Katalin É. Kiss and Beáta Gyuris

Scope inversion under the rise fall contour, or something else?*

Abstract

This paper proposes an explanation of scope inversion under the rise fall intonation. It argues that a left-peripheral quantifier pronounced with a (fall-)rise is in topic position (Spec,TopP). A topic phrase must refer to an individual already present in the domain of discourse - that which will be predicated about in the sentence. Non-individual-denoting expressions, among them quantifiers, can also be made suitable for the topic role if they are individuated by being set into contrast. Individuation by contrast enables non-individual-denoting expressions to be interpreted as semantic objects (properties) which the rest of the sentence predicates a (higher-order) property about. A quantifier functioning as a contrastive topic denotes a property of plural individuals, and its apparent narrow scope arises from the fact that it is considered to be a predicate over a variable inherent in the lexical representation of the verb.

1. Introduction

The narrow scope associated with initial quantifiers in sentences pronounced with a rise fall countour has been a focus of interest for some time (cf. Jackendoff (1972), Liberman and Sag (1974), Höhle (1991), Büring (1997), Jacobs (1997), Molnár (1998) etc.). Most recently Krifka (1998) has put forth an explanation of the phenomenon. He claims that his theory is superior to the earlier accounts because it not only covers the full range of cases (at least those attested in German), but also derives the interrelation between the particular intonation contour and inverted scope.

We will argue in this paper that Krifka's theory, nevertheless, cannot represent a general solution to the problem of scope inversion under the rise fall contour, because it is based on premises specific to German, which do not hold in other languages displaying the same scope inversion phenomenon, e.g. Hungarian.

After summarizing the main points of Krifka's theory in section 1, the paper will point out its limitations in section 2. In sections 3-5 an alternative explanation will be put forward. As section 3 will argue, the constituent associated with the rise in sentences pronounced with a rise fall contour occupies topic position (Spec,TopP). Its particular intonation expresses that it is contrasted with a (set of) alternative(s). Contrast is a means by which also a non-individual-denoting constituent can be individuated, and thus can be made suitable for the role of topic (or, in a different terminology, for the role of the logical subject of predication). Quantifiers

functioning as contrastive topics will be claimed to denote individuated properties of plural individuals. Section 4 will introduce the crucial ingredients of a compositional semantics for sentences predicating about a property, adopting them from the theories of Szabolcsi (1983), Komlósy (1992), Piñón (2001) and van Geenhoven (1996). Section 5 will propose a semantic interpretation for sentences with a contrastive topic which accounts for the seemingly contradictory properties of the topicalized quantifier: its subject-like role in a predication structure, and its referential variance characteristic of narrow scope quantifiers.

1. Krifka's theory of scope inversion

Krifka's theory of scope inversion under the rise fall contour in German is based on two premises: on the scope assignment principle of Frey (1993), and on the assumption that a clause-initial constituent carrying the rise in a rise fall contour is a 'focus in topic', i.e., a constituent moved from a preverbal focus position into topic position. Frey's scope assignment principle states that

(1) If α, β are operators occurring in a sentence S, then S has a reading in which α has scope over β iff:

  a. α c-commands β, or

  b. α c-commands a trace of β.

Krifka argues that - in accordance with principle (1) - a clause-initial quantifier can have narrow scope with respect to a subsequent operator if the operator c-commands the trace of the quantifier. As for the rise fall contour of sentences displaying scope inversion, the rise realized on the initial narrow scope quantifier is not simply a rise but a rise preceded by a brief fall which can be dropped in fast speech, i.e., it is a (fall-)rise, which is represented by the iconic symbol $\sqrt{}$ in Jacobs (1997). The (fall-)rise contour of the initial constituent opens up otherwise not existing scope interpretation possibilities because it indicates that the given constituent is a topic which has been previously focused. Focusing in German consists in the scrambling of non-focus material from between the focused constituent and the verb. The scrambled constituent will c-command the trace of the topicalized focus; hence it can also have scope over it. This is what happens when, for example, a subject undergoes contrastive topicalization:

(2)a. [$_{CP}$ e [$_{C'}$ e [mindestens ein   Student [jeden   Roman [gelesen]] hat]]]

                at least   one-NOM student each-ACC novel   read   has

    b. [$_{CP}$ e [$_{C'}$ hat$_1$ [mindestens ein Student [jeden Roman [gelesen]] t$_1$]]]

c. [$_{CP}$ e [$_{C'}$ hat$_1$ [jeden Roman $_2$ [mindestens ein Student [t$_2$ [gelesen]]] t$_1$]]]

d. [$_{CP}$ e [$_{C'}$ hat$_1$ [jeden Roman $_2$ [[mindestens ein Student]$_F$ [t$_2$ [gelesen]]] t$_1$]]]

e. [$_{CP}$ [mindestens ein Student] $_{F,3}$ [$_{C'}$ hat$_1$ [jeden Roman $_2$ [t$_3$ [t$_2$ [gelesen]]] t$_1$]]]

f. [$_{CP}$ [mindestens ein Student] $_{F,3}$ [$_{C'}$ hat$_1$ [[jeden Roman]$_{F,2}$ [t$_3$ [t$_2$ [gelesen]]] t$_1$]]]

'At least one student has read every novel.'

After verb second in (2b), *jeden Roman* is scrambled out of the preverbal focus position so as to give way to subject focus (2c). After its removal, the focus feature is assigned to the subject (2d), which is topicalized afterwards (2e), and becomes a 'focus in topic'. (Molnár (1998) arrives at a similar conclusion.) The (fall-)rise intonation is a combination of the intonation patterns associated with the topic and the focus functions. Since the trace of *mindestens ein Student* is c-commanded by *jeden Roman*, the narrow scope reading of *mindestens ein Student* is correctly predicted. *Jeden Roman* ends up preverbally, where it assumes a focus feature (2f).

2. Limitations of Krifka's theory

A problem raised by Krifka's theory is that we attest similar scope inversion facts also in other languages, for instance in Hungarian, where the premises from which scope inversion follows in Krifka's framework are not satisfied. Consider the Hungarian equivalent of Krifka's (2f).

(3) √Legalább   egy diák   \minden regényt   elolvasott.

at least   one student every   novel-ACC read

'At least one student read \every novel.'

For Krifka's explanation to go through in Hungarian, it ought to be shown that (i) Frey's scope principle is operative in Hungarian, and (ii) a contrastive topic is focused prior to topicalization.

As for scope interpretation, in Hungarian all operators are preposed into A-bar positions on the left periphery of the proposition - hence all operators c-command the proposition, including the traces of their clause-mates. Consequently, Frey's scope interpretation principle would predict scope relations to be free. In fact, just the opposite is true: scope relations are disambiguated in Hungarian. Preverbal operators have scope precisely over the domain they c-command and precede; i.e., their scope order corresponds to their surface order. (For further details, see É. Kiss (1991, 1994).) Thus the readings that are provided under (4a) and (4b) do not represent merely the most likely readings of these sentences; they represent their only readings:

(4)a. [$_{DistP}$ Mindkét könyvet [$_{DistP}$ több   diák   is   elolvasta]]

both   book-ACC   several student also read

'It holds for both books that they were read by several students.'

b. [DistP Több diák is [DistP mindkét könyvet elolvasta]]

'It holds for several students that they read both books.'

As for focus assignment in Hungarian, it involves the A-bar movement of the focus constituent into a preverbal operator position (Spec,F(ocus)P according to Brody (1990)). Movement of a contrastive topic through Spec,FP, and then the filling of Spec,FP by another constituent would violate the Strict Cycle Condition, a version of which also figures in the Minimalist Program (cf. Chomsky 1995, p. 190). Furthermore, there are various types of constituents which can easily function as contrastive topics, but cannot be focussed. Such are universal quantifiers, which have a designated landing site in Spec,DistP. Since the universal quantifier is ungrammatical as a focus - see (5a), a universal quantifier associated with the (fall-)rise contour - e.g. that in (5b) - cannot be a topicalized focus.

(5)a.*[TopP János [FP MINDEN REGÉNYT olvasott el]]

John   every   novel-ACC read   PERF

'*As for John, it was every novel that he read.'

b. √Minden regényt [FP\JÁNOS olvasott el]

'All novels were read BY JOHN.'

Existential quantifiers of the *vala*- 'some-' type cannot be focussed in either Hungarian or German - see (6a) and (7a), still they can function as contrastive topics - see (6b) and (7b).

(6)a.*[DistP Mindenki [FP VALAKIT   hívott meg]]

everybody   somebody-ACC invited PERF

'*It was somebody that everybody invited.'

b.√Valakit \mindenki meghívott.

'Somebody, everybody invited.'

(7)a.*weil   ein jeder   JEMANDEN   eingeladen hat

because everybody-NOM somebody-ACC invited   has

b. √Jemanden hat ein \jeder eingeladen.

The impossibility of a focussed *jemanden* in German casts doubt on the force of Krifka's explanation also within German.

Krifka (1998) does not actually claim that his theory is of cross-linguistic validity; he calls his theory an explanation of scope inversion under the (fall-)rise intonation in German. Since, however, the (fall-)rise contour of a clause-initial quantifier licenses scope inversion across languages, a generalization appears to be lost if the parallel facts are explained in different ways in every language.

Below we propose an explanation of scope inversion under the (fall-)rise fall contour which, though demonstrated on Hungarian facts, is of cross-linguistic validity. Like Krifka's theory, our explanation will also correlate the narrow scope and the (fall-)rise contour of an initial quantifier - although it will derive the correlation from different premises.

The explanation to be proposed hinges on the claim that quantifiers pronounced with a (fall-)rise are contrastive topics, whose scope interpretation is a consequence of their contrastive topic function.[1] So the first step in our analysis is the discussion of the syntactic and semantic properties of the contrastive topic.

3. The contrastive topic in Hungarian
3.1. Structural position
In Hungarian linguistics it has been a matter of discussion for decades what position constituents pronounced with the contrastive (fall-)rise contour, among them quantifiers undergoing scope inversion, occupy in the richly structured left periphery of the Hungarian sentence. They are clearly neither in the pre-VP focus position (Spec,FP), the canonical position of negative existential quantifiers, nor in a pre-FP quantifier position (Spec,Dist(ributive)P), the canonical position of universal quantifiers. Consider first a negative existential quantifier pronounced with the (fall-)rise contour. Whereas a regular negative existential quantifier, occupying Spec,FP, cannot be followed by (another) focus - see (8a,b), a negative existential quantifier pronounced with a (fall-)rise can - see (9).

(8)a. [FP \KEVÉS DIÁK   bukott meg kémiából]

       few   students failed   PERF chemistry-in

    'It was few students who failed in chemistry.'

  b.*[FP \KEVÉS DIÁK [FP \KÉMIÁBÓL bukott meg]]

(9) √Kevés diák [FP \KÉMIÁBÓL bukott meg]

   'Few students failed in CHEMISTRY. [It was chemistry that few students failed in.]'

Neither negative existential quantifiers in Spec,FP, nor universal quantifiers in Spec,DistP can precede sentence adverbials - see (10a,b). Quantifiers pronounced with a (fall-)rise, on the other hand, sound natural both before and after a sentence adverbial - see (11).

(10)a. **Tudomásom szerint** [DistP \minden diák [FP CSAK \KÉMIÁBÓL bukott meg]]

       to.my.knowledge   every   student only chemistry.in failed   PERF

      'To the best of my knowledge every student failed only in chemistry.'

     b.*[DistP \Minden diák   **tudomásom szerint** [FP CSAK \KÉMIÁBÓL bukott meg]]

       'Every student to the best of my knowledge failed only in chemistry.'

(11) √Minden diák **tudomásom szerint** CSAK \KÉMIÁBÓL bukott meg.

    'All students to the best of my knowledge failed ONLY IN CHEMISTRY. [To the best of my

knowledge it was only chemistry that all students failed in.]'

Functionally, the Hungarian sentence falls into two main units: the predicate part, represented by a verb phrase optionally extended by negation into a NegP, by a focus into an FP, and/or by distributive quantifiers into a DistP, and the topic part, represented by one or more noun phrases, whose referent(s) the predicate part is predicated about. Sentence adverbials must be external to the predicate part; they can appear before, after, or between the topic noun phrases, as follows:

(12)   CP
        C   TopP
       Topic   XP
        AdvP   TopP
          Topic   XP
           AdvP DistP
              QP   FP
             Focus   VP
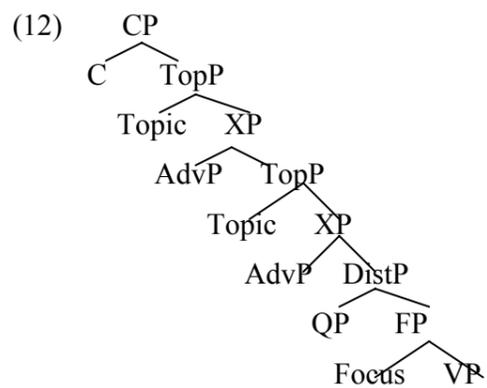
Given that a constituent pronounced with the (fall-)rise contour can precede sentence adverbials, the question is whether it is a topic sitting in Spec,TopP, or a further structural position should be

established for it on the left periphery of the sentence. As Alberti and Medve (1998) showed, the plausibility of the latter view is diminished by the fact that constituents with the (fall-)rise contour can both precede and follow topics proper, or can also intervene between them. Observe in (13a-d) the possible orders of the quantifier *minden kollégáját*, pronounced with the (fall-)rise contour, and the two regular topics: *János* and *a születésnapjára*.

(13)a.√ Minden kollégáját   János a születésnapjára \nem szokta meghívni.
           every   colleague.of.his-ACC John his birthday.on   not used   to.invite
          'Every colleague of his, John \would not invite for his birthday.'
      b. János a születésnapjára √minden kollégáját \nem szokta meghívni.
      c. János √minden kollégáját a születésnapjára \nem szokta meghívni.
      etc.

Since in the Hungarian sentence functional projections have a fixed order, the internal order of topicalized constituents, on the other hand, is free, the logical conclusion to be drawn on the basis of (13a-d) is that constituents pronounced with a (fall-)rise contour, among them narrow scope quantifiers, are in topic position; they are contrasted/contrastive topics.

3.2. Its function and properties

In the language type represented by Hungarian, a topicalized constituent pronounced with regular topic prosody must refer to an individual that is already present in the universe of discourse. This follows from the nature of topic function: a topic foregrounds an individual from the universe of discourse in order to be predicated about.

Non-individual-denoting elements, among them quantifiers, cannot stand outside the predicate part of the sentence - unless they are pronounced with a (fall-)rise contour. Therefore, if a quantifier pronounced with a (fall-)rise indeed occupies topic position and functions as a topic (i.e., as the logical subject of predication), it must be the contrastive (fall-)rise contour that exempts it from the individuality requirement. This conclusion is also confirmed by facts of Japanese, a language representing the same topic-prominent type as Hungarian. According to the Japanese grammar of Kuno (1973), a constituent marked by the topic morpheme *wa* is either referential/generic or contrastive.[2] In other words, a non-R expression, when supplied with the *wa* morpheme, must be interpreted contrasted, and must receive contrastive intonation (Kuno 1973, p. 47). Consider Kuno's examples (21a-d) on pp. 46-47:

(14)a.*Ame wa   hutte   imasu.

rain   TOP falling is

'Speaking of rain, it is falling.'

But:

   b. Ame wa hutte   imasu ga, taisita   koto   wa arimasen.

   rain TOP falling is   but serious matter not exists

   'It is raining, but it is not much.'

(15)a.*Oozei no hito   wa   party ni kimasita.

      many   people TOP party to came

         'Speaking of many people, they came to the party.'

But:

   b. Oozei no hito   wa party ni kimasita ga, omosiroi   hito   wa hitori   mo

   many   people TOP party to came   but interesting people TOP one person even

   imasen desita.

   was.not

   'Many people came to the party indeed, but there was none who was interesting.'

The Japanese analogy suggests that what licences a non-individual-denoting expression as topic in Hungarian as well is the contrast expressed by the (fall-)rise contour.

   To understand the role of contrast, let us consider some typical instances of contrastive topic in Hungarian:

(16)a. √**Jánosra** \számítok.

      John.on   count.I

      'On John, I \do count.'

   b. √**Biciklit**   \sok lány látott.

      bicycle-ACC many girl saw

      'Bicycles,   \many girls saw.'

   c. √**Föl** \LIFTEN   megyek.

       up   elevator.on go.I

       'Up, I go by \elevator.'

   d. √**Minden regényt** \nem olvasott el   János.

      every novel-ACC not   read   PERF John

      'Every novel, John \has not read.'

   e. $\neg\forall x\ (novel(x) \rightarrow read(J, x))$

The contrasted topic of (16a) is a name. The sentence is a statement about its referent, János; it states about János that I count on him. The contrastive (fall-)rise associated with *Jánosra* expresses that the referent of *Jánosra* is a member of a set of individuals for at least one member of which (other than János) an alternative to the predicate *számítok* holds (cf. Szabolcsi (1981)). The alternative to the predicate can be generated by negating the predicate. In the case of a negated predicate, as in (16d), the alternative is its non-negated counterpart. If the VP is preceded by a focus, as in (16c), the alternative predicate is generated by replacing the value of the focus operator expressing exhaustive identification with a different value (i.e. a different member of the set on which the focus operator operates). If the predicate contains a quantifier, the alternative predicate is generated - roughly - by replacing the quantifier with a quantifier of the 'opposite' value - see (16b).

(16b) is a statement about the property 'bicycle'; it states that many girls saw a representative of it. The common noun *bicikli*, expressing a property, inherently does not denote a distinct individual, hence it does not satisfy the condition of topichood. In (16b), however, it is used as the name of an individuated property which is the subject of predication.

Individuation as a condition of the focusing of non-R-expressions was discussed by Szabolcsi (1983). Szabolcsi analyzed the following example:

(17) [$_{Spec,FP}$ BICIKLIT]   látott Mari.
            bicycle-ACC saw   Mary
      'It was a bicycle/bicycles that Mary saw.'

The preverbal focus in Hungarian represents a subset of a set of contextually or situationally given elements for which the predicate phrase can potentially hold; it exhaustively identifies the subset of this set for which the predicate actually holds (cf. É. Kiss (1998)). When a bare noun is focused, it is understood to exhaustively identify a subset of a relevant set of distinct properties. This is the informal interpretation Szabolcsi assigns to (17):

(18) 'Of the currently relevant properties, only the one named in Spec,FP is such that Mary saw a representative of it.'

Focusing, i.e., the identification of a subset and the exclusion of the complementary subset, involves the Boolean operation of complement formation, hence it can only be performed on a set of distinct individuals. When we focus a bare noun, i.e., we contrast the property denoted by it

with the alternative properties, then - "by singling them out as relevant, we actually kind of individuate those properties, that is, we disregard the fact that their extensions overlap with the extensions of other properties." (Szabolcsi 1983, p. 140)

In our view, a similar process of individuation takes place also in the case of non-individual-denoting topics. (16b) can be paraphrased as follows:

(19)   'Of a set of currently relevant properties, the one named in Spec,TopP is under
          consideration. It is stated about it that many girls saw a representative of it. For at
          least one other member of this set an alternative statement holds (few girls saw a
          representative of it).'

(19) expresses the intuition that (16b) is a statement about the property 'bicycle', i.e., *biciklit* functions as a topic. Normally a property is not a possible subject of predication; thus (16b), too, is ungrammatical if *biciklit* is pronounced with the regular topic intonation. The contrastive contour associated with *biciklit*, however, implies that *biciklit* is a member of a set of comparable properties present in the domain of discourse. The fact that it is contrasted with the other relevant properties suggests, on the one hand, that it is to be seen as a property distinct from them, which can be predicated about. On the other hand, the possibility that a property-denoting expression can be contrasted with other alternatives presupposes that its denotation is a subset of a set of referents already present in the domain of discourse - hence a version of the specificity/givenness criterion of topichood is also satisfied by it. Thus, whereas in the case of (16a) the function of the contrastive intonation is to add an implicature to the sentence, in the case of (16b) contrasting is also a means of licensing a property-denoting constituent as a topic. (Let us emphasize again that the topic expression (16b) does not denote a bicycle, or a group of bicycles, but the property 'bicycle', which is possibly embodied by different bicycles for each of the many girls in question.)

(16c), too, contains an inherently non-individual-denoting topic, the verbal particle *föl* 'up'. *Föl* can also be topicalized only if it is individuated through contrasting. The fact that it is set into a tacit contrast with its counterpart denoting the opposite direction, *le* 'down', makes it clear that we use it as the name of a direction. The sentence means the following:

(20)   'Of a set of currently relevant directions, the one named in Spec,TopP is under
          consideration. It is stated about it that I will go there by elevator. For the other relevant
          direction, an alternative statement holds (down I will go by some other means).'

Whereas a universal quantifier cannot be topicalized under the normal topic intonation, it can also be used as a contrastive topic. We will claim that the clause-initial quantifier pronounced with a (fall-)rise contour in (16d), just like those in (3) and (15), is a contrastive topic, which does not denote the maximal set of individuals, or a generalized quantifier, but a property of plural individuals, the property of being the sum of all atomic entities with the property of being a book. We will argue that the apparent narrow scope of the quantifier corresponding to the topic phrase *minden könyvet* 'every book-ACC' in a first-order representation of the meaning of (16d), shown in (16e) is a consequence of the fact that the constituent denotes a property.

4   Towards a compositional interpretation of contrastive topics

4.1 Goals and data

In this section and the next we will propose an account of the narrow scope readings of contrastive topic DPs in Hungarian, as illustrated in the (21b) reading of sentence (21a) below. (The other possible readings of sentences with contrastive topic DPs, in which the topic DP receives a referential interpretation, as illustrated for (21a) in (21c), will not concern us at the moment, since these readings are truth-conditionally equivalent to those where the topic DP does not receive a contrastive intonation, i.e., is interpreted as a regular topic.)

(21) a. [$_{Spec,TopP}$ √Két könyvet] \mindenki elolvasott.

            two book-ACC everybody read

   b. 'Everybody read two (possibly different) books.'

   c. 'There are two particular books such that everybody read them.'

The reading of (21a) under investigation, (21b), can be represented by the following first-order formula:

(22) $\forall x$ (person $(x) \rightarrow \exists y \exists z$ (book$(y) \land$ book$(z) \land y \neq z \land$ read$(x, y) \land$ read (x, z)))

(23) below is a further example where, as its first-order translation in (24) shows, the quantifier in contrastive topic position takes narrow scope with respect to an operator following it (i.e., negation):

(23)   [$_{Spec,TopP}$ √Minden diákot] \nem láttam.

           every student-ACC not saw-I

    'Every student, I didn't see.'

(24)   ¬ ∀x (student(x) → saw(I, x))

The analysis of the meaning of the type of sentences illustrated above will be based on the assumption that contrastive topics can denote properties (although in some cases they can also denote individuals). Furthermore, it will also be assumed that whenever a contrastive topic functions as the (syntactic) argument of a particular verb, the meaning of the verb is not to be represented semantically as an n-place first order predicate, but as a predicate which applies to a predicate (property) argument.

The assumption that the verbs of the language can only denote n-place first-order predicates has been challenged in several proposals before, which either claimed that particular subclasses of verbs should always be taken to be predicates over properties (cf. Piñón 2001, with respect to definiteness effect verbs), or that verbs accompanied by arguments with particular syntactic properties (focused bare nominals in Szabolcsi (1983), and bare nominals in Komlósy (1992)) can also denote predicates over properties, in addition to their interpretation as first-order predicates,.

In the next subsection we will outline and compare these three proposals, which analyze particular classes of argument DPs as denotations of properties and not individuals or generalized quantifiers, and examine what repercussions such a choice has for the lexical representations of verbs.

In order to show that Hungarian is not unique in allowing property-denoting expressions to serve as arguments of verbs, we will also review Van Geenhoven's (1996) proposal for the interpretation of certain indefinite expressions, among then incorporated nouns in West Greenlandic, West Germanic bare plurals, and German split topics, which claims that these types of constituents denote predicates whose argument is semantically incorporated into the denotation of the verb.

4.2 The semantics of property-denoting arguments of the verb in Hungarian: Szabolcsi (1983), Komlósy (1992), Piñón (2001)

Here we will briefly summarize the theories of Szabolcsi (1983), Komlósy (1992) and Piñón (2001), each of which claims about a particular class of arguments (focused bare nominals, bare nominals acting as incorporated arguments, and arguments of definiteness effect verbs, respectively) that they denote properties.

Szabolcsi (1983) proposes a mechanism to derive in a compositional way the interpretation of Hungarian sentences whose focus position is filled by a singular count noun without any overt determiner. Consider again one of her relevant examples:

(25)　[$_{Spec,FP}$ BICIKLIT]　látott Mari.
　　　　　bicycle-ACC saw　Mary
　　　　'It was (a) bicycle that Mary saw.'

Szabolcsi claims that the bare nominal *biciklit* 'bicycle-acc' denotes a property in (25), and the meaning of (25) can be translated into Montague's (1974) IL language as shown in (26):

(26)　$\forall P^d [\exists x[\check{} P^d(x) \wedge saw'(x)(^{\wedge}m)] \leftrightarrow P^d = {}^{\wedge}bike']$, where P^d is a member of some designated set *D* of currently relevant properties.

Informally, (26) means that among the currently relevant properties it is only the property of being a bike which can be predicated of the individual(s) seen by Mary. The representation in (26) accounts for the fact that focusing in Hungarian is associated with exhaustive listing.

Syntactically, (25) is derived by combining the bare nominal with the structure in (27a) by means of the rule of CN (common noun) focusing, represented in (28). (27b) shows the logical translation of (27a).

(27) a.　[$_F$ *az$_i$-t*] *látott Mari* $\varnothing_{t/CN}$
　　　b.　$\lambda P_i \exists x[\check{} P_i(x) \wedge saw'(x)(^{\wedge}m)]$

(28)　CN focusing:
　　　If $\alpha \in P_{CN}$ and $\beta \in P_{t/CN}$ and β contains [$_F$ *az$_n$*], then $F_{j,n}(\alpha, \beta) \in P_t$ and is obtained by replacing *az$_n$* by α in β.

The structure in (27a) is derived from the one in (29a), in which the property-denoting expression (or the pronoun *az$_i$* standing for this type of expression) constitutes a term phrase with the zero determiner in postverbal position. Szabocsi assumes that property-denoting expressions do not appear postverbally in themselves.

(29) a.　*látott Mari* $\varnothing$ *az$_i$-t$_t$*
　　　b.　$\exists x[\check{} P_i(x) \wedge saw'(x)(^{\wedge}m)]$

(29b) shows the logical structure of (29a), where the existential quantifier is introduced by the $\varnothing$ determiner, and the property variable P_i by the pronominal *az*$_i$. Note that the logical representation of the meaning of the verb in (29b) differs considerably from the representation of the meaning of the verb in (30), for example, which involves term focusing.

(30)   [$_{Spec,FP}$ EGY LÁNY] énekel.
                 a   girl   sings
       'It is a girl who sings.'

(31a) below shows the structure which serves as an input to term focusing in (30). (31b), the logical representation of (31a), illustrates that in certain cases the verb can also be represented as an n-place predicate, without the introduction of a property variable.

(31) a. [$_{Spec,FP}$ Ő$_1$] énekel
     b. $\lambda x_1 [sing'(x_1)]$

A comparison between (27b) and (31b) shows that Szabolcsi implicitly assumes that the representation of the lexical meaning of verbs can differ according to the semantic type of the arguments they appear with. Thus, since many verbs in the lexicon can take either focused bare nominal arguments or term phrase arguments, the verbs of the language must be associated with multiple lexical representations.

The example in (32) and the logical representation of its meaning in (33) serve to illustrate how the introduction of the existential quantifier into the representation of the verb (cf. (27b) and (29b)) can account for the narrow scope reading of the focused bare nominal, under which, in the particular example, the bicycles seen can be different for the different members of the group denoted by *mindenki* 'everybody':

(32)   [$_{Spec,FP}$ BICIKLIT] látott   mindenki.
                 bicycle-ACC   saw   everybody
       'It was bikes that everyone saw.'

(33) $\forall P^d[\forall y[human'(y) \rightarrow \exists x[\check{\ } P^d(x) \wedge saw'(x)(y)]] \leftrightarrow P^d = {}^\wedge bike']$, where P^d is a member of
        some designated set *D* of currently relevant properties.

By connecting the presence of the narrow scope existential quantifier to the presence of the ∅ determiner, Szabolcsi's theory predicts that the narrow scope reading of focused noun phrases is only available if the focused expression is a bare nominal. In (34) below, for example, where the focus is a quantified expression, the denotation of *két biciklit* must be referentially independent of the denotation of *mindenki*.

(34)　[Spec,FP　KÉT　BICIKLIT]　látott　mindenki.
　　　　　　　　two　bicycle-ACC　saw　everybody
　　　'It was two (particular) bikes that everyone saw.'

We believe, however, that the same result could also be achieved by allowing the property denoting noun phrase to appear as an argument of the verb in any syntactic position, assuming that quantification over the internal argument in the representations of verbs like in (29b) is inherent in the meaning of the verb. Naturally, since the focused expression in the case of (34) does not count as property denoting, its compulsory wide scope interpretation would not contradict the rule.

On the whole, what Szabolcsi's (1983) theory on the scope of focused bare nominal arguments tells us is that it is a reasonable assumption that verbs should not always be treated as n-place first-order predicates, and that there is evidence that they can also denote predicates over properties.

Komlósy (1992) argues similarly with respect to the bare nominal arguments of verbs illustrated in (35):

(35)　Péter　újságot　　　　olvas.
　　　Peter　newspaper-ACC　reads
　　　'Peter is reading a newspaper.'

Komlósy claims that bare nominal argument DPs do not name or identify a particular object. Thus in (35), the bare nominal does not identify a particular newspaper, rather, it names a property of the internal argument of the verb; that is, it states that the object which was read has the property of being a newspaper. The property identified by the bare nominal holds for the internal argument independently of the relevant situation. Thus, according to Komlósy (1992), the meaning of the sentence in (35) could be represented as in (36):

(36)　$\exists x$ [read(Peter, x) $\wedge$ newspaper(x)]

In view of the lack of the bare nominal argument's ability to identify particular objects, Komlósy represents the meaning of the object argument of (35) as in (37a). It follows from the above argumentation that, in order to be able to derive the interpretation of the whole sentence illustrated in (36) from the meanings of the parts, the meaning of the verb should be given as in (37b):

(37)   a. *újságot* 'newspaper-ACC': newspaper(y_{obj})

b. *olvas* 'reads': $\exists y[read(x, y_{obj}) \wedge F(y)]$

Komlósy claims that representations of verb meanings of the type given in (37b) are always available whenever the verb can have a bare nominal argument, and are derivable from the usual representations of two-place predicates, e.g. *read (x, y)*, by means of a lexical process. Since most Hungarian verbs can have bare nominal arguments, Komlósy's (1992) work counts as an argument against considering property-denoting argument DPs and property-denoting verbs as having exceptional semantic properties, and as an argument for postulating multiple lexical representations for verbs.

As opposed to the previously discussed theories, which argue on the basis of the semantic behaviour of arguments of a particular syntactic type (bare nominals) that verbs should be able to denote predicates over properties in addition to denoting n-place predicates, Piñón (2001) claims that there is a set of verbs in Hungarian, the so-called definiteness effect verbs, which lack the 'regular' n-place first order predicate interpretation, and can only denote predicates over properties.

According to Piñón (2001), the so-called definiteness effect verbs in Hungarian share the following properties: (i) their internal argument cannot be realized by a definite NP in a neutral clause on a terminative interpretation; (ii) they do not allow the indefinite NP realizing their internal argument to take scope over negation; and (iii) they do not allow their internal argument to be realized by a (necessarily) quantificational NP.

Piñón (2001) argues that the analysis of definiteness effect verbs as applying to a predicate (or property) argument, and introducing dynamic existential quantification over their internal argument can account for their properties listed above. The general representation he proposes for transitive and intransitive verbs is shown in (38) below:

(38) a. $V_{def\text{-}eff}$ (tr.) $\Rightarrow \lambda P \, \lambda x \, \lambda e[\, \mathcal{E}y[V(e, x, y) \wedge P(y)]]$

b. $V_{def\text{-}eff}$ (intr.) $\Rightarrow \lambda P \, \lambda e[\, \mathcal{E}x[V(e, x) \wedge P(x)]]$

On the basis of the representations in (38), Piñón (2001) analyzes the meaning of the sentence in (39), which contains a definiteness effect verb and an indefinite noun phrase filling the appropriate argument place, as shown in (40):

(39)   Anna   evett egy   almát.
       Anna   atea   apple-ACC
       'Anna ate an apple.'

(40) a. evett$_{def\text{-}eff}$ 'eat' $\Rightarrow \lambda P \, \lambda x \, \lambda e[\, \mathcal{E}y[Eat(e, x, y) \wedge P(y)]]$

   b. egy almát 'an apple-ACC' $\Rightarrow \lambda x \, [Apple(x) \wedge Atom(x)]$

   c. Anna evett egy almát 'Anna ate an apple' $\Rightarrow$
      $\lambda e[\, \mathcal{E}y[Eat(e, Anna, y) \wedge Apple(y) \wedge Atom(y)]]$

According to Piñón (2001), the fact that definiteness effect verbs are not compatible with definite arguments follows from the assumption that the existential quantifier inherent in the meaning of the verb is a dynamic one, that is, it must introduce a novel discourse referent. The fact the indefinite noun phrase argument takes narrow scope with respect to negation is a consequence of the fact that the indefinite noun phrase is a predicate and not a quantifier. The fact that (necessarily) quantificational noun phrases cannot appear as arguments of definiteness effect verbs is due to the fact that such noun phrases cannot denote properties.

In this section we have reviewed three theories which claim - either about a particular class of verbs (those displaying the definiteness effect), or about verbs taking arguments of a particular syntactic category (bare nominal) and semantic type (property) - that their lexical representation is not given in terms of an n-place predicate but contains a property variable. This is why such verbs can take an argument denoting a property. Although according to Piñón (2001), definiteness effect verbs are always to be given representations of the above kind, it seems that the majority of verbs in the lexicon can appear together with both bare nominal arguments and proper DP arguments. This fact indicates that there must be a lexical rule which maps the ordinary n-place predicate representation of verbs on representations containing property variables.

The next section is intended to illustrate, on the basis of Van Geenhoven's (1996) proposals for the analysis of noun incorporation in West Greenlandic and some semantically related phenomena in other Germanic languages, that there is ample evidence in other languages as well for considering verbs as expressions denoting properties.

4.3 Van Geenhoven (1996) on property-denoting indefinites

Van Geenhoven (1996) gives a syntactic and semantic analysis of noun incorporation in West Greenlandic. She claims that West Greenlandic incorporated nouns are indefinite descriptions from a semantic point of view, which only denote a property. (41) below is the general formula she uses to represent the meaning of a complex consisting of a verb and an incorporated noun:

(41) $\lambda P_{<s, <e, t>>} \lambda w_s \lambda x_e \exists y [Verb_w (x, y) \wedge P_w (y)]$

(41) shows that, according to van Geenhoven, the incorporated noun denotes a property (of type $<s, <e, t>>$) which is absorbed by an incorporating verb as the predicate of its internal argument's variable. Thus, the semantic head of the noun-incorporating configuration is the verb; it introduces the variable of the external argument, and the existential quantifier also comes with the verb.

The reason why van Geenhoven's work is particularly important for us is that she links the behaviour of West Greenlandic incorporated nouns to other indefinite constructions in other languages, namely, bare plurals in West Germanic languages, and German split topics. She claims that the narrow scope effects characteristic of these three constructions can be given a uniform explanation, namely, that they are instances of semantically incorporated, predicative indefinite descriptions, the existential interpretation of which is due to the verb itself. They cannot be interpreted as definite or partitive, since the variable representing the indefinite is always novel, so it cannot pick up a salient referent.

In his review of a version of Van Geenhoven (1996), Cohen (1999) argues that the verbs of a language should be regarded as ambiguous between an incorporating reading and an ordinary n-place predicate interpretation, illustrated in (41) below:

(41) $\lambda w_s \lambda y_e \lambda x_e [Verb_w (x, y)]$

The above view is supported by the fact that that in the Germanic languages verbs can combine with both bare plurals and with other noun phrases, as shown in (43):

(43) a. Tim ate apples.
     b. Tim ate every apple.

Note that although the syntactic properties of contrastive topic noun phrases are in many respects different from those of the bare plurals of West Germanic and the bare noun arguments of Hungarian, they show certain similarities to the above two types of constituents as far as their semantic behaviour is concerned. For example, contrastive topic noun phrases (except in their referential use) cannot be regarded as definite or partitive, that is, they cannot be taken to be anaphoric expressions linked to some salient *object*[3]. (This is why we have to think of them as property-denoting expressions in the first place.)

The following section will show how the insights of the above theories can be incorporated into an account of the narrow scope of contrastive topics in Hungarian and in other languages.

5 Compositional interpretation of sentences with contrastive topics

5.1 On the lexical representations of verbs

The theory to be proposed here to account for the narrow scope reading of contrastive topics will be based on the insights of the theories discussed in section 4.2, but owing to the fact that it targets phenomena which are more general and systematic than those analyzed by Szabolcsi (1983), Komlósy (1992) and Piñón (2001), it will have to make some stronger assumptions. Greater generality and systematicity means the following. On the one hand, as opposed to the data discussed by Szabolcsi, where among the focused noun phrases only bare nominals can (and must) take narrow scope with respect to the quantificational expressions following them, it holds for contrastive topics of any syntactic category that they can take narrow scope with respect to the quantificational expressions and negative particles following them. On the other hand, while definiteness effect verbs constitute a small subset of Hungarian verbs, and, moreover, they display the definiteness effect with respect to a particular argument of theirs (for intransitive verbs the subject and for transitive verbs the object argument), all arguments of all verbs of the language can potentially play the role of contrastive topic. (The narrow scope effect also extends to adjunct phrases, although we will not have much to say about them in this paper.)

On the basis of the arguments for considering contrastive topics as denoting properties, presented in section 3.2, we will assume that both bare nominals and DPs in contrastive topic position can denote properties of plural individuals (in the sense of Link 1983). Quantified noun phrases playing the role of a contrastive topic can denote individuals as well, but such examples will not be treated here, since they are not instances of scope inversion.

We will propose that all verbs in the language can be analyzed as predicates over property denotations, which can characterize any of the arguments of the verb. From the fact that a verb can have several arguments, it follows that each verb in the language must be associated with several representations of its meaning, which should all be derivable from its basic representation

in terms of an n-place predicate, although the nature of the type-raising mechanisms which can generate one of the former interpretations from the latter will not be discussed. In section 5.2 we illustrate how the narrow scope reading of bare nominal arguments in topic position can be achieved, while in section 5.3 the narrow scope readings of full DPs are considered.

5.2 Bare nominals as contrastive topics

To illustrate the idea outlined above, we will first consider bare nominals in topic position, associated with contrastive intonation, and assumed to denote properties of plural individuals. The following example resembles those involving property focusing by Szabolcsi (1983):

(44) [$_{\text{Spec,TopP}}$ √Kutyát] \látott Mari.

dog-ACC saw   Mary

'(A) dog, Mary did see.'

The intuitive meaning of the sentence above could be captured in terms of the following formula, where x is taken to be a variable over plural individuals:[4]

(45) $\exists x\, (\mathbf{dog'}(x) \wedge \mathbf{saw'}(\mathbf{m}, x))$

(45) means that there is an i-sum of atomic individuals which is a member of the join semi-lattice corresponding to the denotation of the noun *dog* (Link (1983)), which was also seen by Mary.

   The syntactic structure of (44) is shown in (47) below, which makes use of the convention, proposed by Heim and Kratzer (1998), according to which the trace of a moved constituent is bound by the index of the constituent, and not by the constituent itself. Thus, a structure which would be represented as (46a) in the traditional way is transformed into a structure shown in (46b). In the latter structure, i ⌢ YP is translated as $\lambda v_i \beta$, where β is the translation of YP, and v_i is the same variable as the one used for the translation of t_i within YP.

(46)

   a.   XP$_i$ YP   b.   XP

                                            i   YP

(47)   TopP

```
        DP                    •
      Kutyát           ╱          ╲
                      1            Top'
                              ╱        ╲
                            Top          VP
                                     ╱    |    ╲
                                    V     DP    DP
                                  látott  Mari   t₁
```
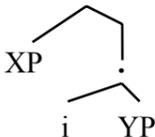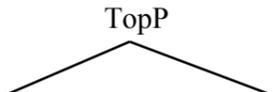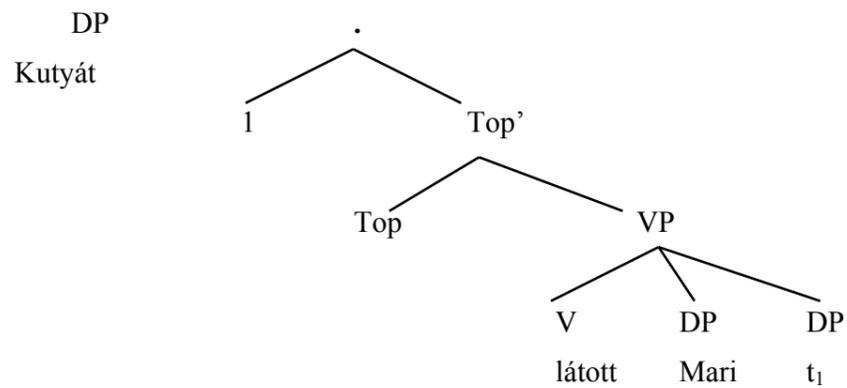
We will assume that two of the interpretations assigned to verbs in Hungarian are more or less similar to those proposed for West Greenlandic by van Geenhoven (1996), shown in (42) and (43) above. As opposed to van Geenhoven, however, we will assume, first, that the arguments of the verb and those of the property-denoting expression denote i-sums and not necessarily atomic individuals. Second, owing to the fact that neither the syntactic well-formedness nor the scope of quantifiers is sensitive to which argument of the verb plays the contrastive topic role, we will assume that each argument of the verb can be interpreted as denoting a property of plural individuals. Third, since the scope facts we want to account for can be captured in terms of an extensional framework, we will ignore intensionality in the rest of the paper. Thus, the meaning of transitive verbs in Hungarian will be analyzed in terms of the following formulae:

(48) a. $\lambda y_e \lambda x_e$ **verb'**(x, y)

    b. $\lambda P_{<e,\,t>} \lambda x_e \exists y[\textbf{verb'}(y)(x) \wedge P(y)]$

    c. $\lambda P_{<e,\,t>} \lambda x_e \exists y[\textbf{verb'}(y)(x) \wedge P(y)]$

We will assume that, as a default, there is a type-raising operation which generates (48b) and (48c) from (48a) whenever an argument of the verb plays the contrastive topic role.

    The logical formulae which serve as translations of the nodes of the tree in (47) are shown below:

(49) $\lambda Q \exists y[\textbf{saw'}(\textbf{m},y) \wedge Q(y)](\lambda x\ \textbf{dog'}(x)) = \exists y\ [\textbf{saw'}(\textbf{m},y) \wedge \textbf{dog'}(y)]$

```
              ╱                      ╲
    λx dog'(x)              λQ ∃y[saw'(m,y) ∧ Q(y)]
                              ╱              ╲
                            λQ          ∃y[saw'(m,y) ∧ Q(y)]
                                          ╱        ╲
```
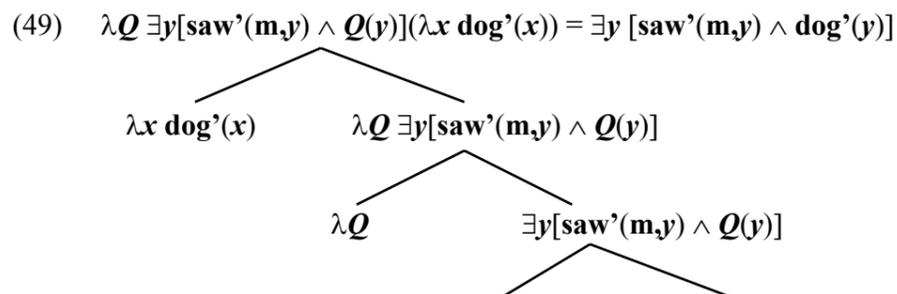
$$\lambda p[p] \qquad \exists y[\mathbf{saw'(m, y)} \wedge \mathbf{Q}(y)]^5$$

$$\lambda P_{<e,t>} \, \lambda x \, \exists y[\mathbf{saw'}(x, y) \wedge P(y)] \qquad \mathbf{m} \qquad \mathbf{Q}$$

The top node in the above tree is identical to (45) above, which indicates that the mechanism proposed is able to account for the intuitive interpretation of the sentence under consideration.

The sentence in (50) is a variant of the previous one, but here the constituent with the falling intonation following the contrastive topic is the negative particle *nem* 'not'. (51) shows the formula corresponding to the intuitive meaning of this sentence:

(50)   [$_{\texttt{Spec, TopP}}$ √Kutyát] \nem látott Mari.

(51) $\neg\exists x \, (\mathbf{dog'}(x) \wedge \mathbf{saw'}(\mathbf{m}, x))$

We will demonstrate below how (51) can be derived compositionally from (50) on the basis of the principles discussed above. (52) represents the syntactic tree corresponding to (50):

(52)

```
                    TopP
            ┌────────┴────────┐
           DP                  .
         Kutyát        ┌────────┴────────┐
                       1                Top'
                              ┌──────────┴──────────┐
                             Top                   NegP
                                           ┌────────┴────────┐
                                          Neg                VP
                                          nem        ┌────────┼────────┐
                                                     V        DP       DP
                                                   látott     Mari      t₁
```
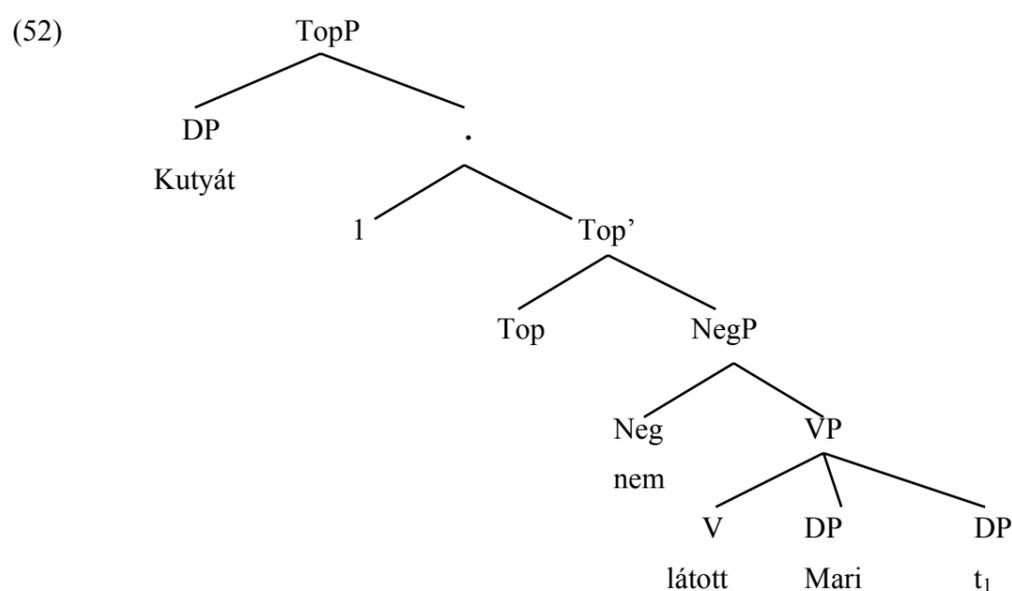
The logical translations of the nodes of the tree are represented in (53):

(53) $\neg\exists y \, [\mathbf{saw'}(\mathbf{m}, y) \wedge \mathbf{dog'}(y)]$

$$\lambda x \, \mathbf{dog'}(x) \qquad \lambda Q_1 \, \neg\exists y \, [\mathbf{saw'}(\mathbf{m}, y) \wedge Q_1(y)]$$

$$\lambda Q_1 \qquad \neg\exists y \; [\textbf{saw'}(\textbf{m}, y) \wedge \textbf{\textit{Q}}_1(y)]$$

$$\lambda p[p] \qquad \neg\exists y \; [\textbf{saw'}(\textbf{m}, y) \wedge \textbf{\textit{Q}}_1(y)]$$

$$\lambda p[\neg p] \qquad \exists y \; [\textbf{saw'}(\textbf{m}, y) \wedge \textbf{\textit{Q}}_1(y)]$$

$$\lambda P_{<e, t>} \; \lambda x \; \exists y \; [\textbf{saw'}(x, y) \wedge P(y)] \qquad \textbf{m} \qquad \textbf{\textit{Q}}_1$$
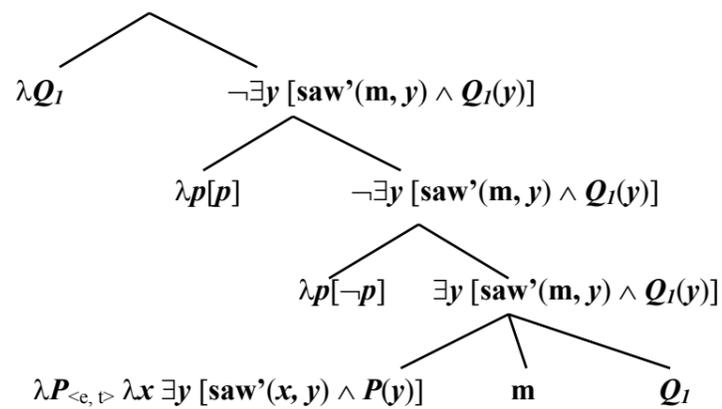
Now, a comparison of (51) and the translation of the root node of (53) shows that the method presented above is able to generate the intuitively correct meaning of the sentence in (50) in a compositional way.

5.3 Quantified DPs as contrastive topics

Next we consider some examples in which the topic position is filled by a quantified DP, like that in (54):

(54)   [$_{Spec,TopP}$ √Két kutyát]   \nem látott Mari.
                two dog-ACC not saw   Mary
       'Two dogs, Mary did not see.'

The formula corresponding to the meaning of (54) would be the following:

(55) $\neg\exists X \, (\textbf{two-dog'}(X) \wedge \textbf{saw'}(\textbf{m}, X))$

The syntactic tree we assume for (54) is as follows:

(56)

```
              TopP
             /    \
           DP      .
        Két kutyát / \
                  1   Top'
                      /   \
                    Top    NegP
                          /    \
```

```
        Neg              VP
        nem          /‾‾‾‾\
              V        DP        DP
             látott   Mari       t₁
```
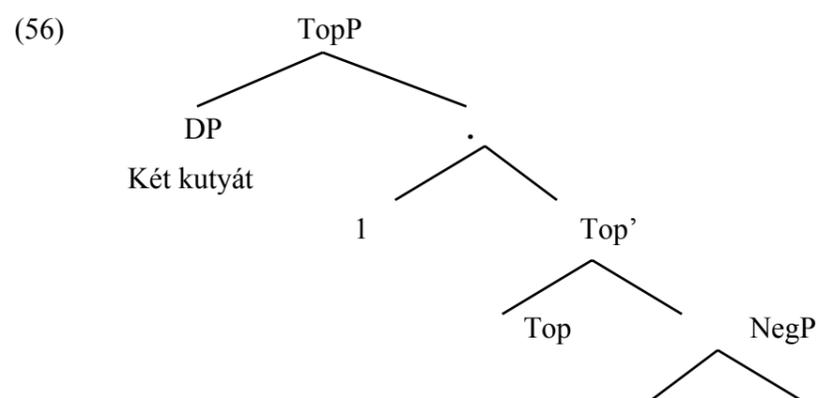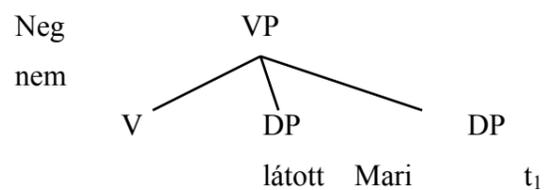
The translations of the nodes of the syntactic tree into the logical language described above are shown below. In this framework, the property of being an individual which can be referred to as *two dogs* is the property of belonging to the set of all i-sums in [[**dogs'**]] = [[**dog'**]] which contain two or more atoms. The name of this property will be abbreviated as **two-dog'**.

(57) $\neg \exists y[\mathbf{saw'(m, y)} \wedge \mathbf{two\text{-}dog'}(y)]$

$\lambda z_e\, \mathbf{two\text{-}dog'}(z)$ $\lambda \mathbf{Q}_i \neg \exists y\, [\mathbf{saw'(m, y)} \wedge \mathbf{Q}_i(y)]$

$\lambda \mathbf{Q}_i$ $\neg \exists y\, [\mathbf{saw'(m, y)} \wedge \mathbf{Q}_i(y)]$

$\lambda p[p]$ $\neg \exists y\, [\mathbf{saw'(m, y)} \wedge \mathbf{Q}_i(y)]$

$\lambda p[\neg p]$ $\exists y\, [\mathbf{saw'(m, y)} \wedge \mathbf{Q}_i(y)]$

$\lambda \mathbf{P}_{<e, t>}\, \lambda x_e\, \exists y_e\, [\mathbf{saw'}(x)(y) \wedge \mathbf{P}(y)]$ $\mathbf{m}$ $\mathbf{Q}_i$
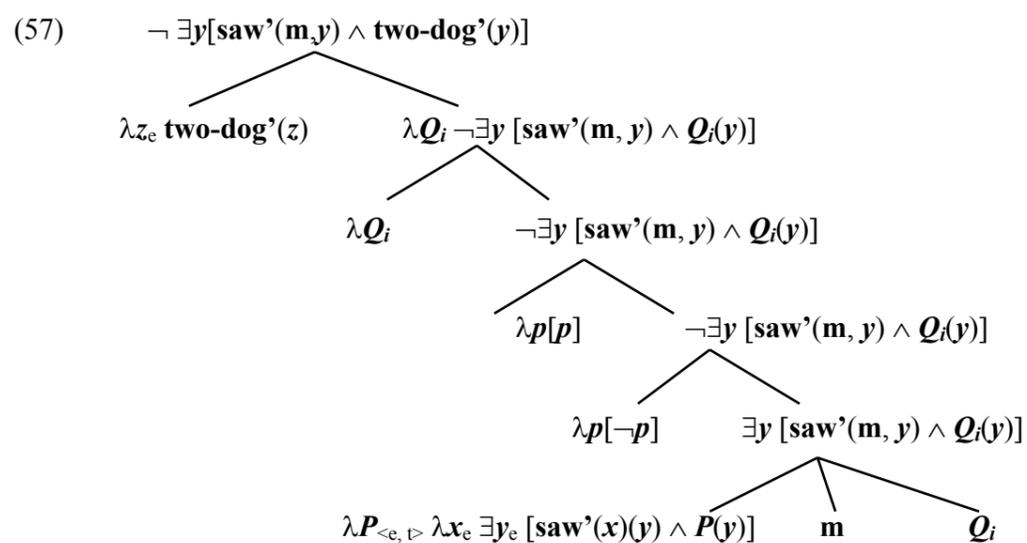
In the following sentence, the associate of the contrastive topic is a quantified noun phrase:

(58) [_Spec, TopP_ √Két kutyát   ] \minden ember látott.
             two dog-ACC every   person saw
    'Two dogs, everybody saw.'

The reading we are after is the narrow scope reading of the contrastive topic expression, corresponding to the formula in (59):

(59) $\forall x(\mathbf{person'}(x) \rightarrow \exists y(\mathbf{two\text{-}dog'}(y) \wedge \mathbf{saw'}(x, y)))$

The syntactic structure of (58) is shown below:

(60)

TopP

DP — Két kutyát

2 — DistP

minden ember

1 — VP

V — látott

DP — t_1

DP — t_2

(61) $\forall x \ [\textbf{person'}(x) \rightarrow \exists y \ [\textbf{saw'}(x, y) \wedge \textbf{two-dog'}(y)]]$

$\lambda x \ \textbf{two-dog'}(x)$ $\lambda Q_i \ \forall x \ [\textbf{person'}(x) \rightarrow \exists y \ [\textbf{saw'}(x, y) \wedge Q_i \ (y)]]$

λQ_i $\forall x \ [\textbf{person'}(x) \rightarrow \exists y \ [\textbf{saw'}(x, y) \wedge Q_i \ (y)]]$

$\lambda P_{<e, \, t>} \ \forall x \ [\textbf{person'}(x) \rightarrow P(x)]$ $\lambda z \ \exists y \ [\textbf{saw'}(z, y) \wedge Q_i \ (y)]$

λz $\exists y \ [\textbf{saw'}(z, y) \wedge Q_i \ (y)]$

$\lambda P_{<e, \, t>} \ \lambda x_e \ \exists y_e \ [\textbf{saw'}(x, y) \wedge P(y)]$ z Q_i
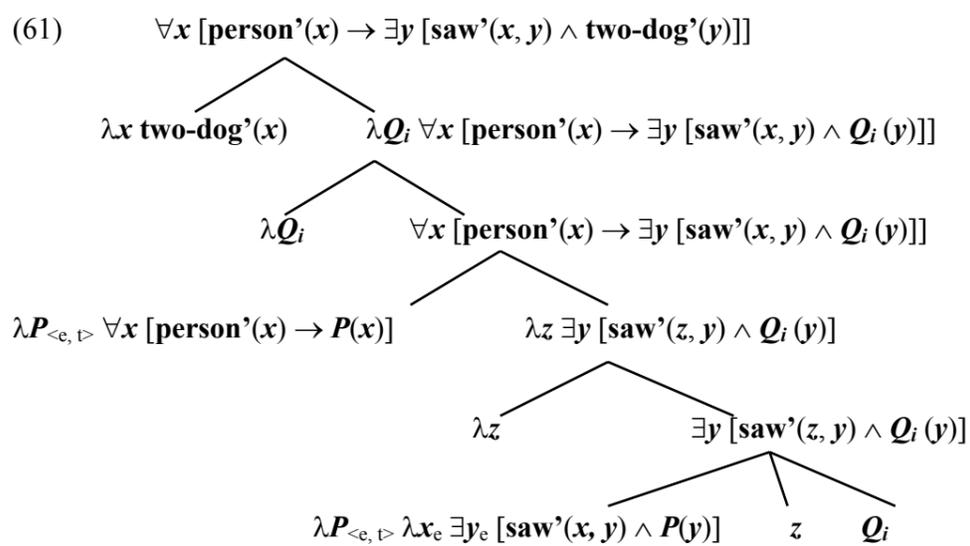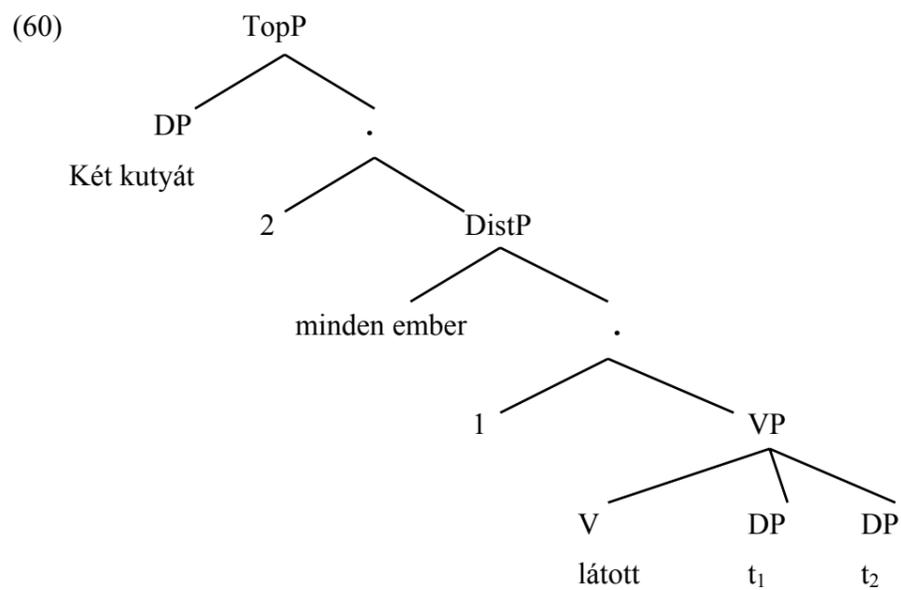
The top node of (61) is identical to (59), which proves that the proposed approach is capable of deriving the required reading of the contrastive topic DP. Note that in the above tree, *mindenki* 'everybody' is given the same translation as in systems which only assume the existence of ordinary (singular) individuals. The fact that the above translation is adequate for the example at hand is due to the inherent distributivity of the determiner.

In the following sentence the contrastive topic is followed by a non-referential DP, which cannot introduce an individual or set into the discourse, it can only predicate about the extension of the predicate (Szabolcsi 1997):

(62) [_{Spec, TopP} √Két kutyát   ] \kevés   ember látott.

               two dog-ACC few   person saw

    'Two dogs, few people saw.'

(63) shows the syntactic structure associated with the above sentence. In (64) below, the translations of the nodes in the tree in (63) are illustrated:

(63)

```
                    TopP
                   /    \
              DP          .
           Két kutyát    / \
                        2   FP
                           /  \
                        DP      .
                   kevés ember  / \
                               1   VP
                                 / | \
                                V  DP DP
                             látott t₁ t₂
```

(64) $\forall x\ [(\mathbf{person'}(x) \land \exists y(\mathbf{saw'}(x, y) \land \mathbf{two\text{-}dog'}(y))) \to |\{V \mid \mathbf{ATP}(V, x)\}| \leq k]$

$\lambda x\ \mathbf{two\text{-}dog'}(x)$ $\lambda \mathbf{Q}_i\ \forall x\ [(\mathbf{person'}(x) \land \exists y(\mathbf{saw'}(x, y) \land \mathbf{Q}_i\,(y))) \to |\{V \mid \mathbf{ATP}(V, x)\}| \leq k]$

      $\lambda \mathbf{Q}_i$ $\forall x\ [(\mathbf{person'}(x) \land \exists y(\mathbf{saw'}(x, y) \land \mathbf{Q}_i\,(y))) \to |\{V \mid \mathbf{ATP}(V, x)\}| \leq k]$

$\lambda P \forall x\ [(\mathbf{person'}(x) \land P(x)) \to |\{V \mid \mathbf{ATP}(V, x)\}| \leq k]$ $\lambda z\ \exists y\ [\mathbf{saw'}(z, y) \land \mathbf{Q}_i\,(y)]$

                      λz $\exists y\ [\mathbf{saw'}(z, y) \land \mathbf{Q}_i\,(y)]$

            $\lambda P_{<e, t>}\ \lambda x_e\ \exists y_e\ [\mathbf{saw'}(x, y) \land P(y)]$ z $\mathbf{Q}_i$
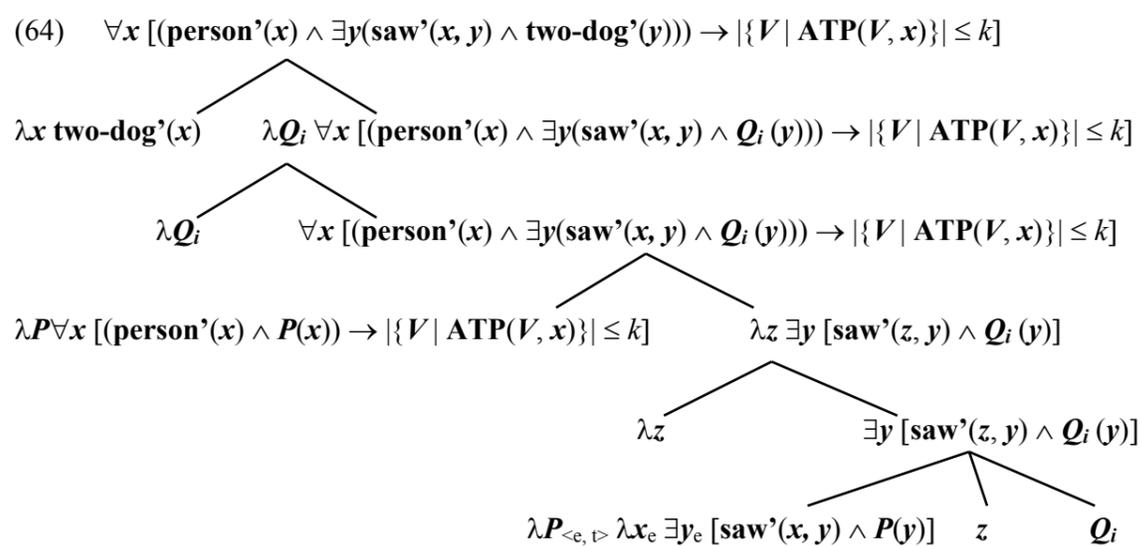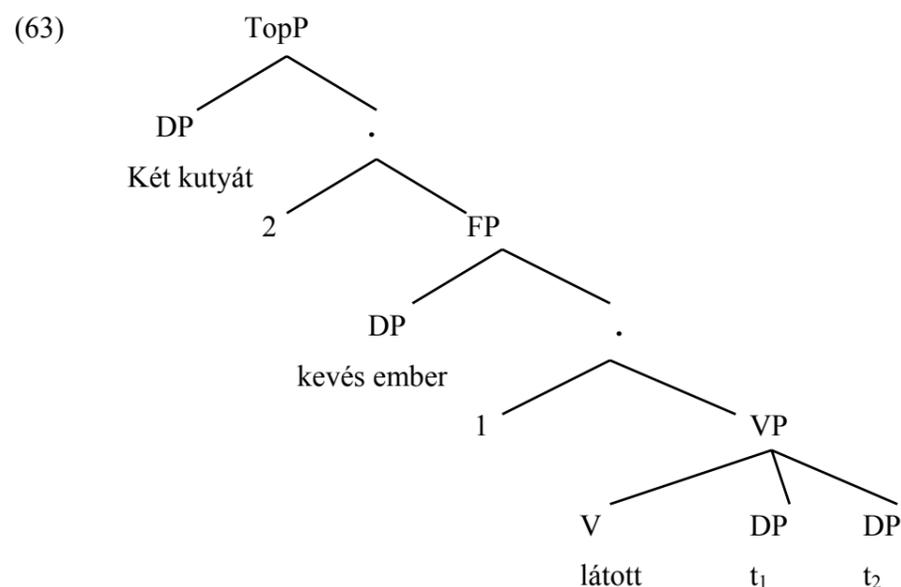
In the translation of the DP *kevés ember* 'few people' above, we made use of the atomic-part relation, defined in Krifka (1989:78) as follows:

(65) $\forall x \forall y[\textbf{ATP}_\textbf{S}(x, y) \leftrightarrow x \subseteq_S y \wedge \textbf{ATOM}_\textbf{S}(x, S)]$

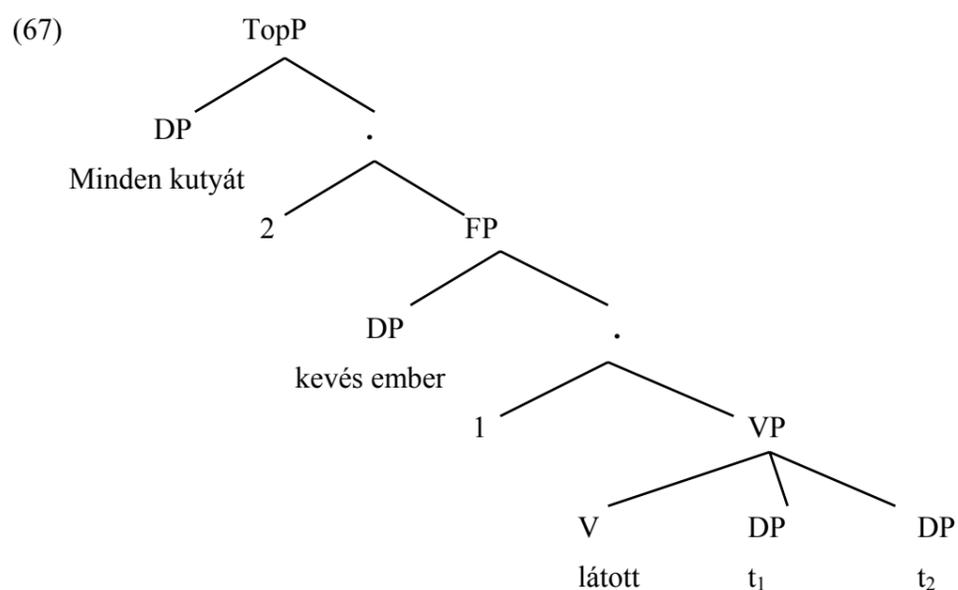   (x is an atomic part of y in sort S)

Thus, the translation of (62), given in the highest node in the tree in (64), can be informally paraphrased as follows: the number of the atomic parts of any individual having the person property which saw an individual with the dog property such that it consists of (at least) two atoms does not exceed a contextually given number k. This paraphrase seems to correspond to the meaning intuitively associated with the sentence above.
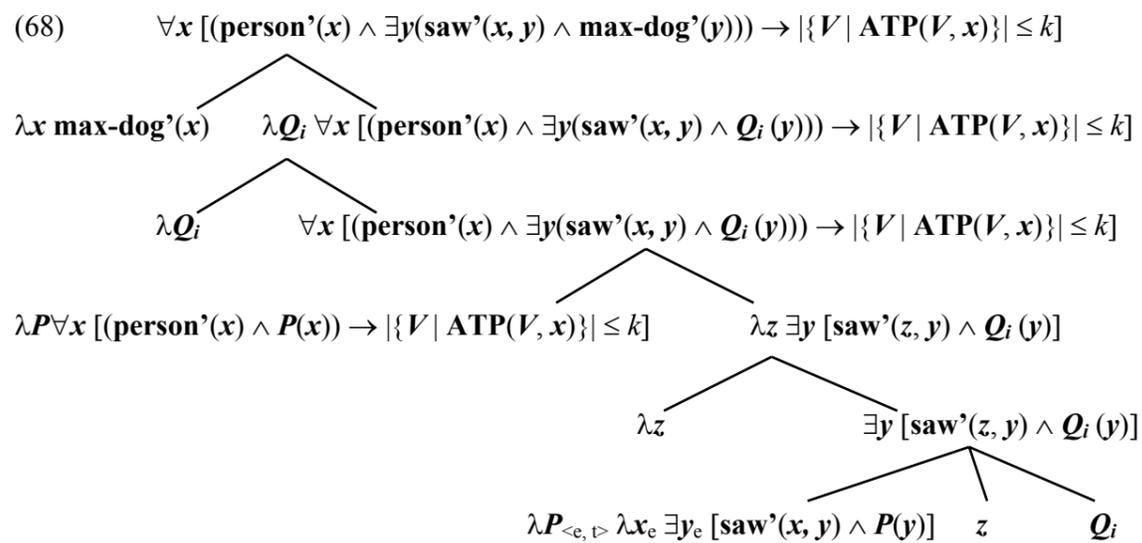
     In the last example to be discussed here, the role of contrastive topic is played by a DP which normally expresses universal quantification:

(66) [$_{\text{Spec,TopP}}$ √Minden kutyát] \kevés ember látott.

               every   dog-ACC few   person saw

     'Every dog, few people saw.'

In the present framework, where non-referential DPs in topic position are taken to denote properties, it seems to be a plausible idea to consider the DP *minden kutyát* 'all dog-ACC' as denoting the maximal member of the join semilattice constituted by the elements in the extension of the common noun *dog*.

     (67) below shows the syntactic structure associated with the above sentence, and (68) the translations of the nodes of (67) on the basis of the above assumptions:

(67)

(68) $\forall x\ [(\textbf{person'}(x) \wedge \exists y(\textbf{saw'}(\textit{x, y}) \wedge \textbf{max-dog'}(y))) \rightarrow |\{V \mid \textbf{ATP}(V, x)\}| \leq k]$

$\lambda x\ \textbf{max-dog'}(x)$ $\lambda \textbf{\textit{Q}}_i\ \forall x\ [(\textbf{person'}(x) \wedge \exists y(\textbf{saw'}(\textit{x, y}) \wedge \textbf{\textit{Q}}_i\,(y))) \rightarrow |\{V \mid \textbf{ATP}(V, x)\}| \leq k]$

$\lambda \textbf{\textit{Q}}_i$ $\forall x\ [(\textbf{person'}(x) \wedge \exists y(\textbf{saw'}(\textit{x, y}) \wedge \textbf{\textit{Q}}_i\,(y))) \rightarrow |\{V \mid \textbf{ATP}(V, x)\}| \leq k]$

$\lambda P \forall x\ [(\textbf{person'}(x) \wedge P(x)) \rightarrow |\{V \mid \textbf{ATP}(V, x)\}| \leq k]$ $\lambda z\ \exists y\ [\textbf{saw'}(z, y) \wedge \textbf{\textit{Q}}_i\,(y)]$

λz $\exists y\ [\textbf{saw'}(z, y) \wedge \textbf{\textit{Q}}_i\,(y)]$

$\lambda P_{<e,\,t>}\ \lambda x_e\ \exists y_e\ [\textbf{saw'}(\textit{x, y}) \wedge P(y)]$ z $\textbf{\textit{Q}}_i$

In the above tree, the contrastive topic DP *minden kutyát* 'every dog-ACC' is translated with the help of the predicate **max-dog'**, which intends to denote the property characterizing the maximal element in the join semilattice corresponding to the denotation of the common noun *dog*. Thus, the translation of the meaning of the top node of (68) could be paraphrased as follows: any individual which saw the maximal individual with the *dog* property (that is, all dogs) is such that the number of its atomic parts does not exceed a contextually given number *k*. This characterization corresponds to the intuitions regarding the meaning of the sentence.

In this section we have shown that, on the basis of the idea that contrastive topic DPs can be interpreted as denoting a property, the narrow scope readings of these DPs can be derived compositionally. In the closing section the most important results of the study are summarized.

6.   Summary

We have proposed an alternative to Manfred Krifka's theory of scope inversion under the rise fall intonation which is not specific to German. We have argued that a left-peripheral quantifier pronounced with a (fall-)rise is in topic position (Spec,TopP). A topic phrase must refer to an individual already present in the domain of discourse - that which will be predicated about in the sentence; however, non-individual-denoting expressions, among them quantifiers, can also be made suitable for the topic role if they are individuated by being set into contrast. Individuation by contrast enables non-individual-denoting expressions to be interpreted as semantic objects (properties) which the rest of the sentence predicates a (higher-order) property about. A quantifier functioning as a contrastive topic denotes a property of plural individuals, and its apparent narrow scope arises from the fact that it is considered to be a predicate over a variable inherent in the lexical representation of the verb.

Notes

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1 Our proposal is related to the analyses of Jackendoff (1972) and Jacobs (1997) in this respect. Jackendoff claims that a sentence like *All men \didn't go* expresses a statement about its contrastive topic; it states that it does not have the property denoted by the comment. In the assertion the negation has scope over the element *all*, which is expressed by stress.

Jacobs (1997) calls the apparent narrow scope of initial quantifiers under the (fall-)rise contour an epiphenomenon. He claims that such sentences consist of a topic and a predicate in the scope of an assertion operator:

(i) [[ASSERT^{IT} (TOP)(PRED)]]

In the propositional content of the sentence the denotatum of PRED is applied to TOP as an argument, which yields (ii):

(ii) [[PRED]]([[TOP]])

It is structure (ii), with the topic functioning as an argument of the predicate, that creates the effect of scope inversion. Scope inversion is a consequence of a syntactic configuration in which the trace of the topic is in the c-command domain of a predicate-internal operator.

2 If generic NPs are names of kinds, as claimed by Carlson (1977), then they are also referential, denoting specific individuals.

3 Naturally, contrastive topic noun phrases can be considered as anaphoric to some salient *property expression*, as mentioned above.

4 Here we ignore the implicatures associated with contrastive topics, since they do not contribute to the truth-conditional interpretation of the sentence. Sentence (45) implicates that there are other properties whose instantiations might not have been seen by Mary.

5 On the assumption that the Hungarian VP is flat, we are going to disregard the compositional makeup of the VP.

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