CONCLUSION

In this chapter, I have explored the semantics of questions and argued that questions denote sets of propositions, though echo and D-linked multiple wh questions may denote sets of sets of propositions. Question-embedding verbs uniformly combine with sets of propositions via $Ans(Q)$. In the case of extensional verbs, $Ans(Q)$ picks out the maximally true proposition. The truth requirement is not built into the question denotation but is introduced by $Ans(Q)$.

A possible answer to a question is constrained by the number marking on the wh expression. Single wh questions with singular morphology denote propositions naming atomic individuals while those with plural morphology denote propositions with plural individuals. This accounts for uniqueness/maximality effects. Multiple wh questions encode functional dependencies. Each possible answer exhaustively pairs the members of the domain of the function. In the absence of functional dependencies a multiple wh question denotes propositions naming single pairs of individuals, yielding the REF-Q reading. While list answers involve functional dependencies in the case of mutliple wh and questions with quantifiers, they derive from a cumulative reading of individual answers in the case of questions with plural definites.

I have also argued against the standard view that long-distance list answers indicate matrix scope of embedded wh in-situ and presented alternatives that interpret all wh expressions in the clause where they occur at S-structure. The apparent conflict between the absence of wide scope readings of wh in-situ and the existence of long-distance lists. in a language like Hindi is thereby resolved. I have argued that these alternatives are needed cross-linguistically by presenting evidence from a number of languages that is problematic for standard approaches. This approach to long-distance lists appeals to universal semantic properties and is predicted to apply universally.

To sum up our investigation into Hindi questions, we have seen, in the case of scope-marking as well as long-distance list answers, that the heuristic of using specification of values as an indicator of syntactic scope is flawed. In each of these cases, principled alternatives to matrix scope assignment of embedded wh were shown to provide greater empirical coverage. Specification of values in the answer has, however, been standardly used to establish syntactic scope. This has proved particularly powerful in the case of wh in-situ, where it is taken as evidence of LF movement in violation of subjacency. The approach argued for here shows that a reappraisal of claims about the nature of LF is needed and we will return to this issue in Chapter VII. The next two chapters enlarge the domain of inquiry by focusing on relative clauses in Hindi and issues of locality having to do with them.

CHAPTER V

RELATIVIZATION STRUCTURES IN HINDI

INTRODUCTION

We now turn to a consideration of relativization structures in Hindi, which are distinguished by the fact that relative clauses readily occur at the periphery of the main clause. As mentioned in chapter I, central to the issue of locality here is the relation between the adjoined relative clause and the main clause DP with which it is construed. The basic thesis I advance is that there are two different types of relativization involved. While right-adjoined relatives are noun modifiers, left-adjoined relatives are generalized quantifiers. Though they enter into different relations with the nominal in the main clause, locality is respected in each case.[1]

I begin this chapter by introducing Hindi relativization structures, noting their implications for a compositional semantic interpretation. I then present syntactic and semantic evidence distinguishing left-adjoined and right-adjoined relatives. I show that the properties of right-adjoined relatives follow from the standard analysis of relative clauses as originating inside the DP they modify and optionally extraposing to the right. Using the difference between left-adjoined and right-adjoined relatives as evidence, I argue for an alternative syntactic analysis of left-adjoined relatives in which they are base-generated in adjoined positions. I demonstrate that such relative clauses are not interpreted as noun modifiers but as operators that A´ bind a variable.

1. ADJOINED RELATIVE CLAUSES

1.1. *Hindi in the Typology of Relativization*

Hindi relativization structures are known in typological literature by the name of correlatives (see, for example, Keenan 1985, Downing 1973, Andrews 1985). The chief characteristic associated with correlative constructions is the possibility of having the relative clause at the periphery of the main clause.[2] Other languages known to have correlatives are Hittite (Raman 1973, Bach and Cooper 1978, Cooper 1979) and Walpiri (Hale 1976, Larson 1982) as well as other South Asian languages like Bangla (Dasgupta 1980, Bagchi 1994) and Marathi (Junghare 1973 and Wali 1982). The Hindi examples in (1) illustrate the basic features of relativization in these languages. The relative clause appears in italics and the noun phrase to which it is linked is in boldface:

(1) a. *jo   khaRii   hai*   **vo laRkii** lambii hai
       who standing be-PR that girl   tall   be-PR

   b. **vo laRkii** lambii hai   *jo   khaRii   hai*
      that girl   tall   be-PR who standing be-PR

   c. **vo laRkii** *jo   khaRii   hai*   lambii hai
      that girl   who standing be-PR tall   be-PR

   "The girl who is standing is tall".

In (1a) the relative clause precedes the head, in (1b) and (1c) it follows it. In (1b) the relative clause occurs after the verbal complex and must be analysed as adjoined to IP or CP. It is not immediately obvious whether (1a) instantiates a similar adjunction on the left since the word order is also compatible with an analysis in which the relative

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[2] Hindi also allows non-finite relative clauses, which precede their heads, as demonstrated below:

(i)   maiN-ne *naacte hue*   **ek laRke**-ko dekhaa
       I-E   dance PCPL one girl-A   see-P
       "I saw a dancing girl" (= a girl who was dancing)

(ii)   maiN-ne **ek** *naacte hue*   **laRke**-ko dekhaa
       I-E   one dance PCPL girl-A   see-P
       "I bought a dancing doll" (= doll that can dance)

The relative clauses here agree in number, gender and case with the head. Presumably, the position to the left of the head is a case position and this bars finite relatives from appearing there. I do not discuss these relatives here.

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clause is contained within the DP. That this is not the case is shown by examples in which a left-adjoined relative clause is construed with a non-topicalized DP in object position (Donaldson 1971).

(2)   *jo   vahaaN khaRii   hai*   raam **us larRkii-ko** jaantaa hai
       who there   standing be-PR Ram that girl-A   know-PR

   "Ram knows the girl who is standing there."

The distribution of relative clauses in Hindi contrasts with English where the relative clause typically occurs next to the head although it may appear at the right periphery of the main clause.[3] There is a clear difference between Hindi and English in the possibility of a left-adjoined relative clause. These facts are illustrated in (3):

(3) a.   The man who wanted to meet you has left.
    b.   The man has left who wanted to meet you.
    c.   *Who wanted to meet you the man has left.

The ability of relative clauses to appear at either edge of the clause may therefore be taken as the defining characteristic of languages with correlatives.

Let me mention in this connection that the freedom of positioning enjoyed by Hindi relative clauses is not due to scrambling. Scrambling of elements within each clause is, of course, possible but it can be shown that the position of the relative clause with respect to the main clause is fixed. The sentences in (4) instantiate clause-internal scrambling and are acceptable with appropriate intonation:

(4) a.   *khaRii   hai   jo*   **vo laRkii** hai   lambii
          standing be-PR who that girl   be-PR tall

    b.   lambii **vo laRkii** hai   *jo   hai   khaRii*
         tall   that girl   be-PR who be-PR standing

    c.   **vo laRkii** *khaRii   hai   jo*   hai   lambii
         that girl   standing be-PR who be-PR tall

    "The girl who is standing is tall."

Note, however, that in each case the relative clause is either at the periphery of the main clause or right-adjacent to the head noun. That

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[3] An intonation break between the clauses may be needed to make extraposition structures completely acceptable in English. See McCawley (1992) for some other observations about the difference in extraposition possibilities in the two languages.

the relative clause cannot occur in other positions is shown by the following examples:[4]

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

   b.   *vo laRkii lambii *jo gayii* hai
      that girl tall   who leave-P be-PR
      "The girl who left is tall."

We know from (4b) that it is possible for a DP to intervene between the main verb and the auxiliary. (5a) shows that a relative clause cannot occur in this position. (5b) establishes that this is not due to any awkwardness caused by the repetition of the auxiliary *hai* but is a general feature of right-adjoined relatives. (6) demonstrates the same fact with respect to the possibility of placing a relative clause modifying an indirect object between the direct object and the verb:

(6) a.   anu **us laRkii-ko**
      Anu that girl-D
      jo vahaaN khaRii hai kitaab degii
      book give-F who there standing be-PR

   b.   anu kitaab **us laRkii-ko**
      Anu book that girl-D
      jo vahaaN khaRii hai degii
      who there standing be-PR give-F

   c.   *anu **us laRkii-ko** kitaab
      Anu that girl-D book
      jo vahaaN khaRii hai degii
      who there standing be-PR give-F

      "Anu will give the book to the girl who is standing there."

(6a) instantiates what is taken to be the basic word order for triadic verbs in Hindi. (6b) shows that the indirect object can occur after the direct object. (6c) establishes that it is not possible to move just the relative clause to this position. If the adjoined position of the relative clause in Hindi were due to scrambling, we would expect greater

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[4] It is harder to show this effect for left-adjoined relatives. I will establish its peripheral position on the basis of other evidence in the discussion to follow.

freedom of positioning than seen in (5)-(6) since scrambling allows constituents to move to non-peripheral sites.

     A somewhat indirect argument against the view that the variation in (1) is a reflex of scrambling comes from non-restrictive or appositive relatives. As in English, non-restrictive relatives in Hindi can modify proper names and are accompanied by an intonational break. Unlike restrictive relatives, however, these relatives must be adjacent to the head:

(7) a.   *jo khaRii hai **anu** lambii hai
      who standing be-PR Anu tall   be-PR

   b.   ***anu** lambii hai *jo khaRii hai*
      Anu tall   be-PR who standing be-PR

   c.   **anu** *jo khaRii hai* lambii hai
      Anu who standing be-PR tall   be-PR
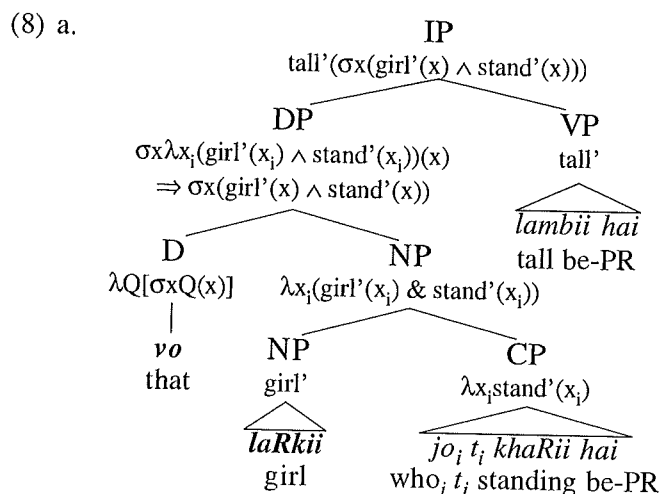
      "Anu, who is standing, is tall."

Non-restrictive relatives, we see, do not have the same options as restrictive relatives. This shows that even though Hindi manifests a great deal of word order variation, there are structures that are quite restricted in this respect (see also Mohanan 1990 and Mahajan 1990 for further discussion on scrambling restrictions). Thus it does not come as a surprise that the position of restrictive relatives, though freer than that of non-restrictives, is still constrained.

     I have established so far that relativization in Hindi instantiates adjunction structures. That is, the relative clause and the DP it is linked to do not form a constituent at S-structure. The question that I want to explore next is the implications of this syntactic analysis for interpretation.

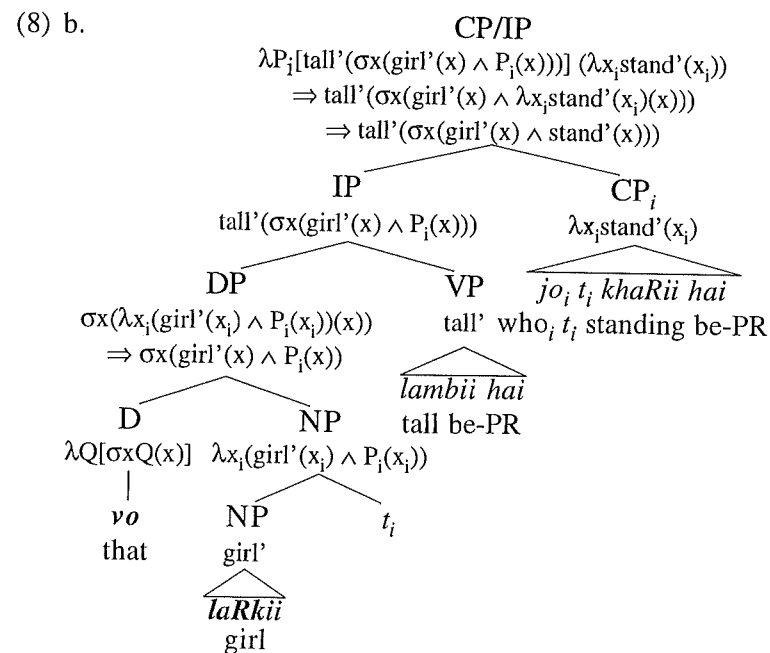### 1.2. *Adjoined Relatives as Noun Modifiers*

Previous approaches to the phenomenon have assumed that adjoined relative clauses are noun modifiers, analogous to restrictive relative clauses in languages like English. In section 1.3 I will present data to show that this assumption needs to be revised, but before doing that I want to outline how adjoined relative clauses can be interpreted as noun modifiers (cf. discussion in Chapter I, section 2.1). The standard interpretation of relative clauses treats the wh expression as a lambda operator that abstracts over the position marked by its trace. This yields a set-denoting expression that can then intersect with the set denoted by the head (Partee 1975). We can illustrate with an example like (1c) in which the head and the modifier are adjacent.

The DP denotes the unique individual who is in the intersection of the set of girls and the set of standing people. The sentence is true if and only if this individual is among the set of tall people:

(8) a.

$$IP$$
$$tall'(\sigma x(girl'(x) \wedge stand'(x)))$$

DP
$\sigma x \lambda x_i(girl'(x_i) \wedge stand'(x_i))(x)$
$\Rightarrow \sigma x(girl'(x) \wedge stand'(x))$

VP
tall'
lambii hai
tall be-PR

D
$\lambda Q[\sigma x Q(x)]$
|
vo
that

NP
$\lambda x_i(girl'(x_i)$ & $stand'(x_i))$

NP
girl'
laRkii
girl

CP
$\lambda x_i stand'(x_i)$
jo$_i$ t$_i$ khaRii hai
who$_i$ t$_i$ standing be-PR

In order to interpret adjoined relatives we have to determine whether the relative clause originates inside the DP and is moved via extraposition or whether it is base-generated in the adjoined position. Let us consider the extraposition option first, which has been proposed for Hindi by Verma (1966), Kachru (1973) and (1978), Subbarao (1984) and Bains (1989). Although these studies do not provide an explicit semantics, it is easy to see how the desired interpretation can be derived. Let us demonstrate with (1b), the case of right-adjoined relativization:[5]

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[5] I am ignoring for the moment the fact that the main clause DP undergoes QR. This will be discussed in section 2 in connection with the right roof effect associated with extrapositon.

(8) b.

$$CP/IP$$
$$\lambda P_i[tall'(\sigma x(girl'(x) \wedge P_i(x)))] (\lambda x_i stand'(x_i))$$
$$\Rightarrow tall'(\sigma x(girl'(x) \wedge \lambda x_i stand'(x_i)(x)))$$
$$\Rightarrow tall'(\sigma x(girl'(x) \wedge stand'(x)))$$

IP
$tall'(\sigma x(girl'(x) \wedge P_i(x)))$

CP$_i$
$\lambda x_i stand'(x_i)$
jo$_i$ t$_i$ khaRii hai
who$_i$ t$_i$ standing be-PR

DP
$\sigma x(\lambda x_i(girl'(x_i) \wedge P_i(x_i))(x))$
$\Rightarrow \sigma x(girl'(x) \wedge P_i(x))$

VP
tall'
lambii hai
tall be-PR

D
$\lambda Q[\sigma x Q(x)]$
|
vo
that

NP
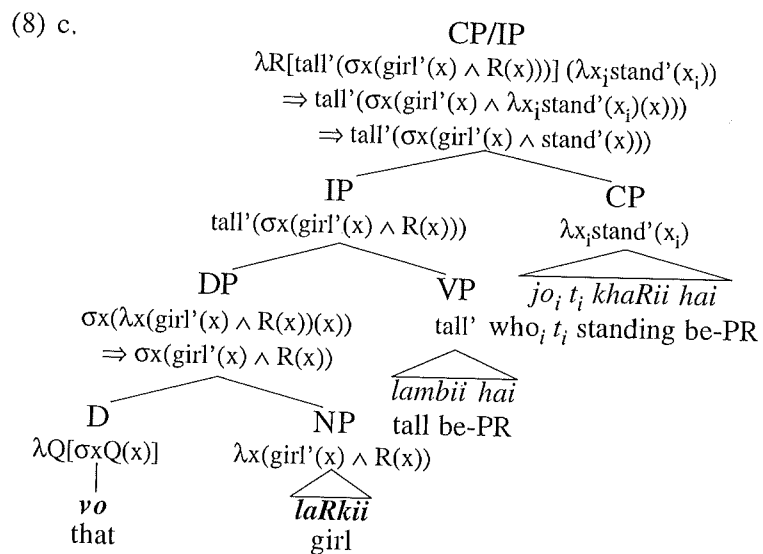$\lambda x_i(girl'(x_i) \wedge P_i(x_i))$

NP
girl'
laRkii
girl

t_i

Here the trace of the moved relative clause is interpreted as a variable of a predicative type. Lambda abstraction and conversion at the adjunction point effectively reconstructs the meaning of the extraposed CP in its base position.[6] A structure with a right-adjoined relative therefore ends up being semantically equivalent to one where the relative occurs next to the head. Under the view that Hindi relative clauses originate inside the noun phrases they modify, the map from syntax to semantics is unproblematic. The only unusual thing about Hindi relativization, under this view, is that it also allows extraposition to the left which is supposed to be proscribed in natural language (Baltin 1985).

Now, consider the possibility of base-generating the relative clause in adjoined position. This view too has been proposed for Hindi and other languages with correlatives (Keenan 1985, Andrews 1985, Donaldson 1971 and Dasgupta 1980 among others). Under this view, there is no trace inside the DP denotation with which the adjoined

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[6] I do not assume syntactic reconstruction though that would yield equivalent results in the case of relative clauses. But in Chapter II we saw that syntactic reconstruction leaves open the possibility of subsequent LF wh movement, which does not occur in Hindi.

relative clause can combine. This would seem, *a priori*, to pose a problem for a compositional mapping from syntax to semantics. Bach and Cooper (1978) and Cooper (1979), however, propose a solution to the problem. They suggest that the relative clause and the main clause are interpreted independently. The main clause DP is interpreted with a property variable R, a mnemonic for relative, which they claim is independently needed to account for contextual restrictions in quantification. This variable then provides the locus for lambda abstraction and conversion needed to combine the meanings of the IP and the adjoined relative clause. The interpretation of the adjoined structure is exactly the same as in the extraposition analysis, the only difference between them being syntactic. Instead of the trace of a moved element there is a free variable posited, which acts as a place-holder for the modifier that is syntactically higher up in the tree. Compare the analysis of (1b) under this view with the extraposition analysis in (8b):

(8) c.

$$
\begin{array}{c}
\text{CP/IP} \\
\lambda R[\text{tall'}(\sigma x(\text{girl'}(x) \land R(x)))] \,(\lambda x_i \text{stand'}(x_i)) \\
\Rightarrow \text{tall'}(\sigma x(\text{girl'}(x) \land \lambda x_i \text{stand'}(x_i)(x))) \\
\Rightarrow \text{tall'}(\sigma x(\text{girl'}(x) \land \text{stand'}(x)))
\end{array}
$$

IP
tall'(σx(girl'(x) $\land$ R(x)))

CP
λx_istand'(x_i)

DP
$\sigma x(\lambda x(\text{girl'}(x) \land R(x))(x))$
$\Rightarrow \sigma x(\text{girl'}(x) \land R(x))$

VP
tall'

jo$_i$ t$_i$ khaRii hai
who$_i$ t$_i$ standing be-PR

lambii hai
tall be-PR

D
$\lambda Q[\sigma x Q(x)]$
|
vo
that

NP
$\lambda x(\text{girl'}(x) \land R(x))$

laRkii
girl

Bach and Cooper thus provide an interpretive analogue of movement, showing that a compositional semantics is possible for relativization structures analyzed as having discontinuous constituents in their base forms.[7] It is worth noting that the Bach-Cooper system goes against

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[7] There is, of course, a fundamental problem with the adjoined clause approach which has not been sufficiently addressed by its proponents. There is no explanation for the fact that if a relative clause occurs inside the main clause it

the spirit of compositionality in that it allows expressions to be interpreted in positions for which there is no syntactic motivation. Of course, such a weakening can be justified if syntactic and semantic considerations warrant it.[8]

We see, then, that there is no problem in interpreting adjunction structures in terms of noun modification. In the next section, however, I point out some differences between relative clauses adjoined to the left and those adjoined to the right, which raise doubts about the fundamental assumption that relativization structures uniformly involve noun modification.

1.3. *Differences between Relative Clauses*

An important difference between left-adjoined and right-adjoined relatives has to do with headedness, by which I mean the presence or absence of the common noun in the relative clause and the main clause. It has been observed that in left-adjoined structures both DPs can be realised with a common noun.[9] Right-adjoined structures, however, do not allow the relative clause to contain the common noun.

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must be adjacent to the head, as shown by the grammaticality of (1c) or (4c) and the ungrammaticality of (5).

[8] In the discussion of scope marking structures I analyse the finite complement as adjoined to CP at D-structure but I interpret it as the restriction of the wh in the matrix, using the implicit variable T. Though the interpretation is compositional in the strict sense, it too allows interpretation to be reconstructed in lower positions. Note that an alternative analysis in terms of extraposition is feasible for scope marking and has, in fact, been proposed by Herburger (1994). The reason for not adopting the extraposition analysis in scope marking was because it would leave open the explanation of the negative island effects. If an alternative explanation were available for the negation facts, strict compositionality could be maintained in the analysis of scope marking by using the trace of the extraposed CP, instead of T, to interpret the structure. One difference between the two cases that may be relevant is that restriction on quantifiers (what T stands for) is obligatory while noun modification (what R stands for) is optional.

[9] In Kachru (1973, 1978) sentences like the second one in (9a), that is, those with a common noun in both clauses, are represented with a question mark. I consider the first sentence basic and, in some sense, more natural than the other two. All three, however, are acceptable and need to be accounted for.

In other words, the relative clause in (9a), but not the one in (9b), can be internally headed:[10]

(9) a. *jo   laRkii khaRii   hai   vo lambii hai*
         which girl   standing be-PR she tall   be-PR
         jo   laRkii khaRii   hai   vo laRkii lambii hai
         which girl   standing be-PR that girl   tall   be-PR
         jo   khaRii   hai   vo laRkii lambii hai
         who standing be-PR that girl   tall   be-PR
         "Which girl is standing, she is tall."

   b. **vo laRkii** lambii hai   *jo   khaRii   hai*
        that girl   tall   be-PR who standing be-PR
        vo laRkii lambii hai   jo   laRkii khaRii   hai
        that girl   tall   be-PR which girl   standing be-PR
        vo lambii hai   jo   laRkii khaRii   hai
        she tall   be-PR which girl   standing be-PR
        "The girl who is standing is tall."

A second difference between the two types of relatives has to do with a demonstrative requirement in left-adjoined structures. Subbarao (1984:13) observes that if the main clause DP is indefinite, the relative clause can only occur to the right.[11]

(10) a. *jo   laRkiyaaN khaRii   haiN   do lambii haiN*
         which girls   standing be-PR two tall   be-PR
         "Which girls are standing, two are tall."

---

[10] From this point on, I will translate left-adjoined relatives in a way that distinguishes them from ordinary relativized structures. Though these translations do not sound natural in English, they preserve the essential properties of the Hindi construction.

[11] It is possible for the main clause DP to be a null pronoun, as in (i):

(i)   *jo   laRkii khaRii   hai   [pro] lambii hai*
       which girl   standing be-PR   tall   be-PR
       "Which girl is standing, (she) is tall."

This is not surprising, given that Hindi is a pro-drop language. However, it is well-known that there are constraints on pro-drop having to do with semantic recoverability (Huang 1984 and Rizzi 1986). I assume that pro-drop is not possible in the case of *ve do* "those two" since the meaning cannot be recovered from *[pro] do* "two" and the structure in which it occurs.

   b. **do laRkiyaaN** lambii haiN   *jo   khaRii   haiN*
        two girls   tall   be-PR who standing be-PR
        "Two girls who are standing are tall."

The only way to express (10) in a left-adjoined structure is to use a partitive in the main clause. The partitive provides the demonstrative **un** and makes the main clause DP definite:

(10) c. *jo   laRkiyaaN khaRii   haiN   **un-meN-se** do lambii haiN*
         which girls   standing be-PR them-PART   two tall   be-PR
         "Which girls are standing, two of them are tall".

Similarly, compare (10a)-(10b) with (11) in which a demonstrative has been added to the main clause DP. The left-adjoined and the right-adjoined relative are both acceptable now:[12]

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

   b. **ve   do laRkiyaaN** lambii haiN   *jo   khaRii   haiN*
       those two girls   tall   be-PR who standing be-PR
       "The two girls who are standing are tall."

Subbarao's observation that left-adjoined relatives are compatible only with definite DP's, though essentially correct, requires one further modification. In Hindi, bare noun phrases can function as definites (see Verma (1966) and Porterfield and Srivastav (1988) for discussion) but such DPs are not possible in left-adjoined structures, as brought to my attention by Geoff Pullum (personal communication):

(12) a. *jo   laRkii khaRii   hai   **laRkii** lambii hai*
         which girl   standing be-PR girl   tall   be-PR
         "Which girl is standing, she is tall."

   b. **laRkii** lambii hai *jo   khaRii   hai*
       girl   tall   is   REL standing is
       "The girl who is standing is tall."

---

[12] Hock (1989) considers (11a) ungrammatical. Although speakers may prefer the main clause to have *ve dono* "both those" in place of *ve do* "those two", both are possible.

It would seem, then, that the restriction on the main clause DP in left-adjoined structures is stricter than definiteness; the DP must contain a demonstrative.

There is, however, a small class of determiners that seems not to require the demonstrative with left-adjoined relatives. These are, roughly speaking, the universals:

(13) a. *jo* *laRkiyaaN khaRii haiN*
    which girls   standing be-PR
    sab/dono/tiino lambii haiN
    all/both/all three tall be-PR
    "Which girls are standing, all/both/all three are tall."

  b. **sab/dono/tiino** laRkiyaaN lambii haiN
    all/both/all three girls tall be-PR
    jo khaRii haiN
    who standing be-PR
    "All/both/all three girls who are standing are tall."

Note though that these determiners may cooccur with the demonstrative *vo*, without a difference in meaning. That is, *sab/ve sab, dono/ve dono, tiino/ve tiino* show the kind of alternation we see between *both/both the* in English. One could very well analyze (13a) as having a null demonstrative in it, keeping intact the generalization that left adjunction requires a demonstrative in the main clause DP.

It is worth mentioning in this connection another determiner that may occur in left-adjoined structures without an overt demonstrative. The DP in (14a) has the determiner *har ek* "each"/"every" which cannot be analyzed as having a null demonstrative since *ve har ek* "those every" is unacceptable.[13] It can, however, be analysed as having a null partitive *un-meN-se har ek* "them-PART each one". This determiner is particularly interesting because it brings out yet another difference between left-adjoined and right-adjoined relatives:

(14) a. *jo* *laRke khaRe haiN* (**un-meN-se**)
    which boys standing be-PR them-PART
    har ek meraa chaatr hai
    each one my student be-PR

---

13 I am not sure whether *har ek* is like "every" or "each". What is of relevance here is that it is clearly singular.

  b. **jo* *laRkaa khaRaa hai* (**un-meN-se**)
    which boy standing be-PR them-PART
    har ek meraa chaatr hai
    each one my student be-PR
    "Which boys are standing, each one is my student."

Although *har ek* is a singular determiner, the left-adjoined relative is required to have plural morphology, as shown above. In contrast, the right-adjoined relative must have singular morphology, as shown in (15):

(15) a. **har ek laRkaa** meraa chaatr hai
    each one boy my student be-PR
    jo khaRaa hai
    who standing be-PR

  b. ****har ek laRkaa** meraa chaatr hai
    each one boy my student be-PR
    jo khaRe haiN
    who standing be-PR
    "Each boy who is standing is my student."

Finally, a pronoun inside a left-adjoined relative cannot be bound by arguments inside the main clause while those in right-adjoined relatives can (Maria Bittner, personal communication):

(16) a. **jis* *laRke-se vo$_i$ sabse pahle miltii hai*
    which boy-INS she of-all before meet-PR
    har laRkii$_i$ us-se shaadii kartii hai
    every girl he-INS marriage do-PR
    "Which boy she meets first, every girl marries him."

  b. **har laRkii$_i$** us laRke-se shaadii kartii hai
    every girl that boy-INS marriage do-PR
    jis-se *vo$_i$ sabse pahle miltii hai*
    who-INS she of-all before meet-PR
    "Every girl marries the boy she meets first."

Related to this is the fact that a pronoun in the main clause must be disjoint in reference with a name in the right-adjoined relative but may corefer with one in the left-adjoined relative:

(17) a. anu-ne$_i$ **vo kitaab** tumhaare liye bhejii hai
     Anu-E that book you-G   for send-PRF-PR
     jo   us-ko$_i$ ravi-ne dii thii
     which she-D Ravi-E give-PRF-P
     "Anu has sent that book for you which Ravi had given her."

   b. us-ne$_{*i}$ **vo kitaab** tumhaare liye bhejii hai
     she-E that book you-G   for send-PRF-PR
     jo   anu-ko$_i$ ravi-ne dii thii
     which Anu-D Ravi-E give-PRF-P
     "She has sent that book for you which Ravi had given Anu."

(18) a. *jo   kitaab us-ko$_i$ ravi-ne dii thii*
     which book she-D Ravi-E give-PRF-P
     anu-ne$_i$ **vo kitaab** tumhaare liye bhejii hai
     Anu-E that book you-G   for send-PRF-PR
     "Which book Ravi had given her, Anu has sent that book for you."

   b. *jo   kitaab anu-ko$_i$ ravi-ne dii thii*
     which book Anu-D Ravi-E give-PRF-P
     us-ne$_i$ **vo kitaab** tumhaare liye bhejii hai
     she-E that book you-G   for send-PRF-PR
     "Which book Ravi had given Anu, she has sent that book for you."

We have seen here that that there are sharp differences in the behavior of left-adjoined and right-adjoined relatives with respect to the demonstrative requirement, agreement with singular determiners, bound variable and disjoint reference facts. Standard analyses of Hindi correlatives in terms of extraposition or adjunction focus on a set of data that does not bring out these distinctions. As such, they attempt a uniform analysis for what is clearly not a uniform phenomenon. In the next sections I propose separate syntactic and semantic analyses for right-adjoined and left-adjoined relatives. Syntactically, right-adjoined relatives will be shown to originate inside the DP and undergo extraposition. Left-adjoined relatives, on the other hand, will be treated as base-generated in adjoined positions. Semantically, right-adjoined relatives will be shown to involve noun modification while left-adjoined relatives will be shown to behave like A´ operators. I will first develop the account for right-adjoined

relatives in section 2 before turning to left-adjoined relatives in section 3.

2. RIGHT ADJUNCTION AND NOUN MODIFICATION

2.1. *Embedded and Extraposed Relatives*

If we consider the differences listed in section 1.3. we notice that in each case the behavior of the right-adjoined relative is the expected one while the behavior of the left-adjoined relative is unusual. That is, the right-adjoined relative behaves like an ordinary restrictive relative. Now, the most plausible analysis for right-adjoined relatives in English is one where they are generated inside DP and optionally extraposed. A similar analysis can be posited for Hindi on the basis of correlations between right-adjoined relatives and embedded relatives of the kind seen in (1c). Towards this end, consider the behavior of embedded relatives with respect to the demonstrative requirement, agreement with singular determiners, bound variable and disjoint reference facts.

(19) shows that embedded relatives do not allow internal heads. They pattern with the right-adjoined relative in (9b) rather than with the left-adjoined relative in (9a) in not allowing a common noun inside the relative clause:

(19)   **vo laRkii** *jo   khaRii   hai*   lambii hai
         that girl   who standing be-PR tall   be-PR
         ***vo laRkii** *jo   laRkii khaRii   hai*   lambii hai
         that girl   which girl   standing be-PR tall   be-PR
         ***vo** *jo   laRkii khaRii hai*   lambii hai
         that which girl   standing be-PR tall   be-PR
         "The girl who is standing is tall."

Similarly, (20) shows that embedded relatives occur with indefinite DP's as well as with bare DP's. Again, this is like the right-adjoined relatives in (10b) and (12b) and unlike the left-adjoined relatives in (10a) and (12a):

(20) a. **do laRkiyaaN** *jo   khaRii   haiN*   lambii haiN
         two girls   who standing be-PR tall   be-PR
         "Two girls who are standing are tall."

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

Further, when the determiner in the main clause is singular, embedded relative clauses also have singular morphology. That is, they align with (15) rather than (14):

(21) a. **har ek laRkaa** *jo   khaRaa hai*   meraa chaatr hai
        each one boy   who standing be-PR my   student be-PR

   b. *__har ek laRkaa__ *jo   khaRe haiN* meraa chaatr   hai
        each one boy   who student be-PR my   standing be-PR

   "Each boy who is standing is my student."

Embedded relatives also allow pronouns to be bound by matrix clause quantifiers, on par with (16b) and unlike (16a):[14]

(22)   har   laRkii, **us laRke-se** *jis-se   vo, sabse pahle*
       every girl   that boy-INS who-INS she of-all before
       miltii hai shaadii   kartii hai
       meet-PR marriage do-PR
       "Every girl marries the boy she meets first."

And, finally, a name inside an embedded relative must be disjoint in reference to a pronoun c-commanding the head DP. This is again like (17) and not like (18):

(23) a. anu-ne, **vo kitaab** *jo   us-ko, ravi-ne dii thii*
        Anu-E that book   which she-D Ravi-E give-PRF-P
        tumhaare liye bhejii hai
        you-G   for send-PRF-PR
        "Anu has sent that book for you which Ravi had given her."

   b. us-ne*, **vo kitaab** *jo   anu-ko, ravi-ne dii thii*
        she-E that book   which Anu-D Ravi-E give-PRF-P
        tumhaare liye bhejii hai
        you-G   for send-PRF-PR
        "She has sent that book for you which Ravi had given Anu."

Note that none of the properties under discussion are at all surprising for embedded relatives. We know, for example, from languages like English that restrictive relative clauses do not have internal heads. I will suggest for now that wh expressions with common nouns are R-expressions while bare wh expressions are pronominal. (19), for example, would have the following structure:

(24)   [$_{DP}$that girl$_i$ [who$_i$/*which girl$_i$ is standing]]

Coindexation between the head and the wh operator will lead to a violation of Principle C in the case of an internally-headed relative clause but not otherwise. In Chapter VI, the semantics of internally-headed relatives will also be argued to be incompatible with the semantics of noun modification. Thus the distribution of the common noun in restrictive relatives follows from syntactic and semantic principles.

The fact that embedded relatives are insensitive to the type of the determiner as well as to its presence follows from the fact that relative clauses take scope at the level of the common noun (cf chapter 1, section 2.1. and section 1.2 above). It then does not matter what type of head DP is involved. (20a)-(20b) are interpreted as (25a)-(25b) respectively:[15]

(25) a. $\exists x[two'(x) \wedge *girl'(x) \wedge stand'(x) \wedge tall'(x)]$

   b. $tall'(\sigma x(two'(x) \wedge *girl'(x) \wedge stand'(x))$

The difference between the two sentences is simply in uniqueness requirements. (25a) makes an assertion about a sum individual with two parts that is a girl and is standing, while (25b) makes an assertion about a unique sum individual with these properties.
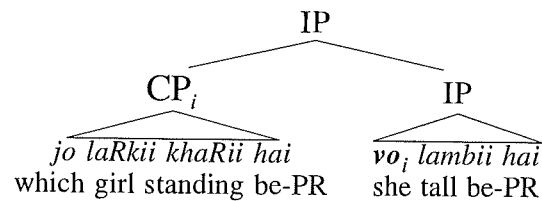
Finally, the structure of embedded relativization transparently accounts for agreement, bound variable and disjoint reference facts. In (21), for example, the relative clause is expected to show singular morphology since it is in the scope of the singular determiner *har ek*. The bound variable reading of the pronominal inside the relative clause in (22) is also expected since the subject c-commands the object DP and can bind elements inside it. Similarly, (23a) is

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[14] In the case of DP's with overt case-marking, extrapositon is preferred over embedding but embedded relatives are not marginal or ungrammatical.

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[15] Recall that we have adopted a theory in which the domain of entities includes atomic as well as sum individuals. Numerals like *two*, for example, can therefore be treated as predicates. *two'(x)* will be true if x is a sum of at least two atomic individuals. Note that indefinites are treated as generalized quantifiers while definites are treated as individual-denoting (see Bittner 1994a, 1994b for further discussion).
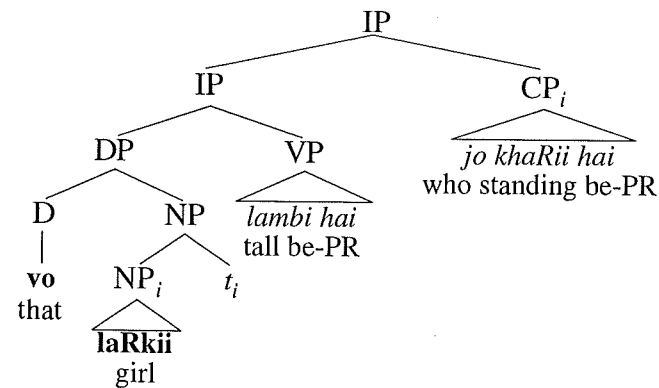
acceptable because there is no violation of Binding Theory but (23b) is ruled out because the R-expression is coindexed with a c-commanding pronoun.

Given the parallel behavior of embedded and right-adjoined relatives, it seems quite plausible to treat Hindi right-adjoined relatives on a par with English right-adjoined relatives as being derived from embedded relatives via extraposition. Note that this provides a partial explanation for the differential behavior of left-adjoined relatives. It is well accepted that extraposition to the left is not possible in languages like English. If this is a universal, as claimed by Baltin (1985), Hindi left-adjoined relatives could not be derived by extraposition. They must then be base-generated in adjoined position. We thus come to the conclusion that Hindi left-adjoined and right-adjoined relatives have different structures. This is illustrated below:
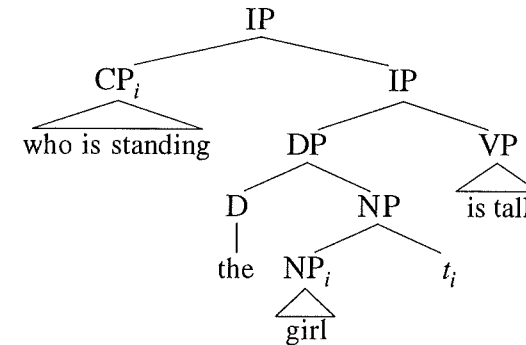
(26) a. <u>Left-adjoined</u>

$$
\begin{array}{c}
\text{IP} \\
\diagup \qquad \diagdown \\
\text{CP}_i \qquad\qquad \text{IP}
\end{array}
$$

jo laRkii khaRii hai   ***vo**_i lambii hai*
which girl standing be-PR   she tall be-PR

b. <u>Right-adjoined</u>

$$
\begin{array}{c}
\text{IP} \\
\diagup \qquad\qquad \diagdown \\
\text{IP} \qquad\qquad \text{CP}_i
\end{array}
$$

IP → DP, VP; DP → D (**vo** / that), NP; NP → NP_i (t_i); NP_i → **laRkii** / girl; VP → *lambi hai* / tall be-PR; CP_i → *jo khaRii hai* / who standing be-PR

A question that arises, of course, is why extraposition to the left should be prohibited in natural language. Guéron (1980) suggests that this is ruled out due to semantic considerations, a constituent adjoined to the left always being interpreted as a topic. It is certainly true that the relative clause in a correlative can, in many cases, be

thought of as a topic. But it seems to me that it still remains an open question why left extraposition would have this semantic effect. An alternative structural explanation was suggested to me by Gennaro Chierchia (personal communication). Left extraposition structures might be ruled out as instances of weak crossover configurations, under the view that the trace of the relative clause is a variable coindexed with the head noun to its left:[16]

(27)

$$
\begin{array}{c}
\text{IP} \\
\diagup \qquad\qquad \diagdown \\
\text{CP}_i \qquad\qquad \text{IP}
\end{array}
$$

CP_i → who is standing; IP → DP, VP; DP → D (the), NP; NP → NP_i, t_i; NP_i → girl; VP → is tall

The problem of blocking leftward extraposition is, of course, not specific to Hindi and I expect that whatever account works in the general case will transfer over to Hindi. The point I am trying to make here takes as the null hypothesis the view that Hindi, like other languages, allows extraposition to the right but disallows it to the left. The relativization structures in (26) would then be the expected ones. The differential behavior of left-adjoined relatives seen in section 1.3 could be taken as providing confirmation of this null hypothesis. It of course remains to be shown why left-adjoined relatives display the particular behavior they do and I will take up this task in section 3 after discussing some further properties of Hindi embedded and extraposed relatives.

In concluding this section, let me make a terminological distinction. Note that a special term such as *correlative* is not needed to refer to right-adjoined relatives if they are typologically indistinct from regular restrictive relatives. From this point on I will therefore use the term to refer only to the structurally distinct left-adjoined structures.

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[16] While this account seems quite plausible it will not hold up if WCO is taken to be a leftness effect and languages with left-branching relative clauses also do not allow leftward extraposition.

2.2. *The Right Roof Effect in Extraposition*

The structure of restrictive relativization that I have suggested above for Hindi is not particularly controversial. In fact, my main claim is that Hindi does not justify any modification to analyses of the phenomenon based on restrictive relativization in languages like English. I should mention, however, that it has been claimed by Subbarao (1984) and McCawley (1992) that Hindi right-adjoined relatives differ from English extraposed relatives in not showing Ross's Right Roof Effect. The aim of this section is to put in perspective the data presented in support of this position and show that they do not warrant a substantive distinction between restrictive relativization in the two languages.

Let us begin by considering a simplified version of a Hindi example given by Subbarao to show absence of the Right Roof Effect:

(28)

"I closed the door on those boys' leaving who had come."
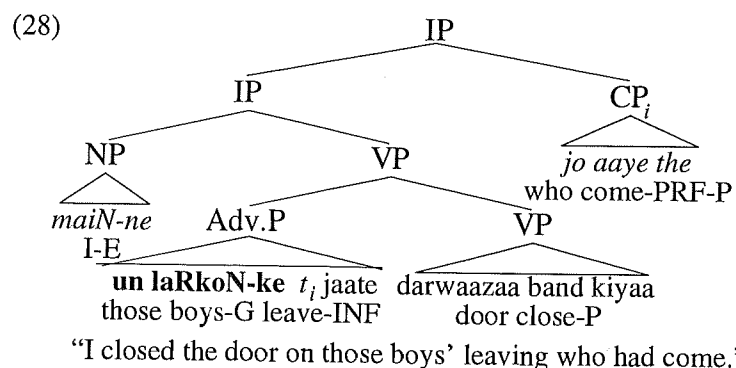
In (28) the relative clause originates inside the adverbial phrase and is adjoined to matrix IP, as opposed to the adverbial phrase. Subbarao claims that this is a case of attachment to a superordinate clause, in violation of the right roof constraint. McCawley gives the following examples to make the same point:

(29) a. **un   jhuuToN-ko** dohraanaa buraa hai
        those lies-A   repeat-INF bad   be-PR
        jo   raam-ne tumheN bataaye the
        which Ram-E   you-D   tell-PRF-P
        "To repeat the lies that Ram told you is bad."

   b. agar raam siitaa-ko **vo patr** dikhaaye   vo
      if   Ram Sita-D   that letter show-SUBJ she
      bhaag jaayegii *jo   tum-ne likhaa*
      run-away-F   which you-E write-P
      "If Ram shows Sita the letter that you wrote, she will run away."

The thrust of the arguments here is that given that Hindi right-adjoined relatives do not obey known constraints on extraposition, they warrant a separate treatment from ordinary restrictives. One possibility would be to have them base-generated in adjoined position (see also Dwivedi 1994).

Before assessing the data in (28)-(29), let us adopt a specific analysis of the right roof effect. In May (1985) it is proposed that an extraposed relative clause must be governed by its head at LF. The head, being a quantified DP, is subject to QR which is a local operation. At LF, then, the head and the relative clause will be dominated by all the same maximal projections and there will be no intervening maximal projection if extraposition is to a local domain. If the relative clause is adjoined higher, the head will not be able to c-command it.[17] Thus proper government will not obtain unless extraposition obeys the right roof constraint. As May shows, this explains the fact that in a sentence like (30) the pronoun and the proper name are necessarily interpreted as disjoint in reference. The requirement of government by a head prevents the relative clause from adjoining to the matrix IP, a position that would not interfere with the coreference under discussion:

(30) $[_{IP}$I told her$_{*i}$ $[_{CP}$that the concert was attended by **many people** t_j last year $[_{CP_j}$*who made Mary$_i$ nervous*$]]$.

Now, if the obligatory disjoint reference in (30) is evidence of the right roof effect, it is easy enough to test whether relative clause extraposition in Hindi displays this effect. Consider (31) which is structurally parallel to (30):

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[17] The relevant definition of c-command here is one in which the first maximal projection rather than the first branching node counts.

(31) [$_{IP}$ maiN-ne us-ko$_{*i}$ samjhaayaa [$_{CP}$ ki yeh kaam **un**
   I-E she-D explain-P that this work those
  logoN-kaa nahiiN hai [$_{CP}$*jinse merii$_i$ nafrat karti hai*]]
  people-G not be-PR who-INS Mary hate do-PR
  "I explained to her that this is not the work of those
  people whom Mary hates."

This sentence can only be interpreted with *us-ko* "her" disjoint in reference with *merii* "Mary". If Hindi extraposition were not subject to the right roof constraint, as claimed by Subbarao and McCawley, it would be possible to adjoin the relative clause to the matrix IP. The pronoun inside IP would not c-command the R-expression inside the relative clause and it would be possible for the two to corefer. Clearly, the kind of evidence given for the Right Roof effect in English transfers over to Hindi in a straightforward manner.

 Returning now to the cases mentioned by Subbarao and McCawley, let me point out that apparent violations of the Right Roof effect is restricted to DP's with definite heads. If one were to substitute an indefinite like *do* "two" or a quantifier like *har ek* "each one" in place of *vo* "that", the examples all become unacceptable. Extending May's analysis of the phenomenon, one might conjecture that the scope of definites is less restricted than that of quantifiers. If so, the difference in behavior could be explained on principled grounds. I will therefore assume that right-adjoined relatives in Hindi are subject to similar, if not the same, constraints as English right-adjoined relatives.

 Before concluding my discussion of Hindi extraposition I would like to emphasize that I do not mean to exclude the possibility of base-generating right-adjoined relatives completely. Consider in this connection (32):

(32) bacce khel rahe the *jis-kii aawaaz aa rahii thii*
  children play-PROG-P who-G sound come-PROG-P
  "Children were playing, whose sound was coming in."
  ("The sound of children playing was coming in.")

There is no noun that the singular genitive wh *jis-kii* "whose" can be syntactically associated with, since the only noun phrase in the main clause is plural. Such structures have to be analyzed as adjoined at the base and taken to modify derived nominals, in this case *the children's playing*.

 Another set of examples where adjunction has to be recognized at the base has to do with the following type of sentence, due to Ross and Perlmutter and noted by Andrews (1985):

(33) **A man** came in and **a woman** went out *who were similar*.

The relative clause here obviously needs a plural antecedent but there is no such noun phrase in the main clause. This phenomenon, traditionally treated as right node raising, is also present in Hindi, as shown by the possibility of the Hindi version of (33):[18]

(34) **ek aadmii** aaya aur **ek aurat** calii gayii
  a man come-P and a woman leave-P
  jo ek duusre-se milte the
  who each other-INS resemble-P

 While examples like (34) and (32) are part of the grammar of Hindi, a theory of noun modification cannot be based on them. As in English, they do not represent the core case of noun modification. They only show that it may be possible to process sentences even in the absence of a strict syntactic relation, as long as a likely nominal can be inferred. As such, I will take it as established that relative clauses acting as noun modifiers are constituents of the DP at D-structure. The difference between Hindi and English seems to be that Hindi tends to extrapose relative clauses much more readily than English. This would tie in with the general tendency in Hindi for finite clauses to occur at the right periphery of the clause.
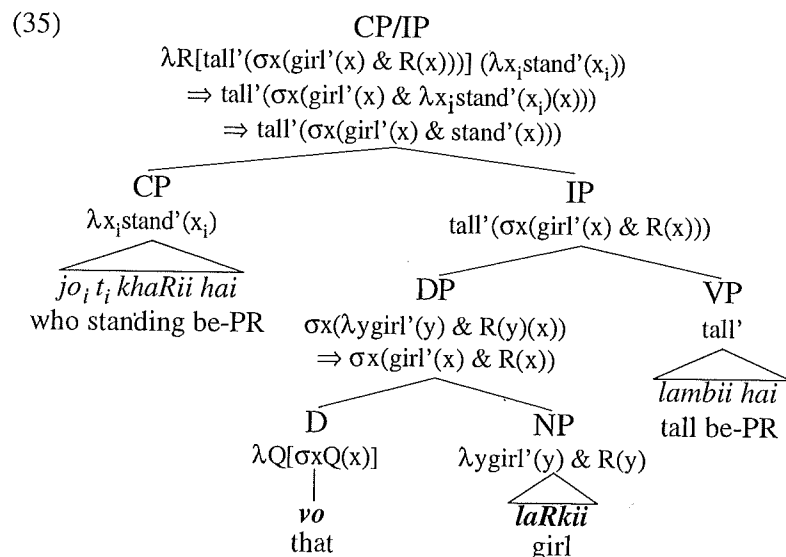
3. LOCALITY IN CORRELATIVES

3.1. *Variables inside Noun Phrases*

We have established so far that Hindi right-adjoined relatives display the properties standardly associated with restrictive relativization. That is, they are generated inside the noun phrase they modify and extraposed to the right. We have also adopted the view that natural language does not allow extraposition to the left and concluded that left-adjoined relatives are base-generated in that position. Though this structural distinction between left and right-adjoined relatives is compatible with the fact that left-adjoined relatives do not display the

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[18] In both (32) and (34), it is not possible to have a full noun phrase in the relative clause. Since internal heads are always possible in the case of correlatives, I take these sentences to involve noun modification rather than variable binding. Note also that (34) can have indefinite determiners on the nouns in the main clause, again suggesting that it belongs with restrictive relatives rather than with correlatives.

properties standardly associated with restrictive relativization, it does not explain it. The goal of this section is to characterize the nature of the relation between the left-adjoined relative and the main clause DP in such a way that its unusual properties can be accounted for.

Let us begin by seeing why the analysis of correlatives in (26a) does not automatically explain the absence of noun modification readings. Recall that in the Bach-Cooper system the implicit property variable inside the DP denotation allows an adjoined relative which is not its constituent at any syntactic level to be interpreted inside it. This is shown below:

(35)
$$CP/IP$$
$$\lambda R[tall'(\sigma x(girl'(x) \& R(x)))] (\lambda x_i stand'(x_i))$$
$$\Rightarrow tall'(\sigma x(girl'(x) \& \lambda x_i stand'(x_i)(x)))$$
$$\Rightarrow tall'(\sigma x(girl'(x) \& stand'(x)))$$

CP
$$\lambda x_i stand'(x_i)$$

jo$_i$ t$_i$ khaRii hai
who standing be-PR

IP
$$tall'(\sigma x(girl'(x) \& R(x)))$$

DP
$$\sigma x(\lambda y girl'(y) \& R(y)(x))$$
$$\Rightarrow \sigma x(girl'(x) \& R(x))$$

VP
tall'

D
$$\lambda Q[\sigma x Q(x)]$$
|
vo
that

NP
$$\lambda y girl'(y) \& R(y)$$

laRkii
girl

lambii hai
tall be-PR

While the interpretation we derive is intuitively correct for this sentence, it implies that a noun modification reading will always be available for correlatives. As we have seen, however, this is not the case. Correlatives with indefinite determiners are not acceptable, but there is no plausible way in which the use of the property variable in lowering the interpretation of left-adjoined relatives can be made sensitive to the definiteness of the main clause DP. (36a) is incorrectly predicted to have a valid interpretation on a par with (35):

(36) a. **jo   laRkiyaaN khaRii   haiN **do** lambii haiN*
        which girls   standing be-PR two tall   be-PR
        "Which girls are standing, two are tall."

     b. $\exists x[two'(x) \land *girl'(x) stand'(x) \land tall'(x)]$

Similarly, the difference between correlatives and embedded or right-adjoined relatives with respect to agreement, bound variable and disjoint reference facts become problematic if the Bach-Cooper semantics is accepted. It seems clear, then, that the use of implicit property variables for the purpose of interpreting relative clauses in positions lower than the site of origin must be blocked if we want to preserve the difference between correlatives and other noun modifiers.

It is worth pointing out in this connection that Cooper (1979) uses implicit property variables for two fundamentally different purposes. In one use, R serves to contextually restrict the interpretation of noun phrase meanings. Thus *every man* would be interpreted as $\lambda P \forall x[(man'(x) \land R(x)) \rightarrow P(x)]$ which denotes not the property set of all men but the property set of a pragmatically restricted subset of men. This restriction also plays a role in anaphoric relations found in donkey anaphora cases where the interpretation of R may be anaphoric. These uses seem to me qualitatively different from the use of property variables in interpreting relative clauses not present at the level of the common noun. Correlatives were considered the primary motivation for this use of property variables but the foregoing discussion has shown this to be based on mistaken assumptions about the meaning of correlatives. Of course, the evidence I have presented is only from Hindi, but the generalizations extend to the other Indic languages as well. Though crucial examples in Hittite and Walpiri are not available to me, there do not seem to be obvious counterexamples in the literature known to me. If correlatives in South Asian languages are representative of correlatives in general, the conclusion is obvious. The use of implicit property variables in relative clause interpretation is not valid.

This conclusion, in fact, echoes earlier concerns voiced in Jacobson (1983) (see also McCloskey 1979). As Bach and Cooper themselves note, modifed noun phrases are also contextually restricted even though R is not present in the representation after the meaning of the relative clause combines with the DP. A solution to this problem is to introduce property variables inside relative clauses as well as DP's. Under this view, a correlative like (35) would be interpreted as *tall'($\sigma x(girl'(x) \land stand'(x) \land R(x))$)*. In fact, the need for introducing property variables inside relative clause denotations has been argued to be necessary to account for the possibility of stacking relative clauses. (37a), under this view, has the interpretation in (37b):

(37) a. Every man who I like who I invited came.

b.
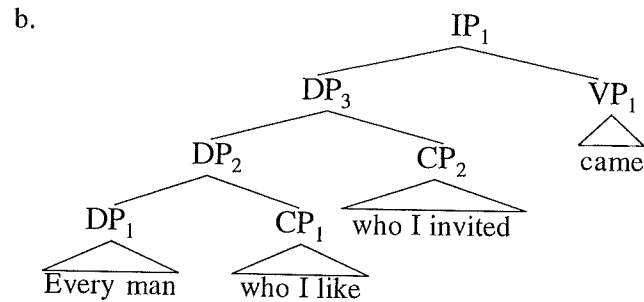
DP_1 = $\lambda P \forall x[(man'(x) \wedge R(x)) \rightarrow P(x)]$

CP_1 = $\lambda y[like'(I,y) \wedge R(y)]$

DP_2 = $\lambda R\ DP_1(CP_1)$

      $\lambda P \forall x[(man'(x) \wedge \lambda y[like'(I,y) \wedge R(y)](x)) \rightarrow P(x)]$

      $\lambda P \forall x[(man'(x) \wedge like'(I,x) \wedge R(x)) \rightarrow P(x)]$

CP_2 = $\lambda y[invited'(I,y) \wedge R(y)]$

DP_3 = $\lambda R\ DP_2(CP_2)$

      $\lambda P \forall x[(man'(x) \wedge like'(I,x) \wedge \lambda y[invited'(I,y) \wedge R(y)](x)) \rightarrow P(x)]$

      $\lambda P \forall x[(man'(x) \wedge like'(I,x) \wedge invited'(I,x) \wedge R(x)) \rightarrow P(x)]$

VP_1 = $came'$

IP_1 = $\lambda P \forall x[(man'(x) \wedge like'(I,x) \wedge invited'(I,x) \wedge R(x)) \rightarrow P(x)](\lambda y\ came'(y))$

      $\forall x[(man'(x) \wedge like'(I,x) \wedge invited'(I,x) \wedge R(x)) \rightarrow \lambda y came'(y)(x)]$

      $\forall x[(man'(x) \wedge like'(I,x) \wedge invited'(I,x) \wedge R(x)) \rightarrow came'(x)]$

Here the NP *every man* starts out with a property variable which is replaced by the meaning of CP_1. But the denotation of CP_1 itself has a property variable which can then be replaced by the meaning of CP_2. The property variable inside the denotation of CP_2 remains free and can provide the contextual restriction on the meaning of the whole DP, or the means whereby yet another relative clause could be added. In the case at hand, the DP denotes the set of properties of a contextually restricted subset of men who also have the two properties denoted by the relative clauses.

Jacobson (1983) argues against this analysis of stacked relatives and in favor of an analysis in which the second relative clause actually originates inside the first. In her account, the sentence under discussion derives from something like (38a), where CP_2 modifies the relative pronoun in CP_1. Obligatory extraposition accounts for the surface order shown in (38b):

(38) a. Every man [who [$_{CP_2}$who I invited] I like] came.

b.
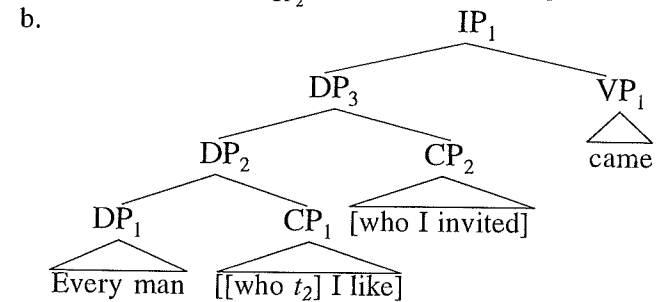
Although Jacobson adopts the Bach-Cooper system and uses the property variable R in interpreting the CP_2 in its base position, note that the use of this variable is no longer necessary. Under present assumptions, extraposition leaves traces which can be interpreted as variables of the appropriate semantic type and serve as place-holders for the meaning of extraposed material. The only point where R plays a crucial role here is in the modification of *man* by CP_1, not in the interpretation of the stacked relative.

To sum up this section, I have considered two cases in which implicit property variables have been used as place-holders for relative clauses. In the case of languages with adjoined relative clauses I have demonstrated that this yields the right results only for right-adjoined structures that are also amenable to an extraposition analysis. In the case of correlatives, where an extraposition analysis is implausible, the use of implicit property variables leads to incorrect results. The other case I have discussed involves stacked relatives, which have independently been shown to be derived from extraposition. Thus in a system like the present where traces are interpreted as variables, the simplest way to account for the absence of noun modification readings in correlatives is to prohibit the use of implicit variables in interpreting expressions lower than their D-structure position. This implies that the coindexation between the relative clause and the DP in a correlative construction must be something other than noun modification and I will argue in section 3.3. that this relation is one of variable binding. Before doing that, however, I want to comment briefly on the structure of restrictive relativization in light of the claim that implicit property variables cannot be used to lower the interpretation of relative clauses.

3.2. *The Structure of Restrictive Relativization*

Recall that Partee (1975) argued that on semantic grounds the optimal analysis of restrictive relativization is one where the relative clause is sister to the common noun. Under present assumptions, this would be a structure in which the relative clause is adjoined at the level of NP, not DP. Most current works, however, take restrictive relativization to be adjunction to DP, relying implicitly or explicitly on the Bach-Cooper semantics to ensure the right interpretation (Chomsky 1986a, Safir 1986). As Higginbotham (1980) points out, the choice between adjunction at DP and adjunction at NP must be based on semantic as well as syntactic considerations. Bach and Cooper's system provides a way of interpreting relativization at the level of DP but the preceding section has shown that correlatives, one of the orginal motivations for their analysis, actually argues against it. If the use of implicit variables is prohibited in the interpretation of restrictive relativization, it follows that restrictive relativization must be adjunction to NP as originally argued by Partee. In this section I want to consider some of the other arguments presented in the literature in favor of adjunction at the DP level and show how they can be handled if restrictive relativization is at the level of NP.

McCloskey (1979) argues for adjunction at the DP level on the basis of the fact that personal pronouns in Modern Irish can be modified by relative clauses in their restrictive sense. Assuming the standard analysis that pronouns are basic DPs, he argues that the modification must be at that level. As he notes, the argument rests on the assumption that pronouns are indeed DP's. A possibility he considers but ultimately rejects is that pronouns are in fact determiners, as suggested originally by Postal. If it were feasible to treat pronouns as determiners, however, an analysis of restrictive relativization at the NP level would be easy to motivate. Here I will try to revive the possibility of treating pronouns as determiners on the basis of Hindi, which like Modern Irish, and unlike English, allows restrictive relativization with third person pronouns.[19] Consider the following paradigm:

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[19] English allows it to some extent, as in the following:

(i)　　　He who fights and runs away lives to fight another day.

These seem to be restricted to generic statements and may be argued not to be part of the productive grammar of English.

(39)	DEMONSTRATIVE + NOUN	PRONOUN
Nominative	vo chiiz/ye chiiz	vo/ye
	that thing this thing	(s)he/it
	ve chiizeN/ye chiizeN	ve/ye
	those things/these things	they
Oblique	us chiiz/is chiiz	us/is
	that thing/this thing	(s)he/it
	un chiizoN/in chiizoN	un/in
	those things/these things	they

The idea of treating pronouns as determiners, we see, is intuitively plausible, given the similarity between third person pronouns and deictic determiners.
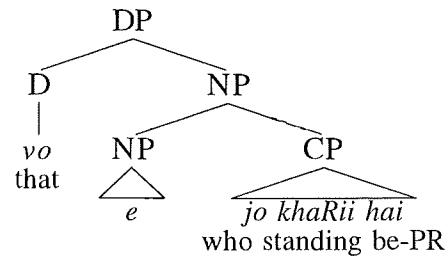
In Abney (1987) pronouns are treated as intransitive determiners. That is, they are D's that do not take NP complements.[20] Suppose we were to suggest that languages differ with respect to the possibility of modifying pronouns because they are intransitive D's in some languages but not in others. We might then say that only in those languages where pronouns are transitive, will restrictive relativization be possible.

Hindi third person pronouns, for example, could be analysed as transitive D's since they have the same form as noun phrase determiners. We get a DP like **vo larkaa** "that boy" when the NP complement is lexically headed , otherwise a pronminal form like **vo** "(s)he". While this is usually translated as "he" or "she", there is nothing specious I think in analysing it as "that one". Thus the difference between a relative clause restricting a full noun phrase and one restricting a third person pronoun in Hindi would be the following:[21]
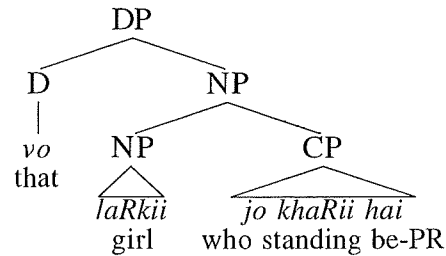
---

[20] Abney's analysis preserves Postal's idea but incorporates it within X' theory since the category of the noun phrase is DP and its head is D^0. Within the older system, generating an intransitive determiner amounted to a structure in which the noun phrase was an NP with a head that was Det.

[21] There need not be an empty position generated under NP in (40a). Transitive determiners could directly take CP complements or possibly NP complements dominating CP [$_{NP}$CP]. The semantics would remain as for (40a).

(40) a.

```
              DP
           /      \
          D        NP
          |       /    \
         vo      NP     CP
         that    /\    /    \
                e    jo khaRii hai
                     who standing be-PR
```

b.

```
              DP
           /      \
          D        NP
          |       /    \
         vo      NP     CP
         that    /\    /    \
              laRkii  jo khaRii hai
               girl   who standing be-PR
```
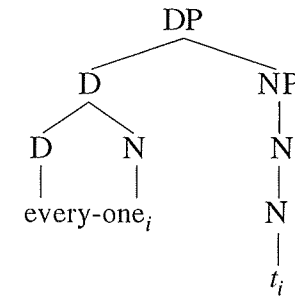
Consider the semantic interpretations of the two structures. In (40a) the denotation of the NP is semantically vacuous and lets in every individual in the domain of discourse, modulo contextual restrictions. The set denoted by CP intersects with the set of entities to give the set denotated by the CP and the determiner takes this as its first argument. The procedure is fully parallel to the regular noun phrase relativization shown in (40b).

In a theory where pronominal relativization is at the level of DP, it has to be stated for different languages whether a DP that dominates a pronoun can be modified. In the present approach it has to be stated for different languages whether a pronoun is transitive or intransitive. As far as I can see there is thus no real argument from pronominal modification in favor of a structure in which restrictive relatives are attached at the level of DP.

A second argument for the DP analysis, presented by Jacobson (1983), is that items such as *everyone* can be modified by a relative clause. This again rests on the assumption that items like *everyone* are basic DP's. However, Abney (1987) has argued that *everyone* involves head to head movement of *one* from the NP complement of D:

(41)

```
              DP
           /      \
          D        NP
         /  \       |
        D    N      N´
        |    |      |
    every-one_i     N
                    |
                    t_i
```

If this analysis is right, relativization at the level of NP becomes entirely plausible.

Thus I take it that there is no motivation for moving from a structure for relativization that transparently reflects meaning, i.e. adjunction at the level of NP, to one in which implicit variables are needed to ensure the right interpretation, i.e. adjunction at the level of DP.[22] This supports the conclusion reached independently on the basis of correlatives.

3.3. *Correlatives and Variable Binding*

I have shown above that the relation between the relative clause and the main clause DP in a correlative construction is not that of noun modification. In this section I would like to propose that the relative clause in a correlative construction is an operator that binds a variable in the main clause.

We saw in section 1.3. that the only main clause DP's that are compatible with left-adjoined relatives are those which can be analysed as having a demonstrative. Further evidence for this comes from the following:[23]

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[22] Another advantage of treating restrictive relativization as adjunction to NP is that it would provide a way of structurally distinguishing them from non-restrictive relatives. It seems quite plausible to treat non-restrictives as adjoining to DP since they typically attach to names. Names, I assume, can be basic DP's in every language.

[23] Needless to say, it is perfectly acceptable to have right-adjoined and embedded relatives construed with a question wh word in the main clause:

(i)   **kaun laRkaa** vahaaN rahtaa hai *jo   khaRaa   hai*
      which boy   there   live-PR·   who standing be-PR

(42) a. *jo　　laRke khaRe　haiN　**kaun** vahaaN rahtaa hai
　　　　 which boys　standing be-PR who　there　live-PR
　　　　 "Which boys are standing, who lives there?"

　　 b. jo　　laRke khaRe　haiN　**un-meN-se**
　　　　 which boys　standing be-PR them-PART
　　　　 kaun vahaaN rahtaa hai
　　　　 who　there　live-PR
　　　　 "Which boys are standing, who out of them lives there?"

(42a) shows that the relative clause cannot be construed with a question wh expression. (42b) shows that there is no inherent incompatibility between correlative constructions and question formation. The only difference between the two is that the main clause DP now has a variable. We might say that a left-adjoined relative, being an operator, must bind a variable, otherwise it will be ruled out as a case of vacuous quantification.[24] A question word, being itself a quantificational element, cannot provide this variable but a demonstrative can.

Similarly, the relative clause cannot be construed with a proper name in the main clause:

(43)　　 *jo　　laRkii khaRii　hai　　**anu** lambii hai
　　　　 which girl　standing be-PR Anu tall　be-PR
　　　　 "Which girl is standing, Anu is tall."

(43) shows that a left-adjoined relative is not non-restrictive since non-restrictives typically occur with proper names.[25] This point is worth

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(ii)　　 **kaun laRkaa** jo　khaRaa hai　　vahaaN rahtaa hai
　　　　 which boy　　who standing be-PR there　live-PR
　　　　 "Which boy who is standing lives there?"

[24] It has been observed by Saito (1985) that base-generated topics do not need to bind argument positions. In (i), for example, only an "aboutness" relation holds:

(i)　　　 As for fish, I like cod.

Correlatives differ from such base-generated topics in requiring a stricter relationship with the main clause DP.

[25] It is possible to have proper names with the demonstrative, for example, vo anu "that Anu" would make (43) acceptable but in that case Anu actually functions like a common noun. To make any pragmatic sense, there would have to be at least two individuals with that name and the relative clause would pick

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making because the left-adjoined relative has a definite reading and is sometimes confused with non-restrictives because of this. (43) is ruled out by the generalization that a left-adjoined relative clause must crucially bind a variable inside the main clause. Since proper names are referential, they are not appropriate bindees for the relative clause. The sentence is ruled out on a par with other cases with a missing demonstrative.

In concluding this section I want to demonstrate that there are constraints on the binding involved in a correlative construction that are typical of operator-variable relationships. Complex noun phrases in Hindi, we saw in chapter II, are islands for extraction. This is demonstrated again in (44a) where topicalizing out of the complex DP leads to unacceptability. (44b) shows that a relative clause construed with a DP inside the complex DP also leads to ungrammaticality. This suggests that the DP coindexed with a left-adjoined relative has the status of a variable:

(44) a. *ravi$_i$ maiN [yeh baat　ki　t_i
　　　　 Ravi I　　this matter that
　　　　 nahiiN aayegaa] jaantii thii
　　　　 not　　come-F know-P
　　　　 "Ravi I knew the fact that will not come."
　　　　 (Ravi, I knew the fact that he will not come)

　　 b. *jo　vahaaN rahtaa hai maiN [yeh baat　ki　**vo**
　　　　 who there　live-PR　I　　this matter that he
　　　　 nahiiN aayeega] jaantii thii
　　　　 not　　come-F know-P
　　　　 "Who lives there, I knew the fact that he will not come."

Recall that left-adjoined structures can be construed with null pronominals. The unacceptability of structures like (44b) is further shown by the fact that substituting pro in place of the DP makes the sentence completely ungrammatical.

Further, correlatives also show weak crossover effects, typical of variable binding constructions, though admittedly, this is not very strong. However, the unacceptability becomes extremely clear if the variable is a pro:

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out one of them. This use of proper names is similar to that in English. *The Smiths who live here are my friends* does not use Smith as a proper name.

(45) *jo $vahaaN$ $rahtaa$ hai_i [[ek aurat   jis-ko vo$_i$ pyaar
       who there   live-PR   a   woman who-A he love
       kartaa hai] [us-se$_i$ shaadii   nahiiN karegii]]
       do-PR   he-INS marriage not   do-F
       "Who lives there, the woman whom he loves will not
       marry him."

This example has the schema [$_{CP}$relative clause]$_i$ [$_{IP}$[$_{NP}$...pronoun$_i$...]
[$_{VP}$...pronoun$_i$...]]. The pronoun inside the subject noun phrase
cannot be the element bound by the relative clause since it is inside an
island, as was shown by (44b). Therefore it is the pronoun in the VP
that the relative clause must bind. This blocks coreference between
the two pronouns. The pronoun inside the VP being a bound
variable, coindexation with a pronoun to its left leads to a weak
crossover violation. Of course, there would be no problem with
coreference if there was no left-adjoined relative clause. The problem
is not internal to the main clause, but a result of coindexation between
the relative clause and the VP-internal demonstrative.

We see, then, that the variable bound by the relative clause is like
variables created by movement. This may appear somewhat
problematic since we have explicitly argued against a movement
account of correlatives. The pronoun in the main clause, under the
approach suggested here, is a resumptive pronoun which is supposed
to be insensitive to the effects observed here (McCloskey 1989:14).

Sells (1984, 1987) provides a diagnostic for separating resumptive
pronouns from variables which are locally A' bound. He argues that
the former force extensional readings while the latter are ambiguous
between extensional and intensional readings.[26] If this is true then it
is easily shown that the pronoun in a correlative construction behaves
like a variable. The following clearly allow for intensional
interpretations:

(46) a. jo $ciiz$ $mujhe$ $caahiye$ $thii$ **vo** us-ko mil   gayii
        which thing I-D   needed   be-P that he-D get-P
        "Which thing I wanted, he got it."

---

[26] Actually, he uses the notion of a 'concept' reading to distinguish the two. I
use the term 'intension' to make the point because it is more familiar. The
distinction between the two, though important, is not directly relevant.

b. jo $aadmii$ $sabhii$ $bhaashaayeN$ bol $sake$
   which man   all   languages   speak can-SUBJ
   vo paidaa nahiiN huaa
   he born   not   be-PR
   "Which man can speak all languages, he has not been
   born."

The situation in Hindi seems comparable to Swedish, which
according to Engdahl (1985) has resumptive pronouns which have the
same properties as traces created by movement (see also Zaenen,
Engdahl and Maling 1981).[27] Thus, we might consider the
demonstrative in Hindi correlatives to be "phonetically realized
traces", on a par with resumptive pronouns in Swedish. Notice that
this actually supports the claim that the relation between a left-
adjoined relative clause and the pronoun is an operator-variable
relation. Operators in natural language not only must bind variables,
they must bind them locally.[28]

CONCLUSION

To sum up, I have shown in this chapter that right-adjoined relatives
manifest typical properties associated with restrictive relatives while
left-adjoined relatives display some unusual properties. On this basis,
I have argued that relative clauses that are adjoined at the clausal level
instantiate two distinct types of relationships with arguments in the
main clause. Adopting the view that extraposition is strictly a
rightward movement, I have analysed right-adjoined relatives as being
generated inside the main clause DP and moved to the right periphery
of the clause at S-structure. I have analysed left-adjoined relatives as
base-generated in that position. Using as evidence the absence of
noun modification readings for left-adjoined relatives I have argued
against the use of implicit property variables in interpreting relative

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[27] For example, resumptive pronouns in Swedish license parasitic gaps and in
structures where subjacency violations obtain, their presence does not lead to
grammaticality. Unfortunately, parasitic gaps are not testable in Hindi.

[28] There appears to be only one exception to the locality requirement. A
demonstrative inside a noun phrase can be bound by the quantifier if it is in
specifier position, i.e. if it carries genitive case as in (i):

(i) jo $larkii$ $khaRii$ hai [[**us-kii** bahan] lambii hai]
     which girl   standing be-PR she-G   sister tall   be-PR
     "Which girl is standing, her sister is tall."

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.