
Uniqueness Effects in Correlatives*

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Abstract

The paper argues that the variability of the uniqueness effects exhibited by Hindi and Romanian correlatives is due to their mixed referential and quantificational nature. The account involves an articulated notion of quantification, independently motivated by donkey anaphora and quantificational subordination and consisting of both (discourse) referential components and non-referential components (dynamic operators over plural info states). The variable uniqueness effects emerge out of the interaction between: (i) the semantics of wh-indefinites, singular anaphors and habitual morphology and (ii) the pragmatics of quantification, which allows for the selection of different levels of 'zoom-in' on the quantified-over objects.

1 Uniqueness Effects in Hindi and Romanian Correlatives

The goal of this paper is to account for the variability of the uniqueness effects associated with correlative constructions in Hindi and Romanian. Correlatives are “biclausal topic-comment structures [...] [in which] the dependent clause introduces one or more topical referents to be commented on by the matrix clause, where each topical referent must be picked up by – correlated with – an anaphoric proform” (Bittner 2001: 39). The examples in (1) (Hindi) and (2, 3) (Romanian) below are single wh-topic correlatives, while (4) (Hindi) and (5) (Romanian) are multiple wh-topic correlatives.

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- (1) definite interpretation – Hindi (based on Dayal 1996):
 jo laRkii lambii hai, vo khaRii hai.
 which girl tall be.prs, that one standing be.prs
 ‘The one girl that is tall is standing.’
- (2) definite interpretation – Romanian:
 Care fată și=a=uitat ieri haina,
 which girl her.Dat=HAS=forgotten yesterday coat.the,
 pe aceea o=caută tată-l ei.
 PE that one her.Acc=look for father-the her.Gen
 ‘The father of the girl that forgot her coat yesterday is looking for her.’
- (3) universal interpretation – Romanian:
 Pe care om l=a=interogat Securitate-a,
 PE which person him.Acc=HAS=interrogated security-the,
 în acela nu=mai=am încredere
 in that one not=anymore=HAVE.1sg trust
 ‘I do not trust any person interrogated by the secret police anymore.’
- (4) mixed universal & definite interpretation – Hindi (Dayal 1996)¹:
 jis laRkii-ne jis laRke-ke saath khel-aa,
 which girl-Erg which boy-with together play-pfv
 us-ne us-ko haraa-yaa.
 that one-Erg that one-Acc defeat-pfv
 ‘Every girl that played against a boy is such that (she played against exactly one boy and) she defeated the one boy she played against.’²
- (5) universal interpretation – Romanian:
 Cine ce mîncare și=a=adus,
 Who what food REFL.Dat=HAS=brought
 pe aceea o =va=mînca.
 PE that one it.Acc=WILL.3sg eat
 ‘Everyone will eat whatever food they brought with them.’³

¹There is speaker variation with respect to the readings associated with episodic multiple-topic correlatives in Hindi: some speakers agree with the claim in Dayal (1996) that sentence (4) has a mixed universal & definite reading, while others claim that (4) can have only an across-the-board definite reading: the (one) girl who played with the (one) boy defeated him. See fn. 12 below for more discussion.

²Dayal (1996) does not provide a translation that clearly locates the uniqueness effects in the nuclear scope of the *every* quantification, but my informants report that this is the correct translation – as opposed to the truth-conditionally distinct ‘Every girl that played against exactly one boy defeated him’, which locates the uniqueness effects in the restrictor of the *every* quantification.

³A more natural (colloquial) variant is: *Cine ce și-a adus, aia o să mînince* (Everyone will eat whatever they brought).

The main proposal is that the variation in interpretation (definite / unique vs. universal / non-unique) exhibited by these constructions follows from their ambivalent referential and quantificational nature, which is closely related to the ambivalent referential and quantificational nature of (wh) indefinites like *a / which frog* or definites like *the frog*. The account is formulated in a compositional dynamic system that is independently motivated by weak / strong donkey anaphora and quantificational / modal subordination (Plural Compositional DRT, Brasoveanu 2007). Crucially, PCDRT enables us to define an articulated notion of quantification that consists of distinct (discourse) referential components and non-referential components (operators over plural info states).

Thus, correlative constructions provide a window into the nature of reference and quantification in natural languages and are relevant for theories of how semantics interfaces with both syntax and pragmatics. On the syntax/semantics side, correlatives are interesting because, just like donkey sentences,⁴ they have a quantifier-binding semantics without syntactic c-command. This is shown in (6) below⁵, where Hindi – and, for all intents and purposes, Romanian – correlatives are analyzed as adjunction structures that are closely related to topicalization constructions like *Megan^x, I like her_x* (indexation convention: superscripts on antecedents, subscripts on anaphors⁶).

(6) [IP [CP which^x girl is standing] [IP that_x one is tall]]

On the semantic/pragmatics side – which is our main focus here – correlatives display a universal vs. definite variation in interpretation both within a particular language and across languages. Intra-linguistic variation is exemplified by single vs. multiple topic correlatives in Hindi: *jo laRkii* (which girl) receives a definite / unique interpretation in (1) (single topic) and a universal / non-unique interpretation in (4) (multiple topic).

Also, compare the two Romanian single-topic correlatives: (2) has a definite / unique interpretation – it is infelicitous if there is more than one contextually salient girl who forgot her coat; (3) has a universal / non-unique interpretation – it is felicitous in the actual world, where more than one person was interrogated by the secret police. The definite correlative in (2) and the universal correlative in (3) are not morpho-syntactically different: in both cases, the subordinate clause is eventive *passé composé* and the matrix clause is stative present; that is, the difference in their interpretation is not due to their temporal-aspectual structure, e.g. generic present (*A dolphin eats fish and squid*) vs. episodic past (*A dolphin ate fish and squid*). So, this variation in

⁴That c-command (o-command, outranking etc.) is needed for quantifier binding is shown by the contrast between *Every^x boy recommended a book to his_x friends* and *#Every boy who read every^x Harry Potter book recommended it_x to his friends*. The minimally different example *Every boy who read a^x Harry Potter book recommended it_x to his friends* shows that c-command is not needed for donkey anaphora.

⁵See Srivastav (1991) and Dayal (1995, 1996) and, also, Bhatt (2003) for a recent detailed discussion.

⁶Determiners are indexed because the non-determiner elements can be part of both antecedents and anaphors, e.g. *a / every frog* vs. *the / this / said frog*.

interpretation seems to be a pragmatic matter: we deal with regular, habitual phenomena in (3) and accidental, sporadic ones in (2) – and it is world knowledge, i.e. an extra-linguistic, pragmatic factor that enables us to make this distinction.

As far as variation across languages is concerned, the morphologically unrealized contrast between the interpretations of the Romanian correlatives in (2) and (3) is overtly marked in Hindi: Dayal (1995) notes that single-topic correlatives have a universal reading if we switch from episodic to habitual morphology, as in (7) below.

(7) universal interpretation with habitual morphology– Hindi:

jo laRkii lambii ho-tii hai, vo khaRii ho-tii hai.
 which girl tall be-hab.f be.prs, that one standing be-hab.f be.prs
 ‘A tall girl (generally) stands, e.g. in buses with very little leg room between seats.’

An informant remarks that, intuitively, (7) generalizes over situations in which there is a unique girl who is tall. About each such situation, we predicate that the girl in it stands.

Another instance of cross-linguistic variation is provided by multiple-topic correlatives, which have an across-the-board universal interpretation in Romanian⁷ and a mixed universal & definite interpretation in Hindi.⁸

Thus, correlative constructions pose two problems: (i) the compositionality problem on the syntax/semantics side – in particular, the fact that the universal, quantificational reading does not require c-command and (ii) the 'uniqueness effects' variability on the semantics/pragmatics side – in particular, the connections between uniqueness effects on the one hand and, on the other hand, the semantics of habitual morphology in Hindi and the pragmatics of quantification at work in Romanian. The first problem is solved by taking a dynamic approach, which is specifically designed to compositionally capture syntactically non-local quantificational dependencies like donkey anaphora. We will not discuss the solution of this problem (see the appendix for all the relevant formal details), but instead focus on solving the second, semantics/pragmatics problem.

⁷This is clearer in examples like *Care ce problemă și=a=ales, pe aceea o=va=rezolva* (Everyone will solve whatever problem, i.e. all & only the problems, they chose) or *Care ce subiect și=a=ales, despre acela trebuie să=scrie* (Everyone must write about whatever topic, i.e. all & only the topics, they chose).

⁸If we look at triple-topic correlatives, we see that the generalization is as follows: the initial topic receives a universal interpretation and the other topics are unique relative to each value of the initial topic.

2 The Semantics of Hindi Single-Topic Correlatives

This section provides the analysis of the definite / unique vs. universal / non-unique interpretation of Hindi correlatives (sections 2.1 and 2.2) and indicates how this analysis is formalized in Plural Compositional DRT (section 2.3). Romanian correlatives and the cross-linguistic variation issues raised above are discussed in section 3.

2.1 The Definite / Unique Interpretation

The Russellian analysis of definite descriptions derives their uniqueness by putting together a maximality and a singleton requirement, as shown in (8) below.

$$(8) \quad \text{The chair Leif brought is wobbly.}$$

$$\underbrace{\exists x[\text{chair}(x) \wedge \text{bring}(\text{leif}, x)]}_{\text{existence}} \wedge \underbrace{\forall y[\text{chair}(y) \wedge \text{bring}(\text{leif}, y) \rightarrow y=x]}_{\substack{\text{maximality} \\ \text{singleton}}} \wedge \text{wobbly}(x)$$

uniqueness

The analysis can be alternatively represented in terms of set variables, as shown in (9).

$$(9) \quad \underbrace{\exists X[X \neq \emptyset]}_{\text{existence}} \wedge \underbrace{X = \{y: \text{chair}(y) \wedge \text{bring}(\text{leif}, y)\}}_{\substack{\text{maximality} \\ \text{singleton}}} \wedge |X| = 1 \wedge \text{wobbly}(X)$$

uniqueness

I propose that the definite / unique interpretation of Hindi (and Romanian) correlatives arises as a consequence of (i) the maximality contributed by the wh-indefinite in the topic / subordinate clause, together with (ii) the singleton requirement contributed by the singular demonstrative in the comment / matrix clause, as (10) below shows:

$$(10) \quad \begin{array}{l} \text{jo}^X \quad \text{laRkii} \text{ lambii} \text{ hai,} \quad \text{vo}_X \quad \text{khaRii} \text{ hai.} \\ \text{which girl tall be.prs,} \quad \text{that one standing be.prs} \\ \exists X[X \neq \emptyset \wedge X = \{y: \text{girl}(y) \wedge \text{tall}(y)\}] \wedge |X| = 1 \wedge \text{standing}(X) \end{array}$$

uniqueness

That is, our Hindi episodic single-topic correlative is interpreted as follows: (i) the topic clause introduces a set X containing all and only the individuals that satisfy both the restrictor and the nuclear scope property of the wh-indefinite, i.e. the set of tall girls –

this is due to the maximality (in a sense, λ -abstraction) contributed by the wh-indefinite; (ii) then, we check the comment clause relative to the set X , that is, we check that X is a singleton set – due to the singleton requirement contributed by the singular anaphor – and that the only girl in X is standing.

Note that we do not conflate Russellian definites (or universal quantifiers) and maximal indefinites: (i) definites maximize only over their restrictor property (the same thing happens with universal quantifiers), i.e. we extract the set of individuals satisfying the restrictor property, and check that this set is a singleton and that it satisfies the nuclear scope property; (ii) maximal indefinites maximize over both the restrictor and the nuclear scope property, i.e. we extract the set of individuals satisfying both of them, and we check that this set is non-empty. Thus, definites and maximal indefinites differ with respect to: (i) whether or not maximization ‘includes’ the nuclear scope property and (ii) whether or not the singleton requirement is part of their meaning.

The way we use maximal indefinites becomes clearer if we look at a related phenomenon in English, namely the uniqueness effects associated with singular cross-sentential anaphora. Consider (11) and (12) below – and “suppose I need to borrow a chair [...] Leif has ten identical chairs, and he is willing to lend any of them. You can now say [(11)] to me [...]. In this situation, the NP *a chair* does not refer to a unique chair. [...] When anaphora is attempted, however, the uniqueness effect always shows up. Consider [(12)] in the same situation, and be sure that you are completely unable to distinguish any one of Leif’s chairs from his other chairs. [...] Many speakers cannot use [(12)] in such a situation [...] [(12)] is only felicitous [...] [if] they are referring to a chair which is uniquely identified by some property” (Kadmon 1990: 279-280).

(11) Leif has a chair. (Kadmon 1990)

(12) a. Leif has a chair. b. It is in the kitchen. (Kadmon 1990)

These uniqueness effects can be derived in terms of maximal indefinites as shown in (13) below (Kadmon 1990 proposes a different analysis): sentence (12a) introduces a set X consisting of all and only the individuals satisfying the restrictor and nuclear scope properties of the indefinite, i.e. the chairs that Leif brought; then, (12b) checks that X is a singleton (due to the singular anaphor) and that the only chair in X is in the kitchen⁹.

⁹Ordinary and wh indefinites differ with respect to how their maximality comes about: maximality is always part of the semantics of wh indefinites, but only a (pragmatic) default for ordinary indefinites. This enables us to account for non-unique singular anaphora (unlike Kadmon 1990), e.g. *Leif memorized a^x poem and I memorized a^x different_x one / an^x other_x one* (or: *a^x poem that was different from it_x*). This also enables us to account for (mixed) weak and strong donkey sentences, as Brasoveanu (2007) shows.

- (13) Leif has a^X chair. It_X is in the kitchen.
 $\exists X[X \neq \emptyset \wedge X = \{y: \text{chair}(y) \wedge \text{have}(\text{leif}, y)\}] \wedge \underbrace{[|X| = 1]}_{\text{singleton}} \wedge \text{in_kitchen}(X)$

 $\underbrace{\hspace{15em}}_{\text{maximality}} \quad \underbrace{\hspace{10em}}_{\text{singleton}}$
 $\underbrace{\hspace{25em}}_{\text{uniqueness}}$

Thus, singular cross-sentential anaphora provides independent justification for the proposed analysis of uniqueness effects in correlatives.

2.2 The Universal / Non-Unique Interpretation

The universal / non-unique interpretation of Hindi correlatives basically arises by interposing a distributivity operator, contributed by the habitual morphology in the matrix clause, between (i) the maximal wh-indefinite in the subordinate clause and (ii) the singleton requirement contributed by the singular demonstrative in the matrix.¹⁰

- (14)
- | | |
|--|--|
| $\text{jo}^X \text{ laRkii lambii ho-tii hai,}$
which girl tall be-hab.f be.prs,
$\exists X[X \neq \emptyset \wedge X = \{y: \text{girl}(y) \wedge \text{tall}(y)\}] \wedge$ | $\text{vo}_X \text{ khaRii ho-tii hai.}$
that one standing be-hab.f be.prs
$\forall x \in X \quad [\{x\} = 1 \wedge \text{standing}(\{x\})]$ |
| $\underbrace{\hspace{15em}}_{\text{maximality}} \quad \underbrace{\hspace{10em}}_{\text{distributivity}} \quad \underbrace{\hspace{10em}}_{\text{singleton}}$ | |
| $\underbrace{\hspace{25em}}_{\text{non-uniqueness}}$ | |
| $\underbrace{\hspace{25em}}_{\text{universal interpretation}}$ | |

The distributivity operator contributed by habitual morphology neutralizes the singleton requirement contributed by the singular anaphor. Therefore, the maximality of the wh-indefinite delivers the desired universal / non-unique interpretation.

But why would habitual morphology contribute a distributivity operator over individuals? In fact, it does not: I actually take habitual morphology to contribute *distributivity over cases / situations* – and only indirectly over the individuals featured in these cases / situations. Recall the informant’s comment about the habitual correlative in (7): this correlative generalizes over situations in which there is a unique girl who is tall; about each such situation, we predicate that the girl in it stands.

¹⁰ For simplicity, I take habitual morphology in the subordinate clause to be an agreement marker with a vacuous semantic value (e.g. an identity function of the appropriate type). Nothing crucial rests on this – the final version of the analysis allows for every occurrence of the habitual morphology to be uniformly interpreted while still deriving the desired interpretation; see the appendix for the formal details.

The English discourses in (15) (Sells 1985) and (16) (Karttunen 1976) below exhibit a similar kind of distributivity, i.e. a similar kind of ‘zooming in’ on each case / situation under consideration: (15) says that, for each case / situation featuring a chess set and a spare pawn, the pawn in the case / situation under consideration is taped to the top of the box; and (16) says that, for each case / situation featuring a convention and a woman courted by Harvey at that convention, the woman in the case / situation under consideration comes to the banquet with Harvey.

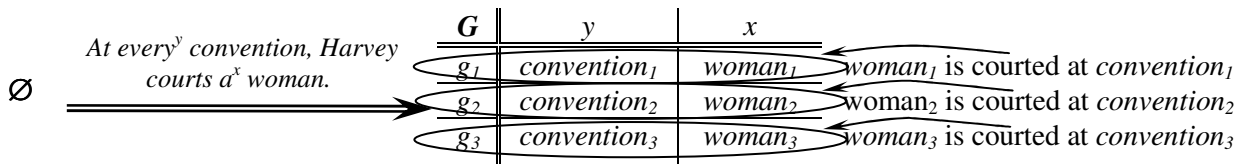
- (15) a. Every chess set comes with a^x spare pawn.
 b. It_x is taped to the top of the box.
- (16) a. Harvey courts a^x woman at every convention.
 b. She_x always comes to the banquet with him.

Thus, I propose that the distributivity contributed by Hindi habitual morphology is the same as the distributivity contributed by *always* in (16) – or covertly supplied in (15).

We also need to slightly revise our semantics for wh-indefinites: they do not introduce maximal sets of individuals, but maximal sets of cases / situations featuring all and only the individuals that satisfy their restrictor and nuclear scope.

So, how should we formalize this pre-theoretical notion of case? “[A] case may be regarded as the tuple of its participants; and these participants are values of the variables [i.e. anaphors] that occur free in the open sentence modified by the adverb [e.g. *always* in (16)]. In other words, we are taking the cases to be the admissible assignments of values to these variables” (Lewis 1975: 5-7). That is, a case is a sequence of individuals assigned as values to whatever variables / anaphors we have. Importantly, formalizing maximality requires us to manipulate *sets* of such cases / sequences – unlike Lewis (1975), which manipulates single cases.

For example, the set of cases contributed by sentence (16a) relative to the empty set of cases \emptyset (on the narrow-scope reading of the indefinite *a woman*) is as shown below:



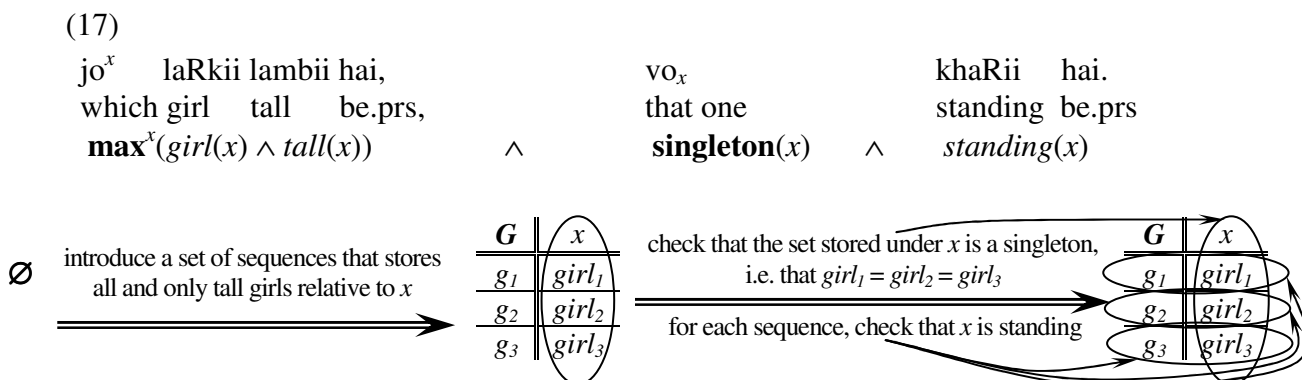
We store under the variable *y* all the conventions attended by Harvey and under *x* all the women courted by Harvey at the *y*-conventions. The cases / sequences encode the

dependencies between conventions and women in a distributive, pointwise manner: the woman in g_1 (namely $woman_1$) is courted at the convention in g_1 (i.e. at $convention_1$), the woman in g_2 is courted at the convention in g_2 etc. Then, sentence (16b), in particular the adverb *always*, instructs us to *distributively* test this set G of sequences: for each sequence, we check that the x -woman came to the banquet of the y -convention, e.g. for g_1 , we check that $woman_1$ came to the banquet of $convention_1$ etc.

A compositional account of quantificational subordination along these lines (also, of donkey anaphora and modal subordination) is provided in Plural Compositional DRT (PCDRT; Brasoveanu 2007). I propose to use the same, independently motivated framework to account for the way in which correlatives are interpreted. The analysis, outlined in the following section, can be reformulated in situation-based terms if suitable adjustments are made, e.g. quantificational structures manipulate *sets* of (minimal) situations and pass them on across clausal boundaries.

2.3 Correlatives in Plural Compositional DRT (PCDRT)

The definite / unique single-topic correlative is analyzed as before, except that the tall girls are stored one at a time in a set of sequences and not lumped together in a single sequence storing the whole set – as shown in (17) below.

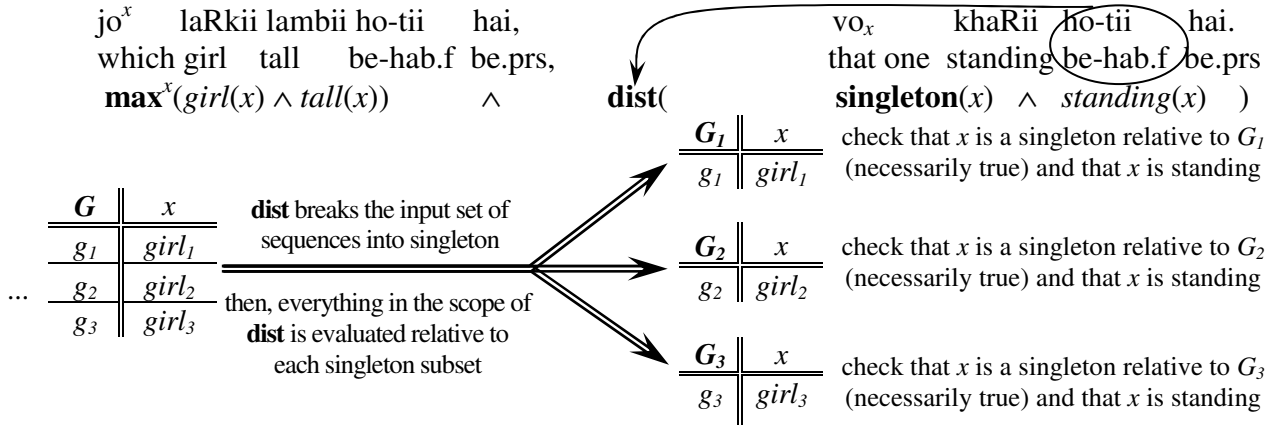


The \mathbf{max}^x operator is dynamic λ -abstraction: (i) we extract the set of individuals satisfying the formula in the scope of the \mathbf{max}^x operator (this is the static part), then (ii) we store it under x and pass it on to the next clause (this is the dynamic part).

The universal / non-unique single-topic correlative is also analyzed as before, except that habitual morphology distributes over the topical set G of sequences. As shown in (18) below, the topic clause receives the same interpretation as in (17) above. The comment clause, however, is differently interpreted due to the distributivity operator **dist** contributed by habitual morphology: the **dist** operator breaks the input set of

sequences $G=\{g_1, g_2, g_3\}$ into the singleton subsets $G_1=\{g_1\}$, $G_2=\{g_2\}$ and $G_3=\{g_3\}$ and requires the formula in its scope, i.e. the remainder of the comment clause, to be evaluated relative to each such singleton subset.

(18)



So, **dist** ensures the vacuous satisfaction / neutralization of the condition **singleton**(x): given that each set of sequences delivered by **dist** is a singleton, the set will store only one value for x . Hence, the \mathbf{max}^x operator contributed by the wh-indefinite yields the desired universal / non-unique interpretation (see the appendix for more formal details).

To summarize, the variable uniqueness effects associated with correlative constructions emerge as a result of the interaction of three distinct components: (i) the *maximality over cases / situations* contributed by wh-indefinites, which update the context by introducing all the individuals that satisfy both their restrictor and their nuclear scope; (ii) the *singleton* requirement contributed by singular anaphors – this requirement applies to the set of cases / situations relative to which the anaphor is interpreted; (iii) the *granularity level* of the quantification denoted by the entire correlative construction – this granularity level is specified in Hindi by the presence vs. absence of habitual morphology.

In particular, the quantification can be *coarse-grained / episodic*, i.e. we ‘collectively’ quantify over the topical cases / situations introduced in the topic clause, which boils down to quantifying over topical individuals – and the comment clause is predicated of these individuals. This yields the definite / unique interpretation.

Alternatively, the quantification can be *fine-grained / habitual*, i.e. we ‘distributively’ quantify over the topical cases / situations introduced in the topic clause – and the comment clause is predicated of each case / situation. This yields the universal / non-unique interpretation.

3 Romanian Correlatives and the Pragmatics of Quantification

Romanian does not have habitual morphology. So, both unique and non-unique readings are available for single-topic correlatives – see (2) and (3) above. In contrast, habitual morphology is *available* in Hindi to express non-unique readings, so it *has to be used* to express such readings. This is an optimality-theoretic kind of reasoning: if a better candidate is *available* in a particular linguistic system – in our case, a candidate that pairs morphology and meaning more ‘transparently’, then this candidate *is* the grammatical one (unless there's an even better candidate); see Farkas & de Swart (2003) for a related proposal with respect to noun incorporation.

Thus, the proposal is that the availability of habitual morphology in Hindi forces single-topic correlatives without habitual morphology to have a definite / unique reading. In Romanian, both readings can be associated with the same morpho-syntactic structure because no such morphology is available.

Importantly, this is *not* to say that Romanian has *covert* habitual morphology of the kind overtly exhibited by Hindi – and that this morphology is covertly present whenever we have a universal reading. Such a hypothesis would be as implausible as the idea that English has covert morphology distinguishing between the inclusive and the exclusive (i.e. +/- addressee) 1st person plural pronoun *we* of the sort exhibited by a variety of languages (e.g. Kalihna, Chinook or Boumaa Fijian; see Harley & Ritter 2002). The 1st person singular pronoun *we* in English can have an inclusive or an exclusive *use*, i.e. this aspect of the interpretation of indexicals is part of pragmatics (and its interface with semantics). Similarly, which reading is available for a particular correlative in Romanian depends on pragmatic factors, e.g. the accidental / sporadic vs. non-accidental / habitual nature of the situations under consideration.

I propose that the interpretation of correlative (in general: quantificational) structures crucially involves a *granularity* level, i.e. a specification of the way in which the comment clause (in general: the nuclear scope) is predicated of the cases / situations characterized by the topic clause (in general: the restrictor). The granularity level of the quantification can be specified only pragmatically, as in Romanian, or there can be grammatical / semantic means to constrain its specification, as in Hindi. This situation is similar to the cross-linguistic variation with respect to the inclusive vs. exclusive specification for 1st person plural pronouns.

Independent evidence for the idea that the interpretation of quantificational structures involves a granularity level that is only pragmatically specified comes from English examples like (19) below.

(19) Four thousand ships passed through the lock last year. (Krifka 1990)

Sentence (19) “has two readings [...] the *object-related* reading says that there are four thousand ships which passed through the lock last year [...] the *event-related* reading says that there were four thousand events of passing through the lock by a ship last year. The [former] reading presupposes the existence of (at least) four thousand ships [...]. In the [latter] reading, there might be fewer ships in the world” (Krifka 1990: 487).

The variation in ship individuation / counting is parallel to the way we interpret the **singleton** requirement contributed by singular anaphors in correlatives: the ‘object-related’, individual-based reading yields the definite interpretation, while the ‘event-related’, case/situation-based reading yields the universal interpretation.

Moreover, just as the granularity level of Romanian correlatives is dependent on pragmatic factors, the selection of a granularity level for examples like (19) is pragmatically constrained: “it is no accident that the best examples of [event-related readings] concern situations in which there are too many individuals to keep track of easily [...]. It is much more difficult to get [such a] reading [for (19)] when only a small number of ships are involved. [For example, consider] the Chicago River–Lake Michigan sightseeing route, which we can assume is plied by just four sightseeing ships. It would be odd to say that *Four thousand sightseeing ships passed through the lock last year* even if each of the four ships did go through 1,000 times” (Barker 1999: 689-690).

This sensitivity to pragmatic factors, i.e. world knowledge, is left unexplained if we postulate two *covertly* different (object-related vs. event-related) denotations for the cardinal indefinite *four thousand* (as Barker 1999 observes)¹¹. Similarly, the fact that the choice between a definite and a universal reading for Romanian correlatives is sensitive to pragmatic factors would be left unexplained if we postulated the existence of covert habitual morphology in Romanian.

I will conclude this discussion with the observation that analyzing single-topic correlatives (in both Hindi and Romanian) in terms of maximal sets of cases / situations – as opposed to maximal sets of individuals – is independently motivated by the interpretation of multiple-topic correlatives. In multiple-topic correlatives, we have anaphora to both *sets* of individuals and the *dependency* between them introduced in the topic clause. For example, the Hindi correlative in (4) introduces a set of girls and, for each girl, the boy she played against. Then, the comment clause elaborates on this “play against” relation – and not only on the ‘bare’, ‘unstructured’ sets of boys and girls: each girl defeated the boy she played against (and not some other boy that some other girl

¹¹Geurts (2002) argues that a similar, pragmatically-determined granularity level is at work in donkey quantification.

played against). This is parallel to example (16): the “come to banquet” relation elaborates on the previously introduced “court at” relation between women and conventions – and not simply on the ‘bare’ sets of women and conventions¹².

Thus, if we have only maximal sets of individuals and distribute over such sets, there is no guarantee that the comment clause elaborates on the relation(s) between these sets mentioned in the topic clause. But if the topic clause introduces a maximal set of cases / situations, these cases / situations encode both sets of individuals and dependencies between them, so the comment clause can simultaneously elaborate on both.

4 Comparison with Previous Approaches

The semantics of Hindi correlatives is discussed in detail in Dayal (1996) (elaborating on Srivastav 1991 and Dayal 1995) and Bittner (2001).

Dayal (1995) examines habitual single-topic correlatives in Hindi and informally suggests that an account formulated in terms of (minimal) situations (Heim 1990 style) should be feasible. However, the formally explicit analysis in Dayal (1996) expressly rejects the idea – advanced in Andrews (1985) and further supported by both Bittner (2001) and the present account – that correlatives contribute quantificational structures of the same kind as donkey sentences: “correlatives and conditionals [like *If a farmer*

¹²The mixed universal & definite interpretation of multiple-topic Hindi correlatives can be captured by means of *selective* distributivity. Instead of unselectively (in the sense of Lewis 1975) distributing over cases / situations with the operator **dist**, we have a level of quantificational granularity that is intermediate between coarse-grained quantification over individuals and fine-grained quantification over cases. This is encoded by an operator **dist_x** (see Brasoveanu 2007 for its definition), which distributes over the cases featuring the values of the variable *x* contributed by the initial topic – hence the universal interpretation of *x* – but, for each value of *x*, the set of situations featuring that value are treated ‘collectively’ – hence the definite interpretation of all non-initial wh-topics in Hindi.

Why do we need to select this intermediate level of granularity in Hindi multiple-topic correlatives? I believe that this is due to a pragmatic (hence violable) constraint that requires topic-comment structures like correlatives to have a *single topic*. This constraint can be taken to follow from the Gricean maxim of manner: talk about only one thing, i.e. one topic, at a time. When we talk about only one individual, e.g. in single-topic correlatives with a definite interpretation, this constraint is satisfied. When we talk about situations that involve multiple topical individuals (introduced by multiple wh-indefinites), we satisfy this constraint if we take the *situations* featuring these individuals to be the one and only topic – and this is how we derive the fact that Romanian multiple-topic correlatives always have a universal interpretation.

In Hindi, however, fine-grained quantification, i.e. distributivity over cases, has to be encoded by habitual morphology, so episodic multiple-topic correlatives cannot receive a universal-across-the-board interpretation (as observed in Dayal 1995). On the other hand, having simultaneous multiple topics is pragmatically dispreferred. The compromise solution is to select an intermediate level of granularity that does not distribute over each case, but over sets of cases featuring the same value for the initial wh-topic. Given that this intermediate level of granularity is pragmatically selected, it is only a default – and we correctly predict that some speakers associate a *definite-across-the-board* interpretation with episodic multiple-topic correlatives in Hindi – a fact that is not noticed (or accounted for) in Dayal (1995, 1996).

owns a donkey, he beats it] encode fundamentally different dependencies” (Dayal 1996: 198). Two reasons are invoked for this claim. First, “in a correlative construction the number of *wh* expressions must match the number of demonstratives anaphoric to them. This, of course, is not true of conditionals” (Dayal 1996: 198), e.g. there is no pronoun co-referring with the indefinite *a donkey* in *If a farmer owns a donkey, he is happy*. Secondly, (the then available) static or dynamic approaches to donkey sentences fail to capture the definite vs. universal variation in interpretation exhibited by correlatives.

Dayal (1996) then proceeds to account for the range of interpretations that single and multiple topic correlatives have by postulating three different kinds of quantificational structures: (i) quantification over individuals for single-topic correlatives with a definite interpretation; (ii) quantification over (minimal) situations for single-topic correlatives with a universal interpretation; finally, (iii) quantification over suitable functions for multiple-topic episodic correlatives – for example, the quantification contributed by (4) above involves the function associating every girl with the one boy she played against.

The variation in quantification between individual and functional variables is attributed to an ambiguity in the interpretation of a covert [+wh] complementizer head that Dayal (1996) assumes to be present in subordinate / topic clauses: “I assume that C_{+wh}^0 of a multiple *wh* relative clause denotes a set of relations [...] The whole sentence is true if the relation denoted by the main clause is included in this set [...] The *wh* expressions trigger this meaning but are otherwise interpreted as ordinary indefinites” (Dayal 1996: 200). Thus, the two different definite vs. universal quantificational ‘forces’ associated with single and multiple topic episodic correlatives are attributed to two suitable meanings for a *wh*-complementizer morpheme that is not realized in the surface structure. Furthermore, it is not clear how to integrate the quantification over individuals or functions contributed by this covert and ambiguous complementizer with the quantification over situations contributed by correlatives with habitual morphology.

Moving on to Bittner (2001), it is clear that the present account of Hindi single-topic episodic correlatives is a descendant of the dynamic analysis of correlatives proposed there (see in particular the discussion on pp. 52-53): both Bittner (2001) and the present analysis follow Andrews (1985) and treat the quantificational dependencies expressed by conditionals and correlatives in the same way.

Bittner (2001) captures Dayal’s observation that correlatives – but not conditionals – have to anaphorically refer back to all the (*wh*) indefinites by means of an ‘aboutness’ presupposition associated with correlative structures (this proposal can be incorporated into the present account¹³). The ‘aboutness’ presupposition is due to the fact that *wh*-

¹³Ivan Sag (p.c.) suggests an alternative, syntactic account: assuming that correlatives involve *wh*-extraction from a coordination structure (Pollard & Sag 1994), the ‘topic-comment matching’ constraint follows from the fact that only across-the-board extraction is possible from coordination islands.

indefinites in correlatives are *topics*, which is not (always) true about ordinary indefinites in conditionals – and we cannot mark an indefinite as topical (by means of wh-morphology) and not comment about it: “the intuitive idea is that topic-comment sequencing presupposes that the comment is about the topic. [A correlative update] requires [...] every topical discourse referent introduced in the topic update [to] be picked up by an anaphoric demonstrative in the comment update” (Bittner 2001: 48).

There are two notable differences between Bittner (2001) and the present proposal. First, Bittner (2001) does not associated the maximality and singleton requirements with particular morphemes, but with a topical maximization operator that always occurs in correlative constructions and that takes scope over the entire subordinate / topic clause. Secondly, Bittner (2001) accounts only for the definite / unique interpretation of single-topic correlatives (see p. 54, fn. 7) and it is not clear how the account can be extended to capture universal / non-unique interpretations of single and multiple topic correlatives in Hindi and Romanian. This is, I take it, the force of the second objection mentioned above that Dayal (1996) raises against unified accounts of conditionals and correlatives.

The present account shows that this is only an objection against dynamic (or situation-based) approaches that update single cases / assignments, as classical DRT / FCS – and also Bittner (2001) – do. In contrast, systems like the one proposed in Brasoveanu (2007) (building on van den Berg 1996; see also Nouwen 2003), which update sets of cases / assignments, are well suited to provide a unified account of donkey conditionals and correlatives that derives their full range of cross-linguistically attested readings.

Appendix: Correlatives in Plural Compositional DRT (PCDRT)

Dynamic Ty2. Just as in Compositional DRT (CDRT; Muskens 1996), the underlying logic is Ty2 (Gallin 1975). There are three basic types: type t (truth-values); type e (individuals); type s (modeling DPL-style variable assignments). Constants of type e : *linus*, *maureen* etc. Variables of type e : x , x' etc. Variables of type s : i , j etc.

A discourse referent (dref) u for individuals is a function of type se from assignments i_s to individuals x_e (subscripts on terms indicate their type). Intuitively, $u_{se}i_s$ is the individual that the assignment i assigns to the dref u . Dynamic info states I , J etc. are plural: they are sets of variable assignments (as in van den Berg 1996), i.e. they are terms of type st . An individual dref u stores a set of individuals with respect to a plural info state I , abbreviated as $uI := \{u_{se}i_s: i_s \in I_{st}\}$, i.e. uI is the image of the set of assignments I under the function u . Thus, drefs are modeled like individual concepts in Montague semantics: just as an individual concept is a function from indices of evaluation to individuals, a dref is a discourse-relative individual concept, i.e. a function from discourse salience states (i.e., in PCDRT, variable assignments) to individuals.

Discourse Representation Structures. A sentence is interpreted as a Discourse Representation Structure (DRS), i.e. as a relation of type $(st)((st)t)$ between an input state I_{st} and an output state J_{st} . The output state J differs from I at most with respect to the new drefs and J satisfies all the conditions: $[new\ drefs \mid conditions] := \lambda I_{st}. \lambda J_{st}. I[new\ drefs]J \wedge conditionsJ$, e.g. $[u, u' \mid girl\{u\}, boy\{u'\}, like\{u, u'\}] := \lambda I_{st}. \lambda J_{st}. I[u, u']J \wedge girl\{u\}J \wedge boy\{u'\}J \wedge like\{u, u'\}J$. Tests are DRSs that do not introduce new drefs: $[conditions] := \lambda I_{st}. \lambda J_{st}. I=J \wedge conditionsJ$, e.g. $[like\{u, u'\}] := \lambda I_{st}. \lambda J_{st}. I=J \wedge like\{u, u'\}J$.

Conditions. Conditions, e.g. lexical relations like $like\{u, u'\}$, are sets of plural info states, i.e. they are terms of type $(st)t$. Lexical relations are *unselectively distributive* with respect to the plural info states they accept – they universally quantify over variable assignments: $R\{u_1, \dots, u_n\} := \lambda I_{st}. I \neq \emptyset \wedge \forall i_s \in I(R(u_1i, \dots, u_ni))$, for any non-logical constant R of type $e^n t$ (where $e^n t$ is the smallest set of types such that (i) $e^0 t := t$ and (ii) $e^{m+1} t := e(e^m t)$). For example, $like\{u_1, u_2\} := \lambda I_{st}. I \neq \emptyset \wedge \forall i_s \in I(like(u_1i, u_2i))$.

Truth. A DRS D of type $(st)((st)t)$ is *true* with respect to an input state I_{st} iff $\exists J_{st}(DIJ)$.

Compositionality. Given the underlying type logic, compositionality at sub-clausal level follows automatically. In a Fregean / Montagovian framework, the compositional aspect of interpretation is largely determined by the types for the ‘saturated’ expressions, i.e. names and sentences. We abbreviate them as **e** and **t**. An extensional static logic is the simplest: **e** is e (individuals) and **t** is t (truth-values). The denotation of the noun *book* is of type **et**, i.e. et : $book \rightsquigarrow \lambda x_e. book_{et}(x)$. We go dynamic by making the ‘meta-types’ **e** and **t** finer-grained: **e** will be the type of drefs for individuals, i.e. se , and **t** will be the type of DRSs, i.e. $(st)((st)t)$. The denotation of the noun *book* is still of type **et**: $book \rightsquigarrow \lambda v_e. [book\{v\}]$, i.e. $book \rightsquigarrow \lambda v_e. \lambda I_{st}. \lambda J_{st}. I=J \wedge book\{v\}J$.

Singular anaphors: $vo_u / aceea_u / acela_u / it_u \rightsquigarrow \lambda P_{et}. [\mathbf{singleton}\{u\}]; P(u)$,¹⁴

¹⁴I remain agnostic with respect to the exact source of the **singleton** condition contributed by singular anaphors. There are two obvious possibilities: the singleton requirement is due to either (i) the singular number morphology on the anaphor or (ii) the very anaphoricity of the singular pronoun / demonstrative. The trade-off between the two options is as follows. If the **singleton** condition is attributed to anaphoricity, we expect plural anaphors to also contribute such a condition, which would enable us to account for the *maximality* effects associated with cross-sentential plural anaphora (noticed by Kadmon 1990) in a way that is parallel to the account of the uniqueness effects associated with singular anaphora in section 2.1 above. For example, we derive the observation that the discourse *Leif has four^u chairs. They_u are in the kitchen* is felicitous only if Leif has exactly four chairs by taking: (i) the cardinal indefinite *four^u chairs* to introduce the (maximal) set of plural/sum individuals consisting of exactly four atoms, each atom being a chair that Leif has, and (ii) the plural anaphor *they_u* to require this set to be a singleton. That is, the PCDRT representation of the above discourse would be: (first sentence) $\mathbf{max}^u(\mathbf{dist}([4_atom\{u\}, chair\{u\}, have\{Leif, u\}]))$; (second sentence) $[\mathbf{singleton}\{u\}, in_kitchen\{u\}]$.

where **singleton** $\{u\} := \lambda_{st}. I \neq \emptyset \wedge \forall i_s \in I \forall i'_s \in I (ui = ui')$
and $D; D' := \lambda_{st}. \lambda J_{st}. \exists H_{st} (DIH \wedge D'HJ)$.

Indefinites: $jo^u / care^u / a^u \rightsquigarrow \lambda P_{et}. \lambda P'_{et}. \mathbf{max}^u(\mathbf{dist}(P(u); P'(u))),$
where $\mathbf{max}^u(D) := \lambda_{st}. \lambda J_{st}. ([u]; D)IJ \wedge \forall K_{st} (([u]; D)IK \rightarrow uK \subseteq uJ)$
and $\mathbf{dist}(D) := \lambda_{st}. \lambda J_{st}. \exists R_{s((st)t)} \neq \emptyset (I = \mathbf{Dom}(R) \wedge J = \cup \mathbf{Ran}(R) \wedge \forall \langle k_s, L_{st} \rangle \in R (D\{k\}L))$
(where $\mathbf{Dom}(R) := \{k_s; \exists L_{st}(RkL)\}$ and $\mathbf{Ran}(R) := \{L_{st}; \exists k_s(RkL)\}$).

Habitual morphology: $hotii \rightsquigarrow \lambda D_t. \mathbf{dist}(D)$. Alternatively, we can have a VP modifier-like denotation: $hotii \rightsquigarrow \lambda P_{et}. \lambda v_e. \mathbf{dist}(P(v))$.

Single-topic correlatives – definite / unique readings:

(TOPIC) $\mathbf{max}^u(\mathbf{dist}([girl\{u\}, tall\{u\}]))$; (COMMENT) $[\mathbf{singleton}\{u\}]; [standing\{u\}]$

Single-topic correlatives – universal / non-unique readings:

(TOPIC) $\mathbf{max}^u(\mathbf{dist}([girl\{u\}, tall\{u\}]))$; (COMMENT) $\mathbf{dist}([\mathbf{singleton}\{u\}]; [standing\{u\}])$

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However, attributing the **singleton** condition to singular number morphology (plural anaphors would therefore not contribute such a condition) would enable us to account for the contrast between the interpretations of the following two discourses (the first discourse is from Karttunen 1976): *Harvey courts a^u woman at every convention. {She_u is very pretty vs. They_u are very pretty}*. The first sentence by itself is ambiguous between a wide-scope and a narrow-scope reading for the indefinite *a^u woman*. But the singular anaphor *she_u* in the second sentence allows only for the wide-scope reading, while the plural anaphor *they_u* allows only for the narrow-scope reading. This contrast can be captured if the singular anaphor, but not the plural one, contributes a **singleton** condition (as proposed in Brasoveanu 2007). I leave the quest for a unified analysis of all these phenomena for future research.

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