is a standing girl: *λPP[σx(girl'(x) ∧ stand'(x))]*. The main clause denotes the property of being tall: *λx(tall'(x))*. The sentence is true just in case the property of being tall is one of the properties of the standing girl. The right truth conditions can be derived, we see, by applying standard rules of quantification to the syntactic tree in (6), once the relative clause is interpreted as a definite.[1]

Let us turn our attention, then, to the relative clause and see how its meaning is built up. The basic idea I want to propose is that a relative clause interpreted like a quantifier differs from ordinary quantifiers in that its first argument is the intersection of two sets rather than one basic set. That is, the common noun and the predicate inside the relative clause jointly determine the set the quantifier lives on. There are a number of ways one might implement this, and I will suggest here that a wh operator marks the C^0 with the +wh feature, triggering the following meaning: *λZλPλQQ[σx(Z(x) ∧ P(x))]*. That is, it denotes the set of properties of the unique maximal individual who is in the intersection of its first two arguments. This gives us the following derivation for the relative clause in (6), where the wh expression *which girl* is interpreted as an ordinary set-denoting expression and the trigger of the *+wh* feature:

[1] Note, incidentally, that the meaning we get here is equivalent to the meaning we would get if the relative clause were treated as a noun modifier (cf. Chapter V, section 1.2). As we will see, however, the present approach blocks the unavailable readings that an approach in terms of noun modification is unable to do.

(7)



An immediate consequence of this approach to correlatives is that it generalizes to those cases where the relative clause has plural morphology:

(8) a. *jo laRkiyaaN khaRii haiN* **ve** lambii haiN
which girls standing be-PR they tall be-PR
"Which girls are standing, they are tall."

b. tall'(σx$_i$(*girl'(x$_i$) ∧ stand'(x$_i$))

(9) a. *jo do laRkiyaaN khaRii haiN* **ve**$_i$ lambii haiN
which two girls standing be-PR they tall be-PR
"Which two girls are standing, they are tall."

b. tall'(σx$_i$(*girl'(x$_i$) ∧ two'(x) ∧ stand'(x$_i$))

Intuitively, (8a) asserts of all standing girls that they are tall. This is captured here via the maximality operation associated with definites. The difference between singular and plural relative clauses is simply that the former is restricted to atomic individuals while the latter includes atomic as well as sum individuals. Although the relative clause still picks out a unique individual, if the predicate is distributive it will hold of all its atomic parts, resulting in a quasi-universal reading. When there is a numeral inside the relative clause, as in (9a), the intuition is that exactly that number of individuals are picked out by the relative clause. This is captured in the present approach by the fact that the numeral specifies the number of atomic parts in the unique maximal individual. Here, for example, it ensures that the

maximal individual has exactly two atomic parts and we get the correct interpretation.[2]

There are cases where a universal reading is not available for relative clauses with plural morphology. In (10), for example, the main clause has a predicate which holds of the plural individual as a whole but not of its parts:

(10) *jo laRkiyaaN khaRii haiN* ve bahane haiN
which girls standing be-PR they sisters be-PR
"The girls who are standing are sisters."

Since the predicate forces a collective reading, the distribution to the atomic parts is blocked. Thus the view that the relative clause is a kind of definite correctly yields the shift from a definite to a quasi-universal reading in some cases but not in all. The fact that correlatives are not truly ambiguous between definite and universal readings, but still seem to allow for both readings, is thus captured in the present account.[3]

To sum up so far, I have suggested that a generalized quantifier meaning for the relative clause can be obtained by taking a C^0_{+wh} in a relative clause to be a function which takes as its first arguments the predicates inside the relative clause and the common noun and yields the set of properties of the maximal individual who satisfies both predicates. The CP, being a generalized quantifier, combines readily with IP, a property-denoting category, by standard rules of quantification.

1.3. *Some Properties of Correlatives Revisited*

What I have proposed here, in effect, is that relative wh expressions are ambiguous. They can be ordinary lambda operators that abstract over the position inside the relative clause that they are coindexed with. That is, they can abstract over their trace position to give a set-denoting term. Alternatively, they can have a generalized quantifier meaning. This second meaning is the one that is crucially triggered

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[2] See Chapter IV, section 2 for related discussion. Briefly, if there are three standing girls *a*, *b* and *c*, there will be three sum individuals with two atomic parts *a*+*b*, *a*+*c* and *b*+*c*. There will then be no maximal individual with two parts and the relative clause will fail to denote anything.

[3] Jacobson (1995) provides a similar solution for the variation between universal and definite readings of free relatives, which we will discuss in section 4.

by the presence of a common noun internal to the wh expression. This ambiguity, it seems to me, yields a very natural account of the distribution of internal heads.

Recall from Chapters V that left-adjoined relatives can have internal heads while right-adjoined and embedded relatives cannot. The following contrast with the examples considered above:

(11) a. *__vo__ **(laRkii)** lambii hai *jo laRkii khaRii hai*
that girl tall be-PR which girl standing be-PR

b. *__vo__ **(laRkii)** *jo laRkii khaRii hai* lambii hai
that (girl) which girl standing be-PR tall be-PR
"That girl which girl is standing is tall."

If internally-headed relative clauses can only have generalized quantifier interpretations, they obviously cannot intersect with the denotation of the common noun as is required for noun modification. They can, however, combine with the denotation of an IP with a free variable inside. The examples in (11) instantiate noun modification structures and are unacceptable because the relative clause, being internally headed, denotes something of the wrong type. In the case of correlatives, relative clauses are always interpreted as generalized quantifiers. If there is an internal head, it provides one of the arguments in building up the set that the quantifier lives on. If there is no internal head, there is a free variable in the relevant position whose content is contextually fixed.

Recall also the demonstrative requirement in correlatives, shown most clearly by the contrast in acceptability between bare DP's that are definite and those with overt demonstratives. The relevant examples are repeated below:

(12) a. *jo khaRii hai* **vo laRkii** lambii hai
who standing be-PR that girl tall be-PR
"Who is standing, that girl is tall."

b. **jo khaRii hai* **laRkii** lambii hai
who standing be-PR girl tall be-PR
"Who is standing, the girl is tall."

I assume that the basic difference between a definite with a demonstrative and a bare definite is that the latter does not have a free variable in its denotation. The IP in (12a) translates as $tall'(\sigma y(girl'(y) \wedge y=x_i))$, while the IP in (12b) translates as $tall'(\sigma x_i(girl'(x_i)))$. In the first case, a property-level meaning can be obtained by abstracting over x_i. This can then combine with the translation of the CP $\lambda PP[\sigma x(C'(x) \wedge stand'(x))]$, that is, the property

set of the maximal entity who is standing. This results in the following: $\lambda PP[\sigma x(C'(x) \wedge stand'(x))]\ (\lambda x_i tall'(\sigma y(girl'(y) \wedge y=x_i)))$. One application of lambda conversion yields $\lambda x_i tall'(\sigma y(girl'(y) \wedge y=x_i))[\sigma x(C'(x) \wedge stand'(x))]$ A second application yields $tall'(\sigma y(girl'(y) \wedge y=\sigma x(C'(x) \wedge stand'(x))))$. This says of the maximal individual y who is a girl and is identical to the maximal standing individual that she is tall. The value of the free variable is fixed by the relative clause instead of deictically. A similar derivation for (12b) is not possible since there is no free variable in the IP denotation to enable the CP and IP meanings to combine.

Similar explanations can be given for the difference between (13a) and (13b):

(13) a. *jo laRkiyaaN khaRii haiN* **ve do**$_i$ lambii haiN
which girls standing be-PR those two tall be-PR
"Which two girls are standing, they are tall."

b. **jo laRkiyaaN khaRii haiN* **do**$_i$ lambii haiN
which girls standing be-PR two tall be-PR
"Which two girls are standing, they are tall."

The IP in the first case denotes $tall'(\sigma y(two'(y) \wedge y=x_i))$, ascribing the property of being tall to the maximal sum individual with two parts who is identical to some individual x_i. If the value of x_i is not set deictically, it can get bound as in the case of (12a). Following the same steps in the derivation we end up with the following as the translation of (13a): $tall'(\sigma y(two'(y) \wedge y=\sigma x(*girl'(x) \wedge stand'(x))))$. This says of the maximal sum individual with two parts, identical to the maximal individual who is a standing girl, that she is tall. It is predicted, on a par with (12b), that (13b) will be uninterpretable, this time because the IP contains an existentially quantified DP $\exists x[two'(x) \wedge tall'(x)]$. Crucially, there is no free variable in the representation to enable the interpretation to proceed.[4]

The translations given above show that the presence of the common noun inside the relative clause or its IP correlate does have an impact on meaning, though this may not be obvious. Compare the translations for the following versions:

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[4] Grosu and Landman (1995) provide a compatible but distinct semantics for these structures. The substantive difference has to do with the fact that they combine the meanings of the main clause DP and the relative clause and then combine the resulting meaning with the IP denotation. This seems to me somewhat problematic as a general procedure for interpreting correlatives from the syntactic point of view. Admittedly though, I have not had an opportunity to study their proposal in any depth.

(14) a. *jo laRkii khaRii hai* **vo** lambii hai
which girl standing be-PR she tall be-PR
tall'(σx(girl'(x) ∧ stand'(x))

b. *jo laRkii khaRii hai* **vo laRkii** lambii hai
which girl standing be-PR that girl tall be-PR
tall'(σy(girl'(y) ∧ y = σx(girl'(x) ∧ stand'(x))))

c. *jo khaRii hai* **vo laRkii** lambii hai
who standing be-PR that girl tall be-PR
tall'(σy(girl'(y) ∧ y=σx(C(x) ∧ stand'(x))))

(14a) and (14b) are equivalent. (14a) says that the unique individual who is a standing girl is tall while (14b) says that the unique individual who is a girl identical to the unique standing girl is tall. (14c) has somewhat different truth conditions. It says of the unique individual who is a girl identical to the unique individual who has some contextually salient property and is standing that she is tall. Now, the truth conditions will depend on the value of *C*. Obviously, this property must be compatible with girlhood or no individual will be able to satisfy the conditions. If the property in question is included in girlhood, say if the conversation is about first graders, the relative clause will be able to denote even if there is more than one standing girl. If the conversation is about all females, girls and women, the relative clause will be undefined if more than one girl is standing. While the semantics leaves open the possibility for the contextual variable to denote subsets or supersets of the set denoted by the common noun in the correlate, it is more natural to have the contextual variable denote a superset. (15a) seems more natural than (15b):

(15) a. *jo laRkaa khaRaa hai* **vo chaatr** tez hai
which boy standing be-PR that student smart be-PR
"Which boy is standing, that student is smart."

b. *jo chaatr khaRaa hai* **vo laRkaa** tez hai
which student standing be-PR that boy smart be-PR
"Which student is standing, that boy is smart."

In (15a), uniqueness is crucially guaranteed by the relative clause. The common noun in the main clause DP provides further information about the individual picked out. In (15b) the correlate DP cannot serve this purpose. There is no semantic problem in interpreting the sentence but there is something pragmatically odd about it.

To sum up this section, I have presented an account of correlatives in which the relative clause is a generalized quantifier over maximal individuals who satisfy the two predicates in the relative clause. This

combines with the IP denotation which is interpreted as a property by abstracting over the free variable that the relative clause is coindexed with. This has the advantage of accounting for the variation between definite readings of relative clauses with singular morphology vs. universal readings of relative clauses with plural morphology using standard notions of maximality/uniqueness. This approach also yields a simple explanation for the distribution of internal heads and the demonstrative requirement in correlatives.

2. MULTIPLE WH CORRELATIVES

2.1. *The Phenomenon of Mutliple Wh Correlatives*

In this section I want to introduce the phenomenon of multiple wh correlatives and show how the approach to correlatives developed on the basis of single wh correlatives can be extended to account for it. A multiple wh correlative is one in which the relative clause has a number of wh expression in it, each one of which has a correlate DP in the main clause. Consider, for example, a case with two such dependencies:

(16) *jis laRkii-ne$_i$ jis laRke$_j$ -ke saath khelaa*
which girl-E which boy with play-P
us-ne$_i$ **us**-ko$_j$ haraayaa
she-E he-A defeated
"Which girl played with which boy, she defeated him."

Such structures are typologically unusual and I will try first of all to convey their meaning informally before trying to show how these meanings can be derived.[5]

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[5] It goes without saying that relative clauses with more than one wh expression cannot occur in embedded positions. It follows that they would not occur in right adjoined positions since such relatives derive from embedded relatives:

(i) ***us laRkii-ne$_i$ us laRke-ko$_j$** bulaayaa
that girl-E that boy-A called
jis-ne$_i$ jis-ko$_j$ dekhaa
who-E who-A see-P

I should mention though that sometimes right-adjoined sentences are accepted by speakers. Usually, they do not have more than two linked elements and do not contain internal or external heads, i.e. common nouns with the wh or the correlate. There is also an intonational break between the clauses. I take these

Andrews (1985) suggests the following algorithm for making the meaning of multiple correlatives accessible to English speakers. A correlative can be translated, according to him, by replacing the wh expression with an indefinite and recasting the relative clause as a conditional. Adopting the approach of Lewis (1975), Kamp (1981) and Heim (1982), one might view the wh expressions as variables bound by an implicit universal quantifier. (16), for example, could be analyzed as having a translation like (17) where the quantifier binds the two free variables represented by the wh expressions and their correlates:

(17) $\forall_{x,y}$ [girl'(x) $\wedge$ boy'(y) $\wedge$ played-with'(x,y)] [defeated'(x,y)]

(17) says that for all pairs of girls and boys, such that the girl played with the boy, she defeated him. This is a plausible first rendering of the meaning of (16).

Thinking of correlatives as having quantificational structures of the same kind as conditionals has intuitive appeal since it establishes the multiple anaphoric links the structures seem to call for. In spite of this, an approach in these terms is not tenable since correlatives and conditionals encode fundamentally different dependencies. In a correlative construction the number of wh expressions must match the number of demonstratives anaphoric to them. This, of course, is not true of conditionals:

(18) a. **jo laRkii$_i$ jis laRke$_j$ -ke saath khelegii*
which girl which boy with play-F
vo$_i$ jiit jaayegii
she win-PERF-F
"Which girl plays with which boy, she will win".

b. agar koii laRkii kisii laRke -ke saath khelegii
if some girl some boy with play-F
vo jiit jaayegii
she win-PERF-F
"If a girl plays with a boy, she will win."

Further, note that moving to an analysis of correlatives in terms of universal quantification would not yield the right results for single wh correlatives. The definite reading of relative clauses with singular morphology as well as the absence of a universal reading when the

to be marginal constructions in which the main clause has been fronted. At this point, however, I do not have an account of the constraints on such fronting.

main clause predicate is collective would both be lost. What we need is a different approach to the phenomenon of multiple wh correlatives, one that would be compatible with the results obtained in connection with single wh correlatives. In order to so, let us take a closer look at the meaning of single and multiple wh correlatives.

A good understanding of the meaning of correlatives can be conveyed by comparing them to questions. Recall from Chapter IV that single wh questions can be thought to vary between definite and universal readings. That is, questions like (19a) presuppose that a unique boy would be named in the answer while questions like (19b) expect an answer to name all the boys that came. (19c) is neutral between these two possibilities:

(19) a. Which boy came?
b. Which boys came?
c. Who came?

The proposed approach to questions exploits quantification over maximal plural individuals to obtain these readings in a uniform manner. The analysis of single wh correlatives is similar in this respect.

Turning to multiple wh questions, we noted that the relations they encode are functional in nature. That is, a question like (20a) presupposes that every girl played with a unique boy but not that every boy played with a girl. Similarly, (20b) can be answered with a list naming two boys who both read the same book: *John and Bill both read* War and Peace but it cannot be answered with a list naming a boy who read two books *John read* War and Peace *and* The Idiot.

(20) a. Which girl played with which boy?
b. Which boy read which book?

The situation with multiple wh correlatives is fully parallel. A correlative like (16) presupposes a contextually salient set of girls who all played with some unique boy. It is not required that all the boys in the context played with a girl. Similarly, a correlative like (21) may assert of two boys who both read the same book that they wrote about it. It is not compatible with a situation in which a single boy read two books and wrote about both of them:

(21) *jis laRke-ne jo kitaab paRhii*
which boy-E which book read-P
us-ne us par lekh likhaa
he-E it on essay write-P
"Which boy read which book$_j$ he wrote an essay on it."

As in the case of questions, the intuitions are subtle but clear. There is exhaustivity on the subject wh expression and the relations between subject and object term can be one-one or many-one but not one-many. That is, multiple wh correlatives have functional readings just like multiple wh questions. In the next section I will extend the analysis of correlatives developed in section 1.3 to accommodate the functional readings of multiple wh correlatives.[6]

2.2. *A Functional Approach to Multiple Wh Correlatives*

The basic idea I want to propose is that a multiple wh correlative encodes functional dependencies between wh expressions just as multiple wh questions do. The relative clause in (16), for example, would have an LF like (22a) in which the object term leaves a functional trace whose a-index is bound by the subject term. That is, the subject determines the domain of the function and the object its range. The binding cannot be reversed since that would lead to a WCO violation, in the sense of Chierchia (1991, 1993):

(22) a. $[_{CP}$which boy$_j$ $[_{CP}$which girl$_i$ $[_{C'}C^0_{+wh}$ $[_{IP}t_i$ played with $t^i_j]]]]$

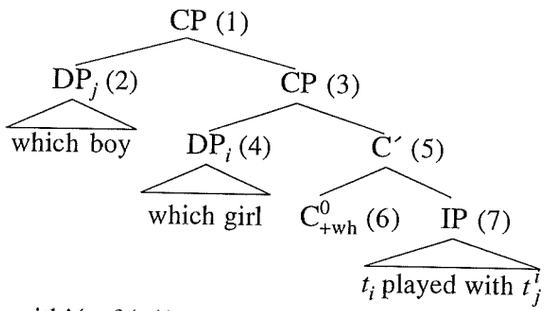
b. *$[_{CP}$which boy$_j$ $[_{CP}$which girl$_i$ $[_{C'}C^0_{+wh}$ $[_{IP}t^j_i$ played with $t_j]]]]$

In order to interpret such structures, I assume that C^0_{+wh} of a multiple wh relative clause denotes a set of relations, as opposed to a set of properties. And that this set is determined by the relations that hold between members of the domain set and those of the range set. The whole sentence is true if the relation denoted by the main clause is included in this set.

The LF in (22a), under this approach, can be translated as (23). Since we are dealing with functions now, C^0_{+wh} takes three, not just two, arguments to build the meaning of the generalized quantifier. The wh expressions trigger this meaning but are otherwise interpreted as ordinary indefinites (see Chapter IV, section 2 for discussion in connection with questions):

[6] I would like to thank Vijay Gambhir and Roli Lall for help with the data on Hindi correlatives.

(23)



(7) play-with'(x_i,f_j(x_i))

(6) $\lambda X \lambda Y \lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = Y \wedge \forall y[Z(f(y))] \wedge \forall y \in Y [X(y)(f)]] \wedge \forall y \in Y\ R(y,f'(y))]$

(5) $\lambda X \lambda Y \lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = Y \wedge \forall y[Z(f(y))] \wedge \forall y \in Y [X(y)(f)]] \wedge \forall y \in Y\ R(y,f'(y))]$ $(\lambda x_i[\lambda f_j[$play-with'$(x_i,f_j(x_i))]])$
$\Rightarrow \lambda Y \lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = Y \wedge \forall y[Z(f(y))] \wedge \forall y \in Y$ [play-with'$(y,f(y))]] \wedge \forall y \in Y\ R(y,f'(y))]$

(4) girl'

(3) $\lambda Y \lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = Y \wedge \forall y[Z(f(y))] \wedge \forall y \in Y$ [play-with'$(y,f(y))]] \wedge \forall y \in Y\ R(y,f'(y))]$ (girl')
$\Rightarrow \lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = \text{girl}' \wedge \forall y[Z(f(y))] \wedge \forall y \in$ girl' [play-with'$(y,f(y))]] \wedge \forall y \in$ girl' $R(y,f'(y))]$

(2) boy'

(1) $\lambda Z \lambda R \exists f'[f' = \iota f[\text{Dom } f = \text{girl}' \wedge \forall y[Z(f(y))] \wedge \forall y \in$ girl' [play-with'$(y,f(y))]] \wedge \forall y \in$ girl' $R(y,f'(y))]$ (boy')
$\Rightarrow \lambda R \exists f'[f' = \iota f[\text{Dom } f = \text{girl}' \wedge \forall y[\text{boy}'(f(y))] \wedge \forall y \in$ girl' [play-with'$(y,f(y))]] \wedge \forall y \in$ girl' $R(y,f'(y))]$

Note that the relative clause denotes the set of relations determined by a unique function. While there may be many functions between girls and boys, there is only one that is relevant here, namely the one that verifies the *play* relation. The uniqueness condition is needed to capture the intuition that a multiple wh relative clause picks out pairs of individuals who are not in a one-many relation.[7] In order for CP to combine with the main clause, it is now necessary that the main clause denote a relation. This can be accomplished if both variables in the main clause are abstracted over *λxλy defeated'(x,y)*. The whole structure will be true just in case the set of relations denoted by the CP includes the relation denoted by the IP. The meaning of multiple

[7] Recall that in the case of questions this was was built into the answerhood conditions.

correlatives, we see, is essentially the same as that of single wh correlatives but generalized to the case of functional dependencies. For the sake of uniformity we might adjust the interpretation of single wh relative clauses to refer to unique 0-place functions. The denotation of C^0_{+wh} would be $\lambda Z \lambda P \lambda Q \exists f[f=\sigma x(Z(x) \wedge P(x)) \wedge Q(f)]$, giving the following $\lambda Q \exists f[f=\sigma x[(girl'(x) \wedge stand'(x)) \wedge Q(f)]$ as the meaning of the relative clause in (6). This is equivalent to the version developed in section 1. Alternatively, one might introduce plurality in the domain of functions to get the same effect (see Bittner 1996 and Sharvit (forthcoming) for relevant discussion).

2.3. *Some Implications*

An immediate advantage of this approach to correlatives is that the matching requirement between wh expressions and demonstratives is accounted for. In a sentence like (18a), for example, there is only one variable position in the IP denotation. Abstracting over this position yields a property but the multiple wh relative denotes a set of two-place relations. The structure is therefore predicted to be uninterpretable.

While the matching requirement is explained, there is another fact about multiple wh correlatives that bears further discussion. The functional dependency in the relative clause is mirrored in the main clause. So, for example, (16) cannot be interpreted as *Which girl played with which boy, he defeated her*, even though Hindi pronouns are neutral with respect to gender. That this is not a pragmatic effect is shown by the following, where the only available interpretation is the pragmatically deviant one where the doctors pay the patients:

(24) *jis DaakTar-ne jis mariiz-ko dekhaa*
which doctor which patient see-P
us-ne us-ko paisaa diyaa
he-E he-D money give-P
"Which doctor saw which patient, he gave him money."

In order to account for these facts one might consider changing the relation *R* in the relative clause to be a function from individuals to a set of functions. The relevant condition in the denotation would be *R(y)(f')*. The two DP's in the IP would have to be interpreted as an individual variable and a functional variable, with lambda abstraction taking place in a fixed order $\lambda x \lambda f$ *defeated'(x,f(x))*. Note that this requires a further assumption. A subject-object asymmetry has to be ensured in the main clause as well. This may be motivated if the correlates are also taken to encode functional dependencies (see

Sharvit (forthcoming) for other cases of functional dependencies in relative clauses). They would then yield configurations that may lead to WCO violations. Interestingly, the option of treating correlates as operators has been argued for on independent grounds by Izvorski (1995).[8]

Further evidence that bears on the order of binding comes from the fact that neither variable in a multiple correlative can occur inside a partitive, as shown by the ungrammaticality of (25):

(25) **jinho-ne jin-ko dekhaa* **un**-meN-se ek-ne
who-E who-A see-P them-PART one-E
un-meN-se ek-ko pasand kiyaa
them-PART one-A like-P
"Who saw whom, one of them liked one of them."

In order for the demonstrative inside the subject of the main clause to functionally bind the demonstrative in the object, c-command has to obtain. This does not happen here since the potential binder is embedded inside the noun phrase. The sentence is predicted to be ungrammatical.[9]

Before concluding this discussion, I would like to address a potential counterexample to the matching requirement that the account in terms of generalized quantifiers captures. McCawley

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[8] Alternatively, one might assume a syntactic explanation in terms of the Path Containment Condition (Pesetsky 1982) for the restriction on ordering. The LF representation of (24), under the disallowed interpretation, would be the following:

(i) $[_{IP}[_{CP_i}$*who-A*$_j$ *who-E*$_i$ t_i t_j *saw*$][_{IP}$**he-E**$_j[_{VP}$**he-D**$_i$ gave money]]

Following standard practice, if we raise the subject first and adjoin the object later, the CP will carry the index of the subject wh term. We then get the following paths for the two wh expressions and their correlates. Path of j = {CP$_i$ IP IP}; Path of i = {IP IP VP}. According to the PCC, if two paths share a segment one must be contained in the other (see also May 1985). Here the two paths share the segment {IP IP} but neither contains the other. Note, that in the allowed reading the path of j = {CP$_i$ IP IP VP} properly contains the path of i = {IP IP}. I leave the choice between an account in terms of WCO requiring raising of the correlates and an account in terms of the PCC open.

[9] Take the subject in the main clause to be DP$_1$ and the object to be DP$_2$. Either the path of j will be {CP$_i$ IP IP VP DP$_2$} and the path of i {IP IP DP$_1$}. Or the path of j will be {CP$_i$ IP IP DP$_1$} and the path of i {IP IP VP DP$_2$}. PCC is violated in both cases.

(1992) notes that the following is acceptable with a plural demonstrative linked to both wh expressions:

(26) *jo laRkii jis laRke-se baat kar rahii hai*
which girl which boy-INS talk do-PROG-PR
ve ek saath sinemaa jaayeNge
they together movie go-F
"Which girl is talking to which boy, they will go to the movies together."

While it is true that this sentence is grammatical, it does not allow for multiple pairings. So, for example, it does not mean that for every pair of a girl and a boy who are talking, they will go out together. Rather, it means that there is a unique girl and a unique boy who are talking and will go out together. It also seems to me that this is only possible if, in fact, the pair of individuals are contextually salient. As further confirmation of this fact, a single correlate is ugrammatical when the tense forces a generic reading:

(27) **jo laRkaa jis laRkii-se pahle miltaa hai*
which boy which girl-INS first meet-PR
ve shaadi kar lete haiN
they marriage do-PR
"Which boy meets which girl first, they get married."

I take the absence of the multiply-paired reading in cases like (26) to show that an independent functional reading for multiple correlatives is available in the general case. But that reading is only possible if the main clause can also denote a relation. What (26) shows is that a multiple relative clause can also be used to refer to a unique pair of individuals in the contextual domain. I assume that just as in the case of questions, it is possible to have a non-functional interpretation for C^0_{+wh}. In that case, a unique pair of individuals becomes available and the sum of this pair becomes the antecedent for the plural correlate in the main clause (see also Grosu and Landman 1995 for discussion of this phenomenon).

Finally, recall from Chapter V that a relative clause must bind a variable locally. This is also true of multiple correlatives. Consider (28), adapted from Wali (1982):

(28) **jis-ne*$_i$ *jis-ko*$_j$ *dekhaa* **us-ne**$_i$ kahaa ki **vo**$_j$ aayegaa
who-E who-A see-P she-E said that he come-F
"Who saw who, she said that he will come."

In order to bind the correlate in the higher IP the relative clause must be adjoined to it. In order to locally bind the correlate in the lower IP, however, the relative clause would have to be adjoined to the lower IP at D-structure. Further movement to the higher position would be possible but its trace would connect it to the lower clause. The competing requirements of the two bindees cannot be met by a single multiple relative clause.

To sum up the discussion of multiple wh correlatives, I have given an account of their semantics that is consistent with the account of single wh correlatives. The differences between the two are parallel to the differences between multiple and single wh questions. I have also discussed a number of facts that follow from this approach to correlatives, most significant of which is the matching requirement between wh expressions and demonstratives. I hope also to have demonstrated that multiple wh correlatives, though seemingly complex, are fully amenable to a principled analysis.

2.4. *Quantifier Adjunction to DP's*

I have argued so far that correlatives involve adjunction of the relative clause to IP, multiple correlatives providing incontrovertible proof of this. In this section I want to note that it is also possible to have correlatives which involve adjunction to DP. Wali (1982) points to the following paradigm:

(29) a. kaun ayii?
who come-P
"Who came?"
jo laRkii vahaaN rahtii hai **vo**
which girl there live-PR she
"Which girl lives there, she."

b. kis-ne kis-ko pasand kiyaa?
who-E who-A like do-P
"Who liked who?"
jis-ne jis-ko dekhaa* **us-ne us-ko
who-E who-A see-P he-E he-A
"Who saw whom, he him."

According to Wali (1982), if the question in (29a) is given a short answer using a correlative construction, it must necessarily contain a demonstrative. The question in (29b), on the other hand, cannot be given a short answer in which demonstratives are present. On this basis, she argues that a single wh correlative must have the relative

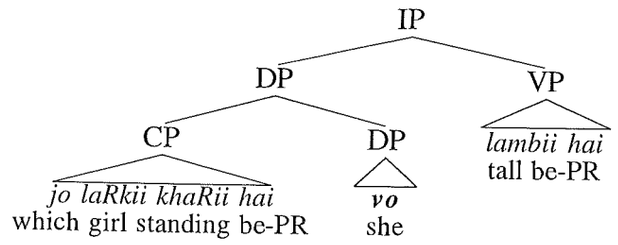
clause adjoined to the correlate DP. Consequently, she is forced to consider it distinct from a multiple wh correlative where such adjunction is not possible.[10] But this, it seems to me, misses the basic similarity between the two types of correlatives. Ideally, one would like to account for the facts in (29) without giving up the insight that all left-adjoined structures have something in common.

There is, however, an even stronger argument than (29a) for Wali's claim that the relative clause forms a constituent with the noun in the main clause. Consider (30):

(30) *jo$_i$ aaye* **un-kaa$_i$** kaam
who come-P they-G work
jo$_j$ gaye **un-ke$_j$** kaam-se behtar hai
who leave-P they-G work than better be-PR
"Who came, their work is better than who went, their work." (="The work of those who came is better than the work of those who left.")

In (30) there are two relative clauses construed with two arguments in the main clause. That we are dealing with a correlative construction can be established by applying the diagnostics from Chapter V. For example, the relative clause can have an internal head and so can the main clause correlate. Further, the main clause DP must contain a demonstrative. Clearly, DP adjunction, in addition to IP adjunction, must be recognized as a possibility in correlative constructions. This is not problematic syntactically but its semantics needs to be considered. In order to do so let us take a simple case:

(31)



Which girl is standing she is tall."

[10] It should be noted that some speakers accept the answer to (29b), i.e. a short answer can be given using a multiple wh relative and two demonstratives. Naturally, it is not possible to treat the relative clause and the two NPs as one constituent. I consider such an answer to involve a null V. That is, the answer in (29b) would have the form *[[wh wh V] [dem dem e]]* where e is a null V.

Adopting a suggestion by Gennaro Chierchia (personal communication), we might treat such cases using Rooth's (1985) semantics for crosscategorial quantification. The meaning of the CP $\lambda P \exists f[f=\sigma x(girl'(x) \wedge stand'(x)) \wedge P(f)]$ could combine with the meaning of the DP $\lambda Q Q(x_i)$ in the following way. The DP meaning is made into something of predicative type by adding a property variable to it $\lambda Q Q(x_i)(Z)$ and then abstracting over the individual variable $\lambda x_i[\lambda Q Q(x_i)(Z)]$. After lambda conversion we get $\lambda x_i Z(x_i)$. This is of the right type to be an argument to the CP meaning. We thus get $\lambda P \exists f[f=\sigma x(girl'(x) \wedge stand'(x)) \wedge P(f)](\lambda x_i Z(x_i))$. After lambda conversion, we get $\exists f[f=\sigma x(girl'(x) \wedge stand'(x)) \wedge \lambda x_i Z(x_i)(f)]$. Another application of lambda conversion yields $\exists f[f=\sigma x(girl'(x) \wedge stand'(x)) \wedge Z(f)]$. A generalized quantifier is obtained by abstracting over the property variable Z which remains after lambda conversion, thus giving us $\lambda Z \exists f[f=\sigma x(girl'(x) \wedge stand'(x)) \wedge Z(f)]$ as the denotation of the topmost DP. That is, the quantified noun phrase in (31) denotes the set of properties of the unique individual who is a girl and is standing. This is of the proper semantic type to function as the subject of the main clause. Essentially, what we have done here is to mimic the IP adjunction structure in the semantics by adding a property variable to the denotation of the DP. In this way, the semantics for correlatives with IP adjunction is extended to correlatives with DP adjunction without a substantive shift in perspective.

3. APPARENT EXCEPTIONS TO UNIQUENESS

3.1. *QVE in Correlatives*

In the preceding sections I have argued for an analysis of correlatives as definites and have built in uniqueness/maximality into its meaning. In this section I would like to discuss two apparent exceptions to the uniqueness requirement in correlatives and show that in each case, the absence of uniqueness effects can be explained by the interaction of the tense and aspect of the sentence with the definiteness of the relative clause.[11]

The first phenomenon that seems to call in question an analysis of the relative clause as a definite is the existence of quantificational variability effects (QVE) in correlatives. Consider the following where

[11] I draw here on the discussion in Dayal (1995a). I would like to acknowledge helpful comments by Angelika Kratzer and Barbara Partee. The essential ideas remain unchanged but there are differences of detail, specially in relation to PSI licensing discussed in section 3.2.

the morphology in the relative clause ensures a singular definite reading for it:

(32) *jo laRkii mehnat kartii hai* vo aksar safal hotii hai
which girl effort do-PR she often successful be-PR
"Which girl makes an effort, she is often successful."

Under one interpretation, (32) says of the unique girl in the context who works hard that she is oftentimes successful. This is the expected adverbial reading. Under another interpretation, however, it says of most girls who work hard that they are successful. This latter reading is the variable reading which is not expected under the view that the relative clause picks out a unique individual.

Berman (1989, 1991) accounts for QVE in embedded questions like (33a) by treating wh expressions as variables that can be bound by the adverb of quantification. (33b) says that (33a) will be true if the number of smart students known to Prof. Jones exceeds the number of smart students unknown to her:

(33) a. Prof. Jones mostly/usually knows which students are smart.

b. $MOST_x$ [student'(x) $\wedge$ smart'(x)] [know'(j,^student'(x) $\wedge$ smart'(x))]

As Berman notes, there must be at least three individuals who satisfy the restrictive clause in (33b) in order for the quantifier *MOST* to be defined. QVE is predicted to be unavailable, under this approach, if a unique individual satisfies the restriction.

This prediction, however, is not correct. (34a)-(34b) allow for QVE even though the embedded question denotes a unique individual:

(34) a. Prof. Jones mostly/usually knows which student is the smartest.

b. Prof. Jones mostly/usually likes the student who is the smartest in the class.

Similarly, (35) shows that QVE may not be available even if several individuals satisfy the restriction. (35) is simply ungrammatical:

(35) *Yesterday between 3 and 4, Prof. Jones mostly/usually found out which students cheated on the exam.

What seems to be crucial to QVE in these cases is the possibility of a habitual or generic reading for the sentence, not the number of individuals who satisfy the conditions in the wh complement. Given this, the availability of a QVE reading for (32) does not argue against an analysis of the wh complement as a singular definite.

The crucial role that genericity plays in QVE can also be demonstrated for Hindi correlatives by taking into account two types of the verb "to be", *hai* and *hotaa hai*. The first yields primarily an epistemic reading, the second only a generic reading.[12] Consider (36a)-(36b), both with singular morphology. The verb in the relative clause varies between the epistemic and the generic:

(36) a. *jo laRkii tez hai* **vo aksar** safal hotii hai
which girl smart be-PR she often successful be-PR

b. *jo laRkii tez hotii hai* **vo aksar** safal hotii hai
which girl smart be-PR she often successful be-PR
"Which girl is smart, she is often successful."

In (36a) the verb form is *hai* and it is a statement about the unique girl in the relevant world who is smart. In (36b), the verb form is *hotii hai* and it is a generic statement about girls who are smart. (36b) but not (36a) has a variable reading, clearly showing that genericity is the critical factor in obtaining QVE.

Similarly, QVE effects show up in multiple correlatives when a generic interpretation is possible. Compare (37a) with (37b):

(37) a. **jis laRkii-ne jis laRke-ko sabse pahle dekhaa*
which girl-E which boy-A of-all first see-P
us-ne usii-ko aksar pasand kiyaa
she-E he-EMPH-A often like do-P
"Which girl saw which boy first of all, she often liked him."

b. *jo laRkii jis laRke-ko sabse pahle dekhtii hai*
which girl which boy-A of-all first see-PR
vo aksar **usii-ko** pasand kartii hai
she often he-EMPH-A like do-PR
"Which girl sees which boy first of all, she often likes him."

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12 In some cases, *hai* can support a generic reading though the epistemic is preferred. For clarity of exposition I will focus on the epistemic reading here, comparing it to structures with *hotaa hai* which cannot be interpreted epistemically.

In (37a) the tense is episodic and QVE is ruled out. The sentence is unacceptable because the adverbial reading is not compatible with the meaning of the predicate. In (36b) the tense is generic and QVE is available.

The distinction that we seem to be faced with in these examples is similar to the distinction between what Kadmon (1987) calls "one-case" vs. "multi-case" conditionals. As Heim (1990) points out, theories committed to uniqueness presuppositions handle one case conditionals in a straightforward way by evaluating them only in those epistemically accessible worlds where uniqueness is maintained and ignoring the rest. Multi-case conditionals, however, are a problem since uniqueness presuppositions seem to be absent. However, it is possible to maintain uniqueness while still allowing enough flexibility to deal with "multi-case" conditionals if adverbs quantify over situations rather than individuals. Berman (1987), drawing on Kratzer (1989a), takes such an approach to embedded wh complements. The basic idea exploited is that situations are parts of worlds, not to be equated with space-time chunks. Thus a world can be composed of smaller parts, namely situations, though it does not have to be. Only individuals who uniquely satisfy the restrictive clause count in the evaluation of truth value but since more than one situation can exist, the uniqueness requirement can be satisfied relative to a situation. This allows for a uniqueness requirement to be maintained while letting, in effect, multiple individuals satisfy the restrictive clause (see also Chierchia 1988, 1992 and Kratzer 1989b for relevant discussion). I assume an explanation along these lines for Hindi correlatives which show an apparent lack of uniqueness effects. I want to emphasize though that such quantification is incompatible with episodic interpretations (cf. 37 above).

Given what we have seen here, then, QVE in correlatives does not warrant a change in the analysis of relative clauses as definites. Rather, correlatives provide further evidence against an approach to QVE in terms of quantification over individuals and in favor of quantification over situations.[13]

[13] Lahiri discusses QVE in the absence of generic interpretations with adverbials like *for the most part*:

(i) For the most part John liked Beethoven's fifth symphony.

QVE here, according to Lahiri, is due to amount quantification over parts. Hindi adverbs, like *jyaadaatar* "mostly", fall in with amount quantification.

3.2. *PSI/FC Items in Correlatives*

Let us turn now to a second phenomenon where the uniqueness presupposition seems to be missing from correlatives. In Chapter II, section 3.2 the polarity sensitive item *bhii* was introduced and shown to have parallel behavior to English *any*. In the example in (38) its presence inside the relative clause coincides with the loss of the singular definite reading for the relative clause. Instead what we get is the Free Choice reading associated with *any* or the morpheme *-ever* which occurs in free relatives:

(38) *jo-bhii laRkii mehnat kartii hai* **vo safal** hotii hai
whichever girl effort do-PR she successful be-PR
"Whichever girl makes an effort, she is successful."

Note, however, that the absence of the definite reading is dependent on a generic interpretation of the sentence. The tense-aspect in (39) does not admit such a reading and uniqueness is maintained. The presence of *-bhii* here signals that the identity of the unique individual picked out by the relative clause is unknown or unimportant (see Dayal 1995a for more data separating out the two readings of *-bhii*):

(39) jo-*bhii laRkii vahaaN khaRii hai*
whichever girl there standing be-PR
vo ravi-kii dost hai
she Ravi-G friend be-PR
"Whichever girl is standing there, she is Ravi's friend."

We might therefore summarize the situation in the following way. Uniqueness effects in definites are always dissipated if the tense and aspect of the sentence supports a generic interpretation. The absence of uniqueness in correlatives with the PSI item *-bhii* is triggered not by the presence of this item but by genericity. Again, there is no need to give up an analysis of the relative clause as a definite.

A question that may legitimately be asked, of course, is what contribution *-bhii* makes to the meaning of the correlative. Ideally, one would like to characterize its impact in a way that the two readings we see in (38) and (39) follow in a pricipled manner. One might, of course, take *-bhii* to be ambiguous between FC and identity readings but that simply begs the question of why generic tense should support the first reading and episodic tense the second. I assume that the behavior of *-bhii* in correlatives can be accommodated within the approach to PSI/FC items suggested in Dayal (1995b). Drawing on ideas in Kadmon and Landman (1993), I argue there that items like

any are not basic determiners but attach to noun phrases with their own properties. I depart from Kadmon and Landman in allowing such items to attach to universals as well. I further show there that this addition introduces modality in the nominal domain. I suggest that the licensing of such items is governed by a requirement that the domain of quantification not be contextually specified. In order to deal with correlatives I would like to claim that unlike English *any*, Hindi *-bhii* also attaches to definites, correlatives being the case in point. The licensing requirement in the case of definites is satisfied by the fact that when the tense-aspect picks out a unique individual, the identity of that individual not be known. When the tense-aspect allows a generic reading, uniqueness is lost anyway. There are no specific (unique) individuals under discussion and *-bhii* implies that the statement holds of all individuals who may satisfy the relative clause.

I have shown here that the absence of uniqueness effects in correlatives is always due to a generic interpretation of the sentence. Since there are independent reasons, presented in sections 1 and 2, for treating the relative clause as a definite I suggest that the apparent loss of uniqueness effects be explained in terms of the relation between tense/aspect and definites rather than by giving up the independently motivated analysis of relative clauses.

4. RELATIVES AS DEFINITES ACROSS LANGUAGES

4.1. *Free Relatives*

In the preceding sections I have argued for an analysis of correlatives in which relative clauses are generalized quantifiers denoting the property set of a unique individual. In this section I turn to the cross-linguistic applicability of this approach to relative clauses. Drawing on free relatives and internally-headed relatives I will show that they share the fundamental property of definiteness with the Hindi relative clauses under discussion.

A recent analysis of English free relatives, in fact, treats them in a way essentially similar to the analysis of correlatives I have developed here. Jacobson (1995) notes that English free relatives show a variation between definite and universal readings and argues against the view that they are lexically ambiguous, as was proposed by Cooper (1983):

(40) a. I ordered what(ever) he ordered.
b. Do what(ever) the babysitter tells you to.

Briefly, she analyses them as predicative terms which type-shift, in the sense of Partee and Rooth (1983) and Partee (1987), into DP-type meanings. The specific operation used is the iota type-shifting rule which maps a property into the unique individual with that property if there is one and is undefined otherwise. Combined with a theory which includes plural individuals, this ensures that a free relative will denote a unique maximal individual. Since English free relatives normally do not contain internal heads, they do not specify singular or plural individuals and come out as being ambiguous between definite and universal readings. As we saw, correlatives, too, vary between these readings but the presence of internal heads helps to disambiguate between the two. The similarity between correlatives and free relatives is further evidenced by the fact that free relatives also show QVE (Kratzer 1988) and the morpheme *-ever* in free relatives varies between FC and identity readings on a par with Hindi *bhii*.

The parallel between English free relatives and Hindi correlatives with respect to definiteness is further shown by the paradigm in (41) and the Hindi example in (42):

(41) a. I didn't like what Sue ordered.
b. I didn't like the things Sue ordered.
c. I didn't like everything Sue ordered.

(42) *jo ciizeN anu-ne mangaayiiN*
which things Anu-E ordered
ve mujh-ko nahiiN pasand aayiiN
them I-D not like come-P
"Which things Anu ordered, I didn't like them."

While the three sentences in (41) have roughly the same meaning, neither (41a) nor (41b) can be continued with ... *but I liked most of them* while (41c) can. Hindi (42) also does not allow such a continuation. These facts follow in analyses that treat the relative clauses in these constructions as definites of some kind.[14]

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[14] It is worth pointing out, in this connection, that Hindi seems to make rather extensive use of correlatives compared to the use of free relatives in English. This could correlate with the fact that Hindi does not have a lexical item corresponding to *the*. While definite descriptions are an alternative to free relatives in English, no such alternative to correlatives exists in Hindi. This would be a functional explanation for the observed cross-linguistic difference in frequency.

The basic difference between Jacobson's analysis of free relatives and the analysis of correlatives presented here is the following. On Jacobson's account, the free relative denotes a unique maximal individual while on my account left-adjoined relatives denote the property set of such an individual. The variation between unique/universal readings is captured in both accounts. The real motivation for treating correlatives as generalized quantifiers comes from multiple wh correlatives discussed in section 2. Treating the wh expressions as denoting unique maximal individuals would not account for the fact that they allow for multiple pairings between individuals. A uniform account of multiple and single wh correlatives is possible under the generalized quantifier approach.

The difference between Jacobson's analysis of free relatives and my analysis of correlatives makes an interesting prediction, as pointed out to me by Polly Jacobson. It is well known that appositive relatives occur with proper names and definites but not with quantifiers:

(43) a. John/The man, who is a doctor, knows what to do.
b. *Every man, who is a doctor, knows what to do.

I assume that appositives adjoined at the DP level are well defined if the entity denoted by the head is a member of the set denoted by the relative clause. (43a), for example, has the following structure $[_{DP}[_{DP}John][_{CP}who\ is\ a\ doctor]]$, where the relative clause denotes the set of doctors and it is assumed that John is a member of this set. If English free relatives denote individuals but Hindi left-adjoined relatives denote qeneralized quantifiers, it is predicted that only the former will accept appositives. This prediction seems to be borne out:

(44) a. John ate what Mary ordered, which incidentally was delicious.
b. **jo us-ne pakaayaa*, jo bahut swaadishT thaa,
what she-E cook-P what very tasty was
vo anu-ne khaa liyaa
that Anu-E eat-PERF-PR
"What she cooked, which was very tasty, Anu has eaten it."

We have seen, then, a number of respects in which Hindi correlatives are similar to English free relatives and noted one difference that follows from the difference in their semantic type. We have not, however, paid sufficient attention to syntactic differences between the two. For example, free relatives are dominated by DP while correlatives are base generated in adjoined positions. The

option of multiple relativization of the kind discussed in section 2 is obviously not available in free relatives. Another difference is that Hindi correlatives can be internally headed while English free relatives typically do not contain such heads, though sometimes they may (Andrews 1985).[15] The point I have focused on is their similarity with respect to semantic characteristics having to do with definiteness.

4.2. *Internally-Headed Relatives*

Let us turn now to internally-headed relative clauses found in languages such as Quechua, Lakhota or Japanese. They have generally been taken to be typologically distinct from correlatives, though there is considerable overlap between the two (Keenan 1985, Cole 1987, Williamson 1987 and Culy 1990).[16] Here I will try to show that definiteness is one property common to both.

Correlative constructions, as we have seen, are also internally headed. However, the defining characteristic of languages with internally-headed relatives is that the relative clause occurs in argument positions and typically does not have a wh expression. An example from Ancash Quechua, taken from Cole (1987), illustrates this fact:

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[15] I have suggested in section 1.3 that the presence of internal heads triggers a generalized quantifier interpretation for the relative clause. I am not sure if the reduced possibilities of internal heads in English can be ascribed to the fact that they are derived from predicative terms.

[16] Bambara, for example, was traditionally thought to have internally-headed relatives but a closer investigation shows them to be closer to correlatives. The following were provided by Mai Wright:

(i) Deni mi djolen file o (deni) ka djan
girl which is standing that girl is tall
"Which girl is standing, that (girl) is tall".

(ii) Denu mun djolen file bula fila ka djan
girls who are standing PART two are tall
e to fila ka surun
the rest two are short
"Which girls are standing, two of them are tall and the other two are short."

As in Hindi, Bambara (i) allows the common noun to be repeated in the main clause. In (ii) we see that indefinite quantification requires a partitive construction on a par with Hindi. This fits in with recent classifications of Bambara as having correlatives (Keenan 1985 Culy 1990).

(45) nuna bestya-ta ranti-shqa-n
man horse-ACC buy-PERF-3
alli bestya-m ka-rqo-n
good horse-VALIDATOR be-PAST-3
"The horse that the man bought was a good horse."

Cole has argued for an LF representation of Quechua internally-headed relatives that would make it parallel to Quechua externally-headed relatives on the grounds that the same semantic rule could interpret both (Cole 1987:298). However, in Srivastav (1991d) I argued that, in fact, internally-headed relatives have a distinct semantics from externally headed relatives. (46) adds a numeral to the example in (45):

(46) nuna ishkay bestya-ta ranti-shqa-n
man two horse-ACC buy-PERF-3
alli bestya-m ka-rqo-n
good horse-VALIDATOR be-PAST-3
"The two horses that the man bought were good horses."

According to Don Sola (personal communication) the relative clause now entails that the total number of horses bought by the man is two. So, for example, the sentence could not be continued with "*...and two were bạd.*" In the corresponding externally-headed relative there would be no such entailment and the continuation would be felicitous. The correlation with Hindi relative clauses is obvious.

Similar effects can be demonstrated for Japanese internally-headed relatives. The following is attributed by Grosu and Landman (1995) to Watanabe (1991):

(47) [john-ga nagai ronbun-o kaita-no-ga]
John-NOM long paper-ACC wrote-NM-NOM
LI-ni notta
LI-LOC appeared
"The /*a long paper that John wrote appeared in LI."

Though Quechua and Japanese give clear evidence of the fact that internally-headed relative clauses are definites, Lakhota is a language in which internally-headed relatives have been claimed to be indefinites. The following are from Williamson (1987):[17]

[17] Williamson focuses on the fact that the common noun inside the relative clause cannot have a strong determiner in the sense of Milsark (1974). Williamson's explanation for this is based on the given-new distinction (Heim 1982). An indefinite being new information is compatible with the meaning of a restrictive relative clause. A definite, on the other hand, is familiar and presupposes the content of its predicate. According to her, "this property is at variance with the meaning of restrictive RCs, for if the head is already familiar to the hearer, further specification by the RC is, at best, unnecessary." This is not further developed by her. It seems to me though that the effect observed by Williamson might be amenable to a different analysis. Hindi internally-headed relatives also do not allow strong determiners, as shown below:

(i) jo *vo/*dono/*sab/do/kuch ciizeeN
which that/both/all/two/few things
"Which *that/*both/*all/two/few things"

For Hindi the indefiniteness restriction is easily explained by the fact that the wh determiner occupies the position of strong determiners (Abney 1987). If the claim that I forward here is on the right track, an account similar to Hindi may be given for the restrictions in Lakhota. For example, there may be a null element in the relevant position blocking the presence of strong determiners. And if the maximalization operation in internally-headed relative clauses is defined on set-denoting constituents, the restriction to weak determiners would follow.

(48) a. $[_{DP_i}[_{IP}$ Mary [owiza wa]$_i$ kage] ki] he ophewathu
Mary quilt a make the DEM I-buy
"I bought the quilt that Mary made."

b. $[_{DP_i}[_{IP}$ Mary [owiza wa]$_i$ kaga] cha] he ophewathu
Mary quilt a make IND DEM I-buy
"I bought a quilt that Mary made."

Grosu and Landman (1995) suggest that Lakhota internally-headed relatives are typologically distinct in not having the maximalization operation that would result in a definite reading.

I would like to challenge here this view of Lakhota internally-headed relatives on the basis of examples like the following:

(49) *Mary [owiza wa]$_i$ kaga cha he ophewathu
Mary quilt a make IND DEM I-buy
na Bill kho Mary [owiza wa]$_i$ kaga cha he ophethu
and Bill also Mary quilt a make IND DEM he-buy
"I bought a quilt that Mary made, and Bill bought a quilt that Mary made too."

According to David Rood (personal communication), the Lakhota informant he interviewed would not accept (49). The only construction she would accept to convey the intended meaning had

the form *Mary made two blankets. I bought one and Bill bought one.* This seems to me to show quite clearly that indefinite readings of internally-headed relatives are not generally available.[18]

Let me note in closing that some of the other facts discussed by Williamson will transfer over to a treatment in which the internally-headed relative denotes a maximal individual. For example, facts about the scope of negation and internally-headed relatives are maintained. An indefinite with scope inside negation and a definite with scope outside negation converge in their semantics. I would also like to point out that an analysis of internally-headed relative as definite is also supported by the presence of the pronominal that follows the relative, glossed by Williamson as DEM. She notes in a footnote that this pronominal may also follow simple DP's but it does not follow non-referring relative clauses or noun phrases. This suggests that it makes a semantic contribution that is compatible only with definites. This, combined with the unacceptability of (49), suggests that the claim of definiteness in internally-headed relatives also applies to Lakhota. Since I do not have access to native speakers, however, I must leave this as a promising line of inquiry.

I have tried to show here that the difference between correlatives and free relatives or internally-headed relatives is syntactic. The primary difference noted for Hindi is that they appear in adjoined positions. I have ascribed this to the Case Resistance Principle of Stowell (1981) and assumed that Hindi simply lacks the structure $[_{DP}\ CP]$ that would allow relative clauses to occur in argument positions. I have shown that these differences notwithstanding, Hindi left adjoined relatives share with relative clauses functioning as arguments in other languages the semantic property of definiteness.

CONCLUSION

I have argued on language-internal evidence that in Hindi correlatives, the relative clause is not a noun modifier but a quantifier binding a variable inside the main clause. In this chapter I have given an explicit semantics for the relative clause, arguing that it can denote the property set of the maximal individual picked out by the predicates

[18] Thanks to Harold Wilcox, John E. Koontz, Robert van Valin and David Rood for crucial information on Lakhota (see also Rood 1973). I owe the facts discussed in relation to (49) to David Rood. Robert van Valin comments that he found the internally-headed relative in (48b) somewhat odd and that in his own work he has only come across instances of definites. Perhaps, the examples of indefinite relatives given by Williamson are really cases of specific indefinites.

inside it. Relative clauses, so defined, can enter into local relationships with IP's or DP's via standard rules of quantification.

The advantage of treating a correlative construction in these terms becomes evident in the case of multiple wh correlatives. Such multiple dependencies remain recalcitrant in standard accounts since the relative clause meaning cannot be reconstructed into more than one argument position simultaneously. The approach developed here, however, treats multiple wh relatives as encoding functional dependencies. The relative clause denotes the set of relations that hold between members of the domain and range of the relevant function. It can therefore combine with an IP that denotes a relation. Correlatives, then, provide supporting evidence for conclusions reached in Chapter IV on the basis of our investigation into the semantics of questions. There is a systematic shift from uniqueness/maximality in single wh constructions to functional dependencies in in multiple wh constructions.

While multiple wh relatives are typologically unusual, the existence of relative clauses that display uniqueness/maximality effects is not a marked phenomenon in natural language. English free relatives are another instantiation of relative clauses having such interpretations. Internally-headed relative clauses in non-correlative languages like Quechua, Lakhota or Japanese also have properties that can only be explained under the view that their denotation is sensitive to uniqueness/maximality. A central claim that I have advanced here, then, is that relative clauses can function as noun phrases cross-linguistically and when they do, they are semantically definite.