VENEETA DAYAL

7. QUANTIFICATION IN CORRELATIVES*

1. INTRODUCTION

The chief characteristic which sets apart the correlative construction from more familiar kinds of relativization is the position of the relative clause. Typically, the relative clause in a correlative construction appears at the beginning or the end, as seen in the following examples from Hindi:

(1) jo   laRkii khaRii   hai, vo   lambii hai
     which girl   standing is,   she tall   is

(2) vo   laRkii lambii hai, jo   khaRii   hai
     that girl   tall   is,   who   standing is

"The girl who is standing is tall."

The relative clause in these sentences is often analyzed as adjoined to the main clause (Keenan, 1985; Andrews, 1985). This poses a problem for a compositional mapping from syntax to semantics since the NP is already interpreted by the time the relative clause combines with it. Bach and Cooper (1978) resolve the problem by interpreting the NP as having an implicit property variable. This variable is abstracted over at the clausal level and the meaning of the relative clause inserted into the NP by lambda conversion. This account has been widely accepted since it maintains a syntactic distinction between correlatives and ordinary relatives but gets them to be semantically equivalent.

In Srivastav (1991a, b) I have argued that Bach and Cooper are mistaken in following the standard assumption that sentences like (1) and (2) both involve noun modification. I have claimed there that Hindi actually has two types of relativization. Right adjoined relatives, such as (2), are generated inside the noun phrase and are extraposed at S-structure. Such relative clauses function like ordinary noun modifiers.[1] Left adjoined relatives such as (1), on the other hand, do not originate inside the NP but are adjoined at the clausal level at D-structure, as shown below:

(3) $[_{IP}$ $[_{CPi}$ which girl is standing] $[_{IP}$ she$_i$ is tall]]

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The relative clause in such structures is not a noun modifier but a quantificational phrase binding an argument position inside the main clause. A direct linking between the wh NP and the main clause NP is ruled out since they are not in a c-command relation. The CP dominating the relative clause, however, can bind the main clause NP since it c-commands it. The CP is analyzed as a quantifier whose meaning is compositionally built up out of the meaning of the wh NP inside it. Briefly, the wh element *jo* is treated as a curried two-place determiner which combines first with a common noun and then with the predicate inside the relative clause to yield a quantifier level meaning for the CP. The pronoun *vo* in the main clause is treated like a bound variable and the full structure is interpreted by standard rules of quantification. For example, the relative clause in (1) denotes the set of properties of the unique individual who is a girl and is standing, the main clause denotes the property of being tall, and the sentence is true if and only if the property of being tall is one of the properties of the girl who is standing.

In this paper I take this distinction between left and right adjoined relatives as a point of departure, focusing on the semantics of correlatives like (1) which have left adjoined relatives.[2] In particular, I will be concerned with two aspects of their semantics that was not touched upon in Srivastav (1991b), namely an account of quantificational variability effects (QVE) and the interpretation of a negative polarity item *bhii* which can occur in correlatives.

Quantificational variability effects show up in correlatives when there is an adverb of quantification in the main clause, as in (4) below:

(4)   jo laRkiyãã mehnat kartii hãĩ ve aksar safal hotii hãĩ
         which girls effort   do   they often successful are

         "Girls who make an effort are often successful."

(4) can mean either that girls who work hard succeed most of the time or that most girls who work hard succeed. The second reading of (4) involves the phenomenon dubbed by Lewis (1975) as QVE and treated most successfully in frameworks like Kamp (1981) and Heim (1982). In Section 2 of this paper I attempt to account for QVE while keeping intact what I consider certain fundamental features of correlatives.

The second aspect of correlatives that I will be interested in is the semantics of Hindi *bhii*, a negative polarity item, which may optionally occur inside the relative clause. The presence of *bhii* sometimes

implies that the identity of the individual picked out by the relative clause is not known, or is irrelevant. In other cases, it seems to yield an interpretation akin to free choice *any* in English. (5a) demonstrates the first use of *bhii*, (5b) its second use:

(5)   a. jo bhii laRkii vahãã khaRii hai   vo ravi kii dost hai
          whichever girl there standing is she Ravi's friend is

          "The girl standing there, whoever she may be, is Ravi's friend."

      b. jo bhii laRkii mehnat kartii hai vo safal hotii hai
          whichever girl effort does   she successful is

          "Any girl who makes an effort is successful."

Though in a given case it is easy enough to decide which reading *bhii* has, it is not immediately obvious how to characterize its contribution to the meaning of the structure in a systematic way. In Section 3 I provide an explanation for its behavior, taking the approach to negative polarity items in Kadmon and Landman (1990).

The two features of correlatives that I investigate in this paper are also found in English. Adverbs of quantification give rise to QVE in English free relatives, as pointed out by Kratzer (1988) and Berman (1989 and 1991), and the behavior of Hindi *bhii* is clearly parallel to that of the morpheme *ever* in English free relatives. As such, the conclusions we reach about Hindi correlatives will have an obvious application to our understanding of these aspects of the semantics of English free relatives. In Section 4 the connection between Hindi correlatives and English free relatives is made explicit and the theoretical implications of an analysis of Hindi correlatives for English free relatives spelt out.

2. QUANTIFICATIONAL VARIABILITY IN CORRELATIVES

2.1. *Wh Expressions as Free Variables*

Let us take Berman (1989 and 1991) as a starting point for our discussion of QVE in correlatives. Briefly, he analyzes free relatives in English as having a tripartite quantificational structure of the same kind as in the Lewis/Kamp/Heim treatment of conditionals. Free relatives are treated as open sentences, wh expressions being free variables which pick up the

quantificational force of the operator which has scope over them. (6a), for example, has a logical translation like (6b). There is an implicit universal in operator position, the free relative is in the restrictive clause and the main clause is in the nuclear scope:

(6) a. Mary likes who she meets.
     b. $\forall_x$ [person'(x) & meet'(m, x)] [like'(m, x)]

Standard truth definitions interpret (6b) as saying that all individuals that Mary meets, she likes.

QVE effects follow when there is an overt adverb of quantification in the main clause, as in (7a). The implicit universal may now be replaced by the adverb, yielding a translation like (7b):

(7) a. Mary mostly likes who she meets.
     b. MOST_x [person'(x) & meet'(m, x)] [like'(m, x)]

This says that most persons that Mary meets, she likes, yielding the variable reading.

It seems fairly straightforward to account for QVE in correlatives along the same lines, if we treat them as involving tripartite quantificational structures. There would be a default universal quantifier in operator position. The relative clause would form the restriction on the quantifier, with the wh NP inside it being treated like a free variable. The main clause would be in the nuclear scope, the demonstrative inside it being treated like a definite anaphorically linked to the wh variable in the relative clause. The correlatives in (1) and (4), under this approach, would have the following translations:[3]

(1) a. $\forall_x$ [girl'(x) & stand'(x)] [tall'(x)]

(4) a. MOST_x [girl'(x) & make-effort'(x)] [succeed'(x)]

Standard truth definitions would ensure the appropriate interpretations.

There is an immediate advantage of taking this approach. Hindi has, in addition to the correlatives we have looked at, multiple correlatives such as (8a) in which there are two wh NPs in the relative clause linked to two demonstratives in the main clause. The analysis of multiple correlatives follows straightforwardly from the Lewis/Kamp/Hein view of quantifiers as unselective binders. (8a), for example, would be analyzed as having a translation like (8b), where the quantifier binds the two free variables represented by the wh NPs and the demonstratives linked to them:[4]

(8) a. jis laRkiine jis laRke ke saath khelaa usne usko haraayaa
        which girl   which boy with   played she him defeated

     b. $\forall_{xy}$ [girl'(x) & boy'(y) & played-with'(x, y)] [defeated'(x, y)]

(8b) says that for all pairs of girls and boys, such that the girl played with the boy, she defeated him. This seems a plausible first rendering of the meaning of (8a).

Thinking of correlatives as having quantificational structures of the same kind as conditionals has intuitive appeal since it establishes an anaphoric link between one or more wh NPs and demonstratives which are not in a c-command relation. At a descriptive level, this connection between correlatives and conditionals was made by Andrews (1985) who suggested the following algorithm for making the meaning of multiple correlatives like (8a) accessible to English speakers. A correlative can be translated, according to him, by replacing the wh NP with an indefinite and recasting the relative clause as a conditional. The analysis motivated by quantificational variability effects gives formal content to this intuition.[5]

2.2. *The Singular-Plural Distinction in Correlatives*

Attractive though the analysis sketched above appears at first, significant problems surface when we take into account the singular-plural distinction in the morphology of correlatives.

Consider first the difference between (9) and (10), which differ only in plurality:

(9)   jo laRkii khaRii hai vo lambii hai
       which girl standing is she tall is

       "The girl who is standing is tall."

(10)   jo laRkiyãã khaRii hãĩ ve lambii hãĩ
       which girls standing are they tall are

       "The girls who are standing are tall."

(9) carries a strong uniqueness implication while (10) has a universal reading. Though the intuition is quite clear it is not obvious, at this point, how best to capture this distinction.[6]

The first step clearly is to adopt an explicit theory of plurality. Taking Link (to appear) and Landman (1989), we can assume that the domain

of individuals includes singular and plural individuals. The basic difference between singular and plural individuals is that plural individuals are built up out of singular individuals. Singular individuals are atomic, i.e. they have no individual parts while plural individuals are groups and may have parts. Applying this to correlatives, we may assume that singular predicates like *girl* in (9) can only be predicated of singular individuals and plural predicates like *girls* in (10) only of plural individuals.

This, however, is not in itself enough to capture the distinction between the unique reading of (9) and the universal reading of (10). Since the quantification involved is universal, the two sentences will come out equivalent. For example, if we have a model in which there are two standing girls, a and b, (9) will say that a and b are tall, while (10) will say that $a + b$ are tall. Intuitively, however, it should not be possible for (9) to be embedded in such a model. What is needed, then, is some way of restricting the interpretation of correlatives with singular morphology to models in which the antecedent is uniquely satisfied.

One option could be to consider such a restriction part of the pragmatics of the use of the singular as opposed to the plural. This solution, however, turns out to be implausible when we take multiple correlatives into account. (8a), for example, clearly allows for multiple pairs of girls and boys and thus seems to warrant the universal quantifier. It would be completely ad hoc to suggest that the use of one singular wh NP signals uniqueness but the use of two or more such NPs does not.

There is a further complicating factor in the semantics of multiple correlatives. Though judgements for sentences like (8a) are delicate, there is a clear intuition that pairings between girls and the boys they play with are bijective, in the sense of Higginbotham and May (1981).[7] (8a) clearly does not refer to doubles, for example, in which two girls played with two boys. This is not captured by the analysis in its present form.

Thus, two problems remain in an analysis of correlatives which treats wh NPs as free variables bound by a universal quantifier. There is no principled way of accounting for the variation between a universal reading for a plural construction and a unique reading for the singular construction, and there is no account for the switch from uniqueness in the single correlative to bijectivity in the multiple correlative.

2.3. *Uniqueness in Correlatives*

We can capture the two important distinctions mentioned above if we include a uniqueness requirement into our analysis. The basic translation of correlatives would remain the same but the restrictive clause would include a condition restricting quantification to those variables which are unique. An adequate characterization of uniqueness could be in terms of maximality.[8]

This modification will yield the following translation for (9), where **max** is like the iota operator of Partee (1987) except that uniqueness is checked for maximal individuals only:

(9)   a. $\forall_x [x = \mathbf{max}\ y\ (girl'(y)\ \&\ stand'(y))]\ [tall'(x)]$

The relative clause in (9) is now interpreted with respect to a unique maximal individual. Since (9) has singular morphology, the maximality clause will be satisfied in a model only if there is exactly one individual who is a girl and is standing. If there are two standing girls in a model, say a and b, a will not satisfy uniqueness since there will be another y, namely b, who is also a standing girl. Thus **max** will be undefined here and there will be no possible assignment to x which will satisfy the restrictive clause. Thus, introducing uniqueness gets us the result we want in the case of correlatives with singular morphology in spite of universal quantification.

Now, consider (10), the plural counterpart of (9):

(10)   a. $\forall_x [x = \mathbf{max}\ y\ (girls'(y)\ \&\ stand'(y))]\ [tall'(x)]$

This too requires the conditions in the relative clause to hold of a unique individual. This individual being plural, however, the conditions will also hold of all its parts. In a model with two girls standing, a and b, the only individual to be taken into consideration will be the sum of a and b, i.e. the maximal individual $a + b$. Since this satisfies uniqueness, (10) will be true if $a + b$ is indeed tall. We can infer from this that it also holds of a and b individually that they are tall. Thus a quasi-universal reading is available for plural correlatives in spite of the restriction to uniqueness.

Note that this approach predicts that when the predicate requires a collective reading, the so-called universal reading will not be available. In (11), for example, the main clause has a predicate which holds of the plural individual as a whole but not of its parts:

(11) jo   laRkiyãã khaRii   hãĩ ve   behane hãĩ
      which   girls   standing are they   sisters are

"The girls who are standing are sisters."

The next step is to see if the uniqueness requirement we have introduced can be used to capture the bijective reading of multiple correlatives such as (8a). This can be done if the uniqueness requirement is encoded separately for each wh NP. (8a), for example, would be translated as (8c):

(8) c. $\forall_{xy}$ [x = **max** z (girl'(z) & boy'(y) & played-with'(z, y)) &
         y = **max** z (girl'(x) & boy (z) & played-with'(x, z))]
         [defeated'(x, y)]

This allows for multiple pairings which respect bijectivity. The maximality clauses ensure that uniqueness for each wh NP is relative to assignment of value to the variable denoted by the other wh NP. For example, in a model where there are two relevant pairs of individuals $\langle a, c \rangle$ and $\langle b, d \rangle$, the interpretation allows for both, since a and c are atomic maximal individuals, unique relative to each other. And uniqueness is satisfied similarly for b and d. This formulation of the uniqueness requirement ensures that (8c) cannot be embedded into models in which the relation *play* between girls and boys is non-bijective. For example, if a plays with c and d, neither c nor d will satisfy **max** since they will both be maximal atomic individuals that a played with, and uniqueness relative to a will not be maintained.

By including uniqueness into the representation, then, we have accomplished both goals. We have accounted for the unique/universal variation between singular and plural correlatives like (9) and (10), and the unique/bijective variation between single and multiple correlatives like (9) and (8a).

Before seeing how this modification impacts on the explanation for QVE, two points need to be clarified. First, a treatment of correlatives as involving universal quantification does not require the existence of any individual satisfying the restrictive clause, but sentences like (8a), (9) or (10) do carry existential presuppositions. A sentence like (4), on the other hand, does not. There is a clear correlation here with the tense-aspect system. Existence is presupposed only when the tense is episodic.

The problem of how to capture this fact is not confined to Hindi correlatives alone but also holds of sentences with ordinary universal

quantifiers. In English, the contrast is shown by sentences like (12a) which presuppose the existence of children and (12b) which does not:

(12) a. Every child is asleep.
     b. Every child who is tired falls asleep easily.

It is standardly accepted that this should be handled through a general theory of presupposition projection (see Karttunen and Peters, 1979 and Heim, 1983 for relevant discussion). I assume that a similar approach will work for correlatives as well.

A second question that needs to be addressed is what happens when the uniqueness requirement is not met. Let us take (9) as an example. Suppose there are two standing girls; **max** will fail to pick either one since neither atomic individual will be unique, but the sentence as a whole will come out vacuously true. Intuitively, however, we feel that the sentence is inappropriate in this situation. I believe there is a Gricean explanation for this. Since the speaker knows the truth conditions associated with such structures, we expect her to use the plural predicate if she intends to refer to the two individuals she knows are standing, rather than to depend on the truth conditions being satisfied vacuously.[9]

Correlative constructions, we may therefore assume, are adequately analysed as universally quantified structures in which wh NPs denote the maximal individuals of whom the predicates in the relative clause hold.

2.4. *Uniqueness and QVE*

Having established the need for encoding uniqueness into the representation, let us return to the issue of QVE in correlatives. The basic idea behind the explanation sketched out in section 2.1 is that correlatives have a default universal quantifier and that variability effects show up when this is replaced by an overt adverb of quantification. Before assessing where uniqueness fits into this account, let us take a closer look at the facts.

Consider a multiple correlative like (13), with an overt adverb of quantification in the main clause. We know that a default universal quantifier is needed in multiple correlatives to ensure that multiple pairs of individuals may be quantified over, and we would expect the adverb to replace the universal in this sentence:

(13) a. jis laRkiine   jis laRke ke saath   khelaa usne usko   asksar
          which girl   which boy with   played she him   often

          haraayaa
          defeated

   b. $\forall_{xy}$ [girl'(x) & boy'(y) & played-with'(x, y)]
      OFTEN[defeated'(x, y)]

   c. MOST$_{xy}$ [girl'(x) & boy'(y) & played-with'(x, y)]
      [defeated'(x, y)]

(13a), however, does not have the variable reading indicated in (13c). This means that the explanation of QVE in correlatives cannot simply involve replacing the universal quantifier with the overt adverb of quantification.

Note that the explanation for QVE fails in the case of multiple correlatives independently of whether we include uniqueness into the representation or not. An example where including uniqueness makes a difference is (4), which has a plural predicate in the relative clause. Under the modified account of correlatives, this will now be analyzed as (4b):

(4) b. MOST$_x$ [x = **max** y (girls'(y) & make-effort'(y))]
             [succeed' (x)]

Since the restrictive clause can only pick out a single individual, in this case a single plural individual, and a quantifier like MOST needs a plurality of individuals in order to be defined, (4b) should be ruled out. That is to say, (4) should not have a variable reading, but it does. The dilemma we seem to be faced with here is the following. We must either forgo the explanation for QVE or the explanation for the distinctions between the unique/universal readings discussed in Section 2.3. Since including uniqueness accounts not only for the unique/universal distinction, but also for the unique/bijective distinction between correlatives with one and those with more than one singular wh expression, it seems important to preserve uniqueness and look further for an account of QVE.

Finally, QVE is also manifested in correlatives with singular morphology. Thus (14) has two readings:

(14)   jo laRkii mehnat kartii hai   vo aksar safal hotii hai
         which girl effort does   she often successful is

         "The girl who works hard is often successful."

The expected reading, on the present analysis, is the one where the relative clause picks out the unique girl who works hard, and the main clause says that she is successful most of the time. The other reading is the variable reading where most girls who work hard succeed. Given the arguments for encoding uniqueness into the semantics of correlatives, we conclude that something other than quantification over individuals must be at issue in QVE.[10]

The generalization that emerges from the above examples is that plurality of individuals is neither sufficient nor necessary for QVE to obtain. If we take a closer look at the examples, we will notice that each of the examples which allows for QVE has a generic reading. The crucial role that genericity plays in QVE can be further demonstrated.

Hindi has two types of verb "to be", *hai* and *hotaa hai*. The first yields primarily an epistemic reading, the second only a generic reading.[11] In (15a)–(15b) we keep the number constant and vary the verb between the epistemic and the generic:

(15) a. jo laRkii tez hai vo aksar safal hotii hai
        which girl smart is she often successful is

   b. jo laRkii tez hotii hai vo aksar safal hotii hai
      which girl smart is   she often successful is

   "The girl who is intelligent is often successful."

In (15a) the verb form is *hai* and it is a statement about the unique girl in the relevant world who is smart. In (15b), the verb form is *hotii hai* and it is a generic statement about girls who are smart. (15b) but not (15a) has a variable reading, clearly showing that genericity is the critical factor in obtaining QVE.[12]

Similarly, QVE effects show up in multiple correlatives when the tense is generic. Compare (16) with (13a) above:

(16)   jo laRkii jis laRkeko   sabse pahle dekhtii hai
         which girl which boy   of-all first sees

         vo aksar usiiko   pasand kartii hai
         she often him   likes

In (13a) the tense was episodic and the variable reading was ruled out. In (16) the tense is generic and a variable reading is allowed. It says that for most pairs x and y, x a girl and y a boy x sees first, x likes y.

The distinction that we seem to be faced with in the above 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. One approach which maintains uniqueness while still allowing enough flexibility to deal with "multi-case" conditionals treats adverbs as quantifying over situations rather than individuals. Berman (1987), drawing on Kratzer (1989a), takes such an approach. 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.

Since correlatives clearly call for uniqueness to be included in their semantic representation, let us try to explore how such an approach may be applied to obtain QVE. According to this approach, (15a) being epistemic, would require absolute uniqueness. (15b), on the other hand, would involve quantification over situations and would say that most situations with a unique smart girl are situations (or extend into situations) where the unique smart girl is successful. The crucial idea is that uniqueness is checked for minimal situations only, so that even if there are situations in which there may be more than one smart girl, there will be subsituations in which a unique smart girl will be present. Thus the analysis maintains uniqueness but allows for a number of situations over which MOST can quantify, yielding the variable reading. Note that multiple correlatives like (13a) allow for a number of subsituations involving unique pairs of boys and girls, but the tense is episodic and a variable reading is ruled out. This clearly shows that adverbs of quantification, if they quantity over situations, can do so only in the case of generic tense.

The view that adverbs of quantification are unselective binders over individual variables as originally proposed by Kamp (1981) and Heim (1982) is at the center of much current debate. Chierchia (1988) and

(1991), for example, strongly argues against it (see also Kratzer, 1989b). Alternatives, such as taking adverbs as quantifying over situations rather than individuals, however, also leave open many problems, some of which are discussed in Heim (1990). Many of the concerns she voices transfer over to an analysis of correlatives which includes uniqueness and tries to get variability via quantifying over situations. To go into them, however, is beyond the scope of this paper and I will settle for pointing out that the facts of Hindi correlatives are relevant to the debate in arguing against a view of adverbs as unselective binders and in favor of a situation-based approach.

3. NEGATIVE POLARITY BHII IN CORRELATIVES

3.1. *Negative Polarity item bhii*

In this section we will see that the distinction between absolute vs. relativized uniqueness that a situation-based approach yields is also needed in understanding the contribution of the negative polarity item *bhii* to correlatives.

To sum up the basic facts, Hindi correlatives can have a particle *bhii* which functions very much like the morpheme *ever* in English free relatives. It can suggest that the identity of the individual denoted by the relative clause is not known to the speaker or it can have a reading akin to free choice *any*. Let us call the first the identity reading of *bhii*, and the second its free choice reading. The two are demonstrated in (5a–b), repeated below:

(17) a. jo bhii laRkii vahāā khaRii hai vo ravi kii dost hai
         whichever girl there standing is she Ravi's friend is

         "The girl who is standing there, whoever she may be, is Ravi's friend."

     b. jo bhii laRkii mehnat kartii hai   vo safal hotii hai
         whichever girl effort does   she successful is

         "Any girl who makes an effort is successful."

Characterizing the semantics of *bhii* in a way that would yield the two readings in a principled manner is not a trivial issue. We could, for example, take the free choice reading as basic and consider *bhii* to be a universal, a sort of spell out of the implicit universal quantifier,

but this would leave unexplained the identity reading. Conversely, if we took the identity reading as basic the free choice reading would remain elusive. A third possibility that suggests itself is to consider *bhii* ambiguous between the two, but then it is unclear why only one reading is available for any given sentence. The problem should be familiar from discussions of the role of *ever* in free relatives. In this section I want to propose a unified account of the semantics of *bhii*. I will begin by establishing that it is a negative polarity item, and then show how the identity and free choice readings follow from the interaction of such items with tense and aspect.

The particle *bhii* is a negative polarity item which occurs with ordinary indefinites only in those contexts which are standardly known to allow for such items. For example, it may occur in a sentence with negation or a modal, such as (18a) and (18b), but not in a sentence like (18c) which has neither:[13]

(18) a. ramaa kisiiko bhii nahĩĩ jantii
       Rama   someone   not   know

   "Rama doesn't know anyone."

   b. ramaa kisiiko bhii dekh saktii hai
      Rama   someone   see   can

   "Rama can see anyone."

   c.*ramaa kisiiko bhii dekh rahii hai
      Rama   someone   is seeing

   "Rama is seeing anyone."

In accounting for the behavior of *bhii* in correlatives I will follow the approach to negative polarity items in Kadmon and Landman (1990). They attempt a unified account of polarity sensitive *any* and free choice *any*, a problem that remains open in earlier accounts such as Ladusaw (1979) and Carlson (1981). They suggest that the item *any* is subject to a semantic criterion of *widening* and a functional criterion of *strengthening*. The relevant definitions are given below:

Widening: In an NP of the form *any* CN, *any* widens the
           interpretation of the common noun along a
           contextual dimension.

Strengthening: *any* is licensed only if the widening that it
                induces creates a stronger statement, i.e. if the
                statement on the wide interpretation ⇒ the
                statement on the narrow interpretation.

Kadmon and Landman argue that the so-called ambiguity between polarity sensitive *any* and free choice *any* results from the effect of widening in different contexts. The interpretation it will have in a particular context can be determined by applying the two criteria of widening and strengthening. My attempt in the next section will be to show that the two readings of *bhii* in correlatives, namely the identity reading and the free choice reading, can also be derived by applying the principles proposed by Kadmon and Landman for English *any*.

3.2. *The Two Readings of bhii*

Let us begin by identifying the contexts in which the two readings of *bhii* become available. Consider the examples in (19) in which *bhii* yields an identity reading, and those in (20) where it yields a free choice reading.

(19) a. jo bhii laRkii is patrikaa kii sampaadikaa hai
        whichever girl this magazine's editor   is

    usko inaam miltaa hai
    her   prize given   is

    "The girl who is the editor of this magazine, whoever she may be, gets prizes."

    b. jo bhii laRkii sundar hai   ravi usse milnaa caahtaa hai
       whichever girl pretty is   Ravi her to-meet wants

    "Ravi wants to meet the girl who is beautiful, whoever she may be."

(20) a. jo bhii laRkii is patrikaa kii sampadikaa hotii hai
        whichever girl this magazine's editor   is

    usko inaam miltaa hai
    her   prize given   is

    "Any girl who is the editor of this magazine gets prizes."

b. jo bhii laRkii   sundar hotii hai ravi   usse   milnaa
   whichever girl   pretty   is   Ravi her   to-meet

caahtaa hai
wants

"Ravi wants to meet any girl who is beautiful."

If we look at the examples above we see that the only difference between the two sets is in the verb form of the relative clause. (19) has the epistemic *hai* while (20) has the generic *hotaa hai* for the verb "to be". Recall that this difference was analyzed as relating to absolute uniqueness vs. uniqueness relative to situations and that this was important in determining whether QVE could obtain in correlatives. The correlation between the reading *bhii* yields and the tense-aspect of the clause is clear. In cases where the tense-aspect system imposes absolute uniqueness requirements, as in (19a–b), we get the identity reading; in cases where relativized uniqueness suffices, as in (20a–b), we get the free choice reading.

In order to analyze how *bhii* affects the meaning of a correlative it is instructive to compare it to the version without it. Let us compare (19a) which has *bhii*, for example, with (21), the version without it:

(21)   jo laRkii is patrikaa kii sampaadikaa hai
        which girl this magazine's editor   is

        usko   inaam miltaa hai
        her   prize given is

        "The girl who is the editor of this magazine gets prizes."

Since the verb in the relative clause is epistemic, we know that there is a requirement of absolute uniqueness in (21). The speaker of this sentence clearly has a uniqueness presupposition, though she may or may not know the identity of the unique individual denoted by the relative clause. That is, she can use it referentially to denote a particular individual or attributively without having a specific individual in mind. The referential-attributive distinction I am suggesting here is the one proposed by Donellan (1966) for definite descriptions. Suppose that this distinction is represented in the translation of the correlative. On the referential use, the representation of (21) will include an identity statement. If the speaker thinks that Mary is the editor of the magazine, for example, the antecedent would contain a statement identifying the

referent of the relative clause with Mary, as in (22a). This would be missing from the attributive use of (21), represented in (22b):

(22) a. $\forall_x$ [x = **max** y(girl'(y) & editor'(y)) & x = m]
         [gets prizes'(x)]

    b. $\forall_x$ [x = **max** y(girl'(y) & editor'(y))] [gets prizes'(x)]

The claim I would like to make is that (19a) differs from (21) in allowing only the attributive use and that the absence of a restricting statement about identity in a correlative with *bhii* fulfills the semantic criterion of widening, in the sense of Kadmon and Landman (1990). This widening is along a dimension of identity since it prevents the identity presupposition of the speaker from being represented in the logical form. Further, this widening is licensed since it results in strengthening.

Let us see how widening along the dimension of identity strengthens the correlative. If *bhii* strengthens a correlative then (19a), the version with *bhii*, should entail (21), the version without it. To see if it does, let us check the entailment relations between (22a), the referential use of (21), and (22b), its attributive use.

Take two scenarios, one in which Mary is actually the editor of the magazine and gets prizes. In the second scenario Sue is the editor and gets prizes but Mary does not. The speaker has heard that the editor of the magazine gets prizes but mistakenly believes Mary to be the editor. In the first scenario, (22a) and (22b) will both be true. In the second scenario, (22b) will naturally be true. (22a) will also be true in this scenario even through there is a false presupposition about identity. The antecedent being false, the conditional will automatically be true. Thus (22b) entails (22a), since whenever it is true, (22a) has to be true regardless of the accuracy of the identity presupposition.

Now take a third scenario. Mary is not the editor of the magazine but gets prizes. Sue is the actual editor but she never gets prizes. The speaker knows that Mary gets prizes and mistakenly believes her to be the editor. In this scenario, (22a) will be true, albeit vacuosly. (22b), however, will be false since Sue will satisfy the antecedent but not the consequent. The inference from (22a) to (22b) is contingent upon the accuracy of the identity presupposition. Thus (22a) does not entail (22b). In other words, the attributive use entails the referential use but the referential use does not entail the attributive use.

We are now in a position to decide whether the use of *bhii* results

in strengthening. The version with *bhii*, (19a), has only the translation in (22b), while (21) can be translated as (22a) or (22b). Since (22b) logically entails (22a) or (22b), we can conclude that the presence of *bhii* has the effect of widening and that this widening is licensed by strengthening. Correlatives which demand absolute uniqueness, then, are ambiguous between attributive and referential uses of the relative clause – the presence of *bhii* makes it unambiguously attributive. In order words, the identity reading of *bhii* is simply the unambiguously attributive reading of the correlative.

Let us turn now to (20a), repeated below, and compare it to (23), the version without *bhii*:

(20) a. jo bhii laRkii is patrikaa kii sampadikaa hotii hai
         whichever girl this magazine's editor   is

         usko inaam miltaa hai
         her prize given is

         "Any girl who is the editor of this magazine gets prizes."

(23) jo laRkii is patrikaa kii sampadikaa hotii hai
      which girl this magazine's editor   is

      usko inaam miltaa hai
      her prize given is

      "The girl who is the editor of this magazine gets prizes."

In (20a) the tense-aspect shows that it is a generic statement and *bhii* yields a free choice reading. The opposition between referential and attributive uses is not relevant. Since the context is generic, we are dealing with possible or typical situations, so the speaker cannot be expected to have any presuppositions about identity. Thus we cannot analyse *bhii* in the same terms as in the case of (19a). We want to maintain, however, that the contribution of *bhii* is the same. It involves widening along a particular dimension and that this widening is licensed by strengthening.

In the case of generics, widening can only be along the lines of what counts as a relevant situation for evaluation. Consider (23), the version without *bhii*. Singular morphology suggests that at any given time, the magazine would have only one editor but the verb form indicates that it is a generic statement about the magazine's editors. Like all generics, it allows for exceptions. Thus, its truth will not be affected by a situa-

tion in which a girl who edits the magazine does not get prizes, if that situation is atypical in some way. For example, the magazine might have a record of brilliant editors except for one particularly incompetent editor who was fired after serving for just a couple of months. We would be inclined to judge (23) as true since we would consider the situation with the incompetent editor atypical.

Adding *bhii* to a generic, it seems, narrows down the range of possible exceptions. All situations, even atypical ones, become relevant in evaluating truth values. In the scenario described above, (20a) would be judged false. (20a) would be true only in models where even incompetent editors are awarded prizes. It could be appropriately used, for example, if it were the case that prizes were awarded by the same organization which owned the magazine and the speaker was pointing to the lack of integrity of this organization.

The free choice reading of *bhii* in generics, then, reflects a widening along the dimension of what situations count for evaluation. It involves a strengthening of the original statement since including atypical situations entails the typical ones (see Kadmon and Landman (1990) for further discussion).

The examples that I have used to demonstrate the effect of *bhii* are clearly epistemic or generic. In fact, many sentences can be interpreted in either way. For example, (24) is ambiguous between the two interpretations:

(24) jo laRkii patrikaa   nikaaltii hai usko inaam miltaa hai
      which girl magazine   takes out   her   prize given is

      "The girl who edits magazines is given prizes."

If we keep the two readings constant, however, we can test the effect of adding *bhii*. If the interpretation is epistemic, the relative clause requires absolute uniqueness and the introduction of *bhii* yields an identity reading. If the interpretation is generic, relativized uniqueness suffices and the introduction of *bhii* yields a free choice reading.

While more work is clearly needed to make the correlation between tense and aspect on uniqueness requirements more precise, I hope to have shown that *bhii* is not ambiguous between identity and free choice readings. The so-called ambiguity is a reflex of independently established distinctions between absolute and relativized uniqueness requirements in correlatives.

3.3. *QVE and bhii*

In Section 2 we saw that QVE is sensitive to genericity and in the previous subsection we saw that the interpretation of *bhii* is also sensitive to it. Essentially, variability shows up in the same or similar contexts as the free choice reading of *bhii*. In this subsection I would like to point out that variability and free choice readings do not coexist and that this is something the present analysis predicts.

Consider (25a) where the relative clause allows for a generic reading:

(25) a. jo   laRkii mehnat kartii hai vo safal hotii   hai
        which girl   effort   does   she successful is

"The girl who makes an effort is successful."

We assume that generics have a covert operator which involves universal quantification over situations but allows for some exceptions. For example, there may be some girls who work hard but do not succeed because they are somewhat unlucky. The situations containing such girls would be considered atypical and not taken into consideration, and (25a) would be judged true if all the girls in the typical situations succeed. Adding an adverb of quantification to (25a) we get (14), repeated below as (25b):

(25) b. jo laRkii mehnat kartii hai vo aksar safal hotii hai
        which girl effort does she   often successful is

Recall that this has a variable reading which says that most girls who work hard succeed. Here most, not all, situations with hard working girls must verify the truth of the statement. The difference between (25a) and (25b) is subtle, but our real concern is with a sentence like (25c) which has *bhii* in the relative clause and an adverb of quantification in the main clause:

(25) c. jo bhii laRkii mehnat kartii hai vo aksar safal
        whichever girl effort does   she often successful

        hotii hai
        is

Under the generic interpretation, *bhii* has a free choice reading. This means that all situations, even atypical ones, must verify the truth of the statement. In contrast, in order to get a variable reading, it is required

that some situations do not verify its truth. The analysis of correlatives we have proposed, then, predicts that a variable reading is incompatible with *bhii*. This is, in fact, the case. (25c) says that any girl who tries hard succeeds most of the time. The presence of *bhii* blocks the variable reading which would be otherwise available.

4. ENGLISH COUNTERPARTS OF CORRELATIVES

4.1. *Correlatives and Free Relatives*

By now it should be evident that correlatives are not as exotic as they were once thought to be. In fact, they share several semantic properties with English free relatives. For example, they both show a variation between unique and universal readings; they both display QVE in appropriate contexts; and both have an optional particle, *bhii* in Hindi and *ever* in English, which affects their meaning in similar ways. In this section I want to make explicit the implications of the proposed analysis of correlatives for English free relatives.

The syntactic representation that I have assumed for Hindi correlatives is that of a relative clause adjoined to the main clause at D-structure, as was shown in (3). English free relatives differ in occupying an argument position at D and S-Structure. Since free relatives do have some kind of quantificational force it is not implausible, however, to assume that they are subject to Quantifier Raising. If so, the representation of free relatives and correlatives would become parallel at LF.

Of course, certain differences between the two must be kept in mind. For example, since free relatives originate in argument positions the option of multiple relativization of the kind exemplified by (8a) will not be available. Another difference is that Hindi correlatives can be "internally headed", i.e. they can have a common noun inside the wh NP, while English free relatives typically do not contain such heads, though sometimes they may (Andrews, 1985). The point I want to focus on is that in spite of these differences, the two structures are isomorphic at the level at which interpretation is defined and it is not surprising that they should share so many semantic features.

A recent analysis of free relatives, in fact, treats them in a way essentially similar to the interpretation of correlatives I have given. Jacobson (1988) and (this volume, pp. 451–486) argues against the view that free

relatives are lexically ambiguous, as was proposed by Cooper (1983). Briefly, she analyses them as predicative terms which type shift, in the sense of Partee and Rooth (1983) and Partee (1987), into NP 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 of plurals such as Link (to appear) and Landman (1989), this ensures that a free relative will denote a unique maximal individual, singular or plural. Since English free relatives normally do not contain internal heads, they do not specify singular or plural individuals and come out as being ambiguous.

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 correlatives are universally quantified structures, even though quantification is restricted to those individuals who uniquely satisfy maximality.

As far as single correlatives go, there would be no problem in assuming Jacobson's analysis. The variation between unique/universal readings is captured in both accounts. The real motivation for treating correlatives as having universally quantified structures comes from multiple correlatives like (8a). As we saw, these structures must allow for multiple pairings between individuals. Treating wh NPs as denoting unique maximal individuals does not yield this result. Universal quantification restricted by uniqueness is needed in order to capture this fact.

As pointed out by Kratzer (1988), Jacobson's analysis, as it stands, does not account for variability effects. It seems to me that in order to do so, it would also have to appeal to the idea that adverbs of quantification bind not individuals but situations, in the sense of Kratzer (1989a), since it is committed to uniqueness just as my analysis of correlatives is.

Finally, the analysis of *bhii* that I have given extends straightforwardly to English *ever*. Interestingly enough, Jacobson (this volume, pp. 451–486) indicates that Kadmon and Landman's (1990) idea of widening is relevant to the semantics of *ever*, though there may be a difference in the way she intends to apply it.

4.2. *Correlatives and Definite Descriptions*

It should by now be obvious that the present approach to correlatives and free relatives, in imposing uniqueness requirements, treats them like definite descriptions. English free relatives and definite descriptions are known to be similar, and if correlatives are like free relatives, the connection with definite descriptions is not surprising.

English free relatives and definite descriptions, of course, cannot be completely identified. There are several differences between the two. Free relatives, for example, are sometimes disfavored in subject positions, unlike definite descriptions which may freely occur in any argument position:

(26) a.* Who she likes is a college professor.
     b. The person she likes is a college professor.

Such differences, however, seem to be primarily syntactic, and the claim here is that it is in their semantics that they are alike.

The present approach, in treating free relatives and correlatives as a type of definite description, differs from an approach such as Berman (1991), which groups free relatives with universally quantified NP's. The following paradigm is relevant to this question:

(27) 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.

While the three sentences appear to mean roughly the same thing, neither (27a) nor (27b) can be continued with ". . . but I liked most of them", while (27c) can. This follows if uniqueness requirements are built into the meaning of free relatives. Clearly, such a requirement would feature somewhere in the analysis of plural definite descriptions but not of universally quantified NP's.

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 crosslinguistic difference in frequency. These remarks are of course speculative, and I will leave them as such. How far one should

push the idea that correlatives are simply a type of definite description remains a matter for further investigation.

5. CONCLUSION

To sum up, I have taken as fundamental the distinction between the unique reading of correlatives with singular morphology and the universal reading of those with plural morphology, as well as the distinction between the unique reading of correlatives with one singular wh and the bijective reading of those with more than one such NP, and included a uniqueness requirement into their logical representation. In sentences with non-generic readings absolute uniqueness is required, while in those with generic readings uniqueness relative to situations suffices. Variability effects, I have argued, result from adverbs of quantification binding situations, not individuals; and such binding is only licensed when the tense and aspect allows for a generic reading. I have also provided an account of the negative polarity item *bhii*, whose contribution is analysed as involving widening and strengthening. The effect of widening is also dependent on tense and aspect. When the tense is episodic and absolute uniqueness is required, *bhii* blocks the referential use of the relative clause and yields only the attributive use. When the tense is generic and allows for evaluation of the correlative in different situations, it broadens the range of situations taken into account. In the first case, we get the identity reading, in the second, the free choice reading. Finally, I have shown that Hindi correlatives, though syntactically distinct from English free relatives, belong semantically with them. In particular, correlatives and free relatives appear to be a kind of definite description.

Department of Linguistics
Rutgers University

NOTES

[1] Hindi also has relative clauses next to the NP as in English. They are analyzed as the source for (2).

[2] I use the familiar term *correlative* to refer only to left adjoined structures since I take right adjoined structures to involve ordinary relativization.

[3] I am ignoring for the moment the singular-plural distinction, which will be addressed in Section 2.2.

[4] In the generalized quantifier approach of Srivastav (1991a, b), sentences like (8a) are analyzed as involving binary quantification. Specifically, the relative clause is taken to denote the set of relations that obtain between girls and boys they play with and the main clause as the relation *defeat*. The sentence is true iff the *defeat* relation is one of the relations in the denotation of the relative clause.

[5] It is worth emphasizing, however, that conditionals and correlatives cannot be conflated. One difference, for example, is that in a correlative construction the number of wh NPs must match the number of demonstratives anaphoric to them. This, of course, is not true of conditionals. In the generalized quantifier approach adopted in Srivastav (1991a, b) this matching is ensured, since a relative clause with n wh NPs is analyzed as a set of n-place relations. Quantification is only defined if the main clause denotes an n-place relation, which is only possible if it has n demonstratives. The matching of wh NP's and demonstratives remains an open problem within the approach being explored here.

[6] The translations I have given anticipate the analysis of correlatives as definite descriptions.

[7] See Srivastav (1991a) for arguments supporting bijectivity. I would also like to acknowledge Vijay Gambhir's help in confirming the judgements I rely on here and in the following section.

[8] This is similar in spirit to the representation of uniqueness in conditionals with anaphorically linked definites in Kadmon (1987).

[9] See Kadmon (1987: 347) for similar arguments for preserving uniqueness in conditionals like "Most women who own a dog beat it", despite problems with presupposition failure in situations with women having more than one dog.

[10] The Hindi facts clearly contradict the claim in Berman (1991) who allows for QVE in English indirect questions only when the wh expression is plural. I believe this claim to be wrong even for English. The following do seem to have variable readings:

(i)   Prof. Jones usually knows which student is the smartest.
(ii)   Prof. Jones usually likes the student who is the smartest in the class.

[11] 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.

[12] An adverb like *jyaadaatar* "mostly" does not seem to adhere to this distinction, showing QVE even with episodic tense. It should be pointed out in this connection that English *mostly* also differs from other adverbs in showing QVE even when it occurs with episodic tense. (i), for example, has a variable reading that (ii) does not:

(i)   I mostly liked what Sue ordered yesterday.
(ii)   I often liked what Sue ordered yesterday.

This suggests that *mostly* may be amenable to a different analysis (see Lahiri (1990), for example). In this paper I steer clear of *jyaadaatar* for this reason.

[13] *bhii* has a second meaning, namely "too" or "also", which shows up in sentences like (i). Here it does not attach to the indefinite determiner *kisii* and does not adhere to the restrictions being discussed.

(i)   ramaa   raviko   bhii   jaantii   hai
             Rama   Ravi   also   knows

             "Rama knows Ravi too."

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