

## **Quantificational Dependencies**

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# **Quantificational Dependencies**

## **Kwantificatiele Afhankelijkheden**

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aan de Universiteit Utrecht  
op gezag van de Rector Magnificus, Prof. dr. W. H. Gispen,  
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door Sarah D. Kennelly

geboren op 22 november 1944 in Berkeley, California

Promotores: Prof. dr. H. de Swart  
Prof. dr. H. Verkuyl

This dissertation is dedicated to three people:  
to the memory of my father, Louis M. Rorden  
to the memory of my friend, Elâ Gönenc  
and to Richie Kayne

three people who have taught me the dignity of difference

# QUANTIFICATIONAL DEPENDENCIES

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# QUANTIFICATIONAL DEPENDENCIES\*

## INTRODUCTION

### 1. INTRODUCTION

This dissertation consists of five articles:

- #1 ‘\*Nonspecific External Arguments in Turkish’ (1997) in *Dilbilim Araştırmaları* 7, Istanbul. p. 58-75.
- #2 ‘The Syntax of the P-Focus Position in Turkish’ (1999) in G. Rebuschi, & Tuller, L. (eds.) *The Grammar of Focus*. Amsterdam, John Benjamins Publishing Co. p.179-211.
- #3 ‘Cumulativity and Distributivity Interaction of Polyadic Quantifiers’ (1999) written together with Fabien Reniers in P. Dekker (ed.) *12th Amsterdam Colloquium*, Institute for Logic, Language and Computation. 181-185.
- #4 ‘The Implications of Quantification for the Role of Focus in Discourse Structure’ (2003) in "Focus in Turkish", A. Göksel, & Özsoy, S. (eds.) *Lingua* 113: 1005-1088
- #5 ‘Pragmatics and Quantificational Dependencies’ (2004) in "Focus and the Syntax-Pragmatics Interface", D. Bury, Froud, K., Horsey, R., & Szendroi, K. (eds.) *Lingua* 114: 367-388

The first two are steeped in syntactic theory and provide background for some of the issues, while the other three address semantics. The underlying themes throughout the articles are twofold. First the nature of **(non)specificity** is considered from many distinct points of view, both syntactic and semantic. **Specificity** is defined as Discourse

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\* In the articles I consider only a) two place non-stative predicates, b) count nouns, c) atemporal structures (discounting all forms of sequencing), and d) positive assertions, with an occasional lapse at my discretion for my own purposes. It is also considered that meaning postulates in the lexicon deal with a) collective predicates such as *gather*, b) collective nouns such as *committee*, *crowd*. It is considered that *see*, *taste*, *cross*, *visit*, etc. predicate of individuals, even if those individuals perform these activities together with others performing the same activity. Other predicates such as *write*, *pick*, *open*, *tie*, *kill*, and *lift* are ambiguous as to whether performed by an individual or by a collection of individuals, none of whom performed the activity by her/himself. *DP* is used to cover both the traditional use of NP and of DP. It is assumed that DPs are  $\pm$ definite and that indefinite DPs are  $\pm$ specific; in addition determiners are divided into strong, specific (*every*, *all*, *each*, *most*, *both*, *many*) and weak (*a*, *some*, *few*, cardinals), with weak determiners ambiguous between  $\pm$ specific. This dissertation owes a lot to the work of Farkas (1994;1997) and to crucial discussion with A. Birtürk, C. Bozşahin, A. Göksel, J. Hoeksema, S. İşsever, G. Kuruoğlu, K. Oflazer, I. Pembeci, F. Reniers, E. Ruys, A. San, B. Say, O. Şehitoğlu, S. Şener, M. Steedman, Ü. Turan, E. Uzun and D. Zeyrek. Sources used throughout the dissertation: (de Mey 1990; Chierchia & McConnell-Ginet 1991; Gamut 1991; Landman 1991; Partee, ter Meulen et al. 1993; van der Does & van Eijck 1996; de Swart 1998).

Linking (Pesetsky 1987; Enç 1991), which is elaborated in Art.#4 in terms of a binding system. The binding system of D(iscourse)-Linking in turn provides the framework for the definition of discourse structure. The second underlying theme that is developed in the five articles is the **role of predication** within its relation to Focus Information, i.e. discourse structure. The analysis of both (non)specificity and predication are then integrated with discourse structure to provide the building blocks for the proposed analysis of Quantificational Dependencies (QDs). The term 'Quantificational Dependencies' – used to refer to the multiple box reading in *Every child opened a box* - originated from a discussion with J. Hoeksema, but it also appears in Partee (1993); the term 'multiplication' is from Szabolcsi (1997) while I coined the term 'Base Plural' (BP) for the quantificational role of 'every child'.

Stemming from the use of specificity to characterize members of a subset relation, where the superset is part of the previous discourse, Heim (1982) claims that specific DPs are necessarily *familiar* within the discourse, and that position is adopted in the first article. As other forms of specificity, such as relational nouns, are brought into the discussion (in Art.#4), it becomes clear that Heim's claim cannot be maintained. In the proposition *Everyone has a mother*, where the DP 'mother' is clearly specific due to its self-defining D-Linking relation with the presuppositional, i.e. anaphoric (van der Sandt 1992) DP *everyone*, the discourse referents of the specific DP are not necessarily part of the previous discourse. To replace the across-the-board association of (non)specificity with discourse structuring, a binding system is developed in the final two articles that provides a more fine grained definition of D-Linking as well as tangible definitions of discourse roles. **Nonspecific DPs** are first examined from a syntactic point of view in Arts #1 & #2, where they are not only constrained to a VP internal position as proposed by Diesing (1989) but, in Turkish, they are exclusively internal arguments. This is later attributed to their Focus role, which is that of a derived predicate. Turkish then has a VP level of existential closure. One frequent assessment of QDs is that the multiple DP must be nonspecific (Ruys 1992; Farkas 1994; Farkas 2001) (plus many others). It is shown that that cannot be the case since empirically, any quantified DP can multiply, and clearly it is a specific DP that multiplies in *Everyone has a mother*. Furthermore, it is claimed in Art. #5 that under a multiple interpretation a nonspecific DP is coerced to a D-Linked and therefore specific interpretation by the very relation that allows it to multiply. As the role of binding theory in determining the definition of a DP evolves through the last two articles, the need to explain quantificational interpretation in terms of covert movement collapses. A movement analysis is directly related to the representation of quantification in terms of first order logic. Under scrutiny the utility of such a representation cannot be sustained, thus paving the way for the analysis of quantification in terms of discourse, i.e. information structure, that is in terms of binding theory.

Drawing on the work of Chomsky (1971) and Herburger (1995), Art #2 presents focus information as the derived predicate, motivating the constraint on contiguity with the verb in Turkish presented in Art. #1. Art. #3 looks at the role of the predicate relation within QDs and demonstrates conclusively that QDs cannot be explained as incorporation of the multiple argument with the predicate. Clearly a multiple construal of the predicate does not entail a multiple construal of the potentially multiple DP. In *Every child opened a box* under the single box reading there is nevertheless a multiple reading of the predicate. The idea that QDs realize a multiple VP can be solidly

rejected by examples of VP internal Base Plurals (BPs), as in the multiple book reading of: *A book was available to John and Mary during their examination* (Verkuyl 1999) (eg. (58)). In such cases, a multiple VP would entail the infinite generation of multiplication. The final article carries the distinction between multiple predicate and multiple argument one step further; based on the fact that a multiple predicate does not entail a multiple DP, it concludes that there must be a non-assertive D-Linking relation that relates the base plural to the multiple DP. The analysis stems from the use of contrast to invoke a QDs interpretation whereby there is a demotion of the main predicate to a nonassertive role such that it can sustain a QDs reading, while the assertive predicate is in fact the negation of the alternatives to the proposition.

A fundamental point that is supported in the final three articles is that the theory of quantificational interpretation is a binary concept. That is quantification is either interpreted as QDs or as a Cumulative construal, following (my extension of) Verkuyl's Law of Quantification (1988) (presented in example (29)). The recognition of Verkuyl's work is fundamental to any dimension of understanding of quantification.

Section 2 continues with a brief summary of Turkish structure to serve as a basis for the examples not only in the introduction but also in the five articles. Then Specificity, D-Linking and Discourse Structure are presented in Section 3. The discussion alters from the motivation of the dissertation to the content with brief summaries of Arts.#1/#2 in Sec. 4, fundamentally a background for the discussion of Arts. #3/#4/#5 throughout Sec. 5-7. Section 5 gives a background on quantification and then introduces (my extension of) Verkuyl's Law of Quantification, addressing functions, distributivity, monotonicity, semantics of pairs of determiners and inverse QDs. Locality, Discourse Structure & Binding, and Discourse Structure & Inverse QDs are addressed in Section 6 while Section 7 considers the Anywhere Principle in Turkish QDs inducing morphology and in contrast, which in turn motivates the application of polyadic quantification. Section 8 summarizes the discussion and draws some conclusions.

## 2. TURKISH

In the discussion of (non)specificity and predication with respect to discourse structure and its interaction with QDs, both in this introduction and in the five articles, I have relied heavily on examples from Turkish since it is a discourse configurational language that has explicit morphology for (non)specificity. The transparency of these two factors renders Turkish an optimal tool in such an investigation. The purpose of this brief section is to render more accessible the information in the examples. There are also contradictions within the analyses in the distinct articles that need to be highlighted, such as the syntactic position of the subject in Turkish. It is a SOV head final language where the head of the Relative Clause (RC) is to the right. A simple sentence carries verbal agreement on the predicate in sentential final position and DPs carry suffixed Case markers, albeit the nominal marker is  $\emptyset$ .

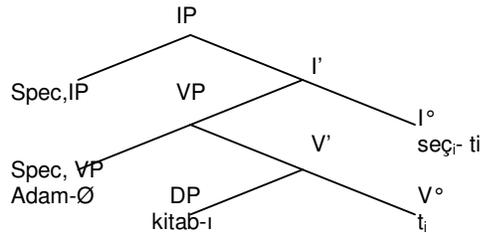
The motivation for the proposal that the subject remain in Spec, VP, while the verb raises to  $I^{\circ}$  is explicated in Art. #2. The strong agreement in Turkish motivates verb movement to  $I^{\circ}$  while the fact that a sentential subject tolerates extraction in terms of relativization motivates the position of the subject as Spec,VP where it is governed by the verb in  $I^{\circ}$ . In opposition, Art. #1 claims that the subject moves into Spec, AgrP (i.e. Spec, IP) for purposes of agreement, whereas in Art.#2 only a subject with a strong

determiner moves out of VP. Koopman and Sportiche (1988:17) propose that in English Tensed INFL assigns (checks) Nominative Case by agreement in a Spec-Head configuration, forcing the external argument DP to raise to Spec,IP, but that in Arabic, Irish and Welsh Tensed INFL can assign Case structurally, under government, permitting lexical DPs to surface in Spec,VP if and only if the verb is in I°.

While the motivation for the Spec,VP subject position is the capacity to relativize out of the subject, it is also debatable if relativization in Turkish entails extraction in terms of movement. On the one hand subjects are shown to be specific in Art.#1, on the other a relativized or 'extracted' subject can be the nonspecific object of the matrix clause in Art.#2. These data only make sense if relativization does not entail movement. Therefore the motivation for a VP internal subject is seriously in question. If QDs are analyzed in terms of syntactic position, which I argue for in Art.#2 and against in Arts.#4/5, then the fact that not all quantified DP subjects allow QDs would indicate that only those subjects that have a BP interpretation have undergone movement out of VP. The discussion of the position of the subject in Turkish remains an open question, while the position of the verb in I° is strongly supported by data with adverbs in Art.#2. Since the final analysis of QDs does not depend on syntax, sustained in Art. #4 by anaphoric data, the determination of the position of the subject loses its importance.

The SOV word order in Turkish is seen in propositional structures. The interpretation of anaphora is strictly linear, which supports the following analysis of a proposition.

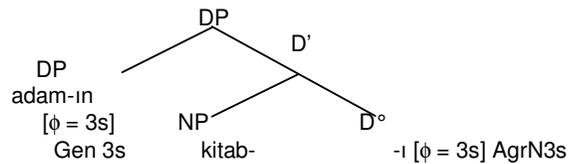
- (1) Adam<sub>i</sub> kitab-ı seç- ti.  
 man-Nom book-Acc choose-present perfect-Agr (a Ø morpheme for 3s)  
 'The man has chosen the book.'



Crucial to the appreciation of the morphology of subordinate propositions in Art. #1 is the representation of the morphology of a Turkish nominal in (2). (The NP here is later referred to as a common noun (CN) in the discussion of the semantics of a determiner, and is noted CN/NP.) In a complex DP, the Genitive marker appears on the possessor while the Possessive morpheme appears on the noun. Since both the Genitive and the Possessive have  $\phi$  features which agree with the subject in number and person (there is no gender in Turkish), I have labeled the Possessive morpheme AgrN (Kennelly 1991) which is distinct from both the verbal and copular agreement

paradigms in Turkish. In view of the fact that the possessive is one of the two non-quantificational determiners it is posited as D°. <sup>1</sup>

- (2)  $[_{DP}[_{DP} \text{adam-}]\text{-in}] \quad [_{D'}[_{NP} \text{kitab-}]\text{-i}]$   
 man-Gen3s                      book-AgrN3s  
 'the man's book' (lit: man's book-his)



Drawing on the work of Kayne (1989) and Carstens & Kinyalolo (1989), Chomsky (1991) maintains that the Spec-head relation is one of agreement. In keeping with this evaluation and in order to account for the assignment of  $\phi$  features to D°, the Genitive is posited in Spec,DP with the result that D° qualifies as a bound variable.

The morphology of the complex DP in (2) is duplicated on the subordinate proposition, followed by Case which is determined by the matrix verb, seen in (3).

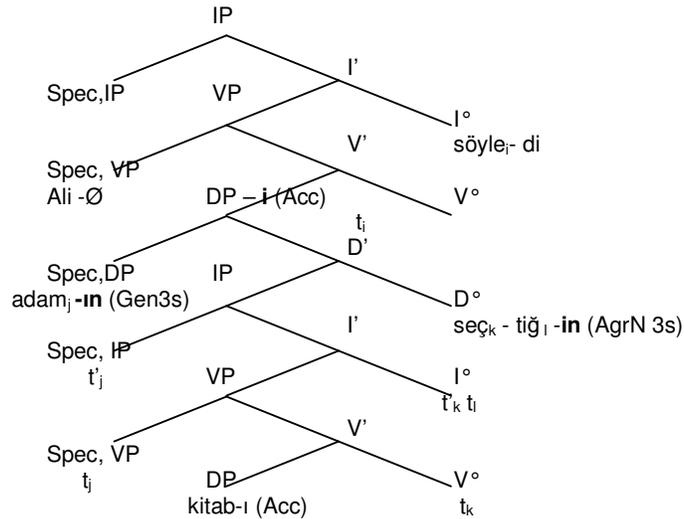
- (3) Ali  $[_{DP} \text{adam-}]\text{-in}_i \quad [_{IP} t'_j [_{VP} t_j \text{ [kitab-}]\text{-}]\text{t}_k] t'_k t_l \text{ se}ç_k \text{-ti}ğ\text{-in}_i \text{-i-i}$  söyledi.  
 man-Gen3s                      book-Acc                      choose-Infl-AgrN3s-Acc has.said  
 'Ali said that the man (had) chose(n)/chooses the book.'  
 (lit:Ali [the man's the book chosen-his] said.)

Note that the form of the Acc. marker on *kitab-* 'book' in (3) is homophonous with the 3<sup>rd</sup> singular of the AgrN morpheme in (2). Turkish is an agglutinative language whereby suffixes occur in succession, one after another, with the order strictly regulated. As seen in the nominalized subordinate verb in (3), the 3<sup>rd</sup> singular of AgrN, *-I*, takes an 'n' to separate it from a vowel initial succeeding suffix.<sup>2</sup> This in turn renders it homophonous with the 3<sup>rd</sup> singular of the Genitive, seen on the subordinate subject in (3), as well as in (2).

<sup>1</sup> It has been argued that the possessive is not a determiner since it appears together with the definite article in some languages such as Italian. We also find 'the many women' and 'the three girls' in English. While the status of 'many' and 'few' has been argued to vary between that of an adjective and determiner (Partee 1988) (among others), they are nevertheless generally considered to fall, in at least some environments, within the category of determiners. Numerals have always been considered determiners, regardless of whether they have a cardinal or proportional interpretation. So the fact that the possessive occurs in the presence of the definite article in Italian is not enough evidence to invalidate the proposal that they function as determiners. Vergnaud & Zubizarreta (1992) propose that the definite article plus the pronominal possessor in Italian are both dominated by the D node since no lexical material may intervene between them. Furthermore, Keenan & Stavi (1986) have demonstrated that the possessive patterns with the other determiners in its semantic properties.

<sup>2</sup> In the base form of a Turkish morpheme, letters subject to rules of vowel harmony and de-voicing are capitalized.

(3)' Sketch of the structure in (3):



The verbal morphology in subordinate propositions is totally distinct from that in the main clause; it is nominal morphology, suggesting that Turkish subordinate propositions are aspectual rather than temporal. The subordinate inflection *-DİK-*, with morphophonemic variations such as *-tiğ* and *-duğ*, indicates all temporal reference that is not future and is found in complementary distribution with the future morpheme *-ECEK-*. These two morphemes have been analyzed as aspectual (Erguvanlı-Taylan 1993; Kennelly 1996), which is in keeping with Higginbotham's (1992) observation that tense and nominalizations are contradictory.<sup>3</sup>

Arts. #4/#5 make use of the fact that Turkish is a discourse configurational language in the integration of discourse structuring and quantification. In Turkish the linear organization of a proposition indicates the discourse function (Erkü 1982; 1983), with Topic as sentential initial information, Focus information is immediately preverbally and Backgrounded information occurs postverbally, that is information unaffected by the assertion. Since Erkü's work, two distinct forms of Focus have been identified, a weaker form and a stronger form that involves contrast (Rooth 1985; Rullman 1995). In Art. #2 I refer to the weaker form as P(resentational)-Focus and then the stronger is C(ontrastive)-Focus. İşsever (2003) has then updated Erkü's work, noting that it is P-Focus that appears immediately preverbally, while C-Focus may appear anywhere preverbally with contrastive pitch accent, and the two do not co-appear.

<sup>3</sup> The analysis of tense on the matrix S in Turkish is based on the interpretation of the past tense morpheme, *-di*, which cannot appear on an embedded verb. However this morpheme can also appear immediately affixed to a DP *kadın-ıdı* lit.'Woman-was'. Since \*[nominal+tense] *-di* cannot be tense.

Since Turkish structure is radically different from that of English, it was considered opportune to present a brief discussion of it in Section 2 of this introduction to aid the reader in the appreciation of the examples in the next section as well as in the five articles that make up the dissertation.

### 3. SPECIFICITY AND DISCOURSE STRUCTURE

This dissertation addresses both (non)specificity and predication with respect to discourse structuring, within an analysis of quantification, making extensive use of Turkish examples because of its transparency for (non)specificity and discourse structure. In the final two articles discourse structuring is analyzed in terms of binding theory. There are 2 relevant types of binding: 1) direct in the form of anaphoric binding as well as existential closure, and 2) indirect binding in the form of D-Linking, which can be extended to include direct anaphoric binding. D-Linking is the equivalent of specificity. So the transparency of Turkish with respect to specificity is of great help in visualizing where the binding of D-Linking occurs. This awareness, together with the transparency of discourse structure in Turkish, lends readily to a more accurate appreciation of the relation between (non)specificity and discourse structuring, laying the groundwork for the analyses of quantification in Arts #3/#4/#5. The previous accounts of the relation between the semantics of DPs and discourse structure as well as of (non)specificity put forth by Heim (1982) and Enç (1991) are found to be inadequate under scrutiny. Heim proposes an across-the-board one-to-one relation between the semantics of a DP and its discourse role: definites are Given Information and indefinites are New. Data here and in Art.#4 show that this cannot be the case. The challenge of the analyses of Heim and Enç lays the ground for my proposals in Arts. #4/#5 that specifics, both definites and indefinites, when locally bound, behave as New Information while a DP bound at text-level, including indefinites, behaves as Given. QDs are then analyzed as a mapping from Given to New Information.

#### 3.0 (Non)specificity

A nonspecific object is morphologically explicit in Turkish. While a specific object is marked with an Accusative clitic<sup>4</sup>, a nonspecific object is unmarked for Case (Erkü 1982:30; Enç 1991:4), indicated in the glosses with '@'. In the written language, the unmarked nonspecific object occurs exclusively in the immediately preverbal Focus position. While there is no definite article in Turkish, definiteness of the object is communicated by means of the Acc. marker on the DP without a determiner, as in (3). The Acc. marker plus an indefinite determiner indicates a specific indefinite. In her analysis of specificity in terms of D-linking Enç makes use of the following scenario. The scene is set in (4) when the speaker mentions that several kids came into her/his room. As with *kids* in English, *çocuk* 'child' is taken here to be mixed male and female. Each of the sentences in (5) is discourse that immediately follows (4).

#### Scenario I

- (4) Odama birkaç çocuk girdi.  
to.my.room several child entered  
'Several kids entered my room.' (Enç 1991:6)

---

<sup>4</sup> Both *Acc(usative)* and *specificity clitic* are used for the Accusative morpheme.

- (5) a. İki kız-ı/çocuğ-u tanıyordum.<sup>5</sup>  
 2 girl-Acc/child-Acc I.knew  
 'I knew two of the girls/kids.'  
 (They are members of the group in (4).) (Enç 1991:6)
- b. # İki kız/çocuk tanıyordum.  
 2 girl-@/child-@ I.knew  
 'I knew two girls.'  
 (They cannot be members of the group in (4).) (Enç 1991:6)

In the discourse immediately following (4), when the speaker states that s/he knew two girls/kids, the use of the specificity clitic in (5)a on the object renders it implicit that the object DP represents members of the previously mentioned group. When the specificity clitic is used there is the creation of a conversational scalar implicature<sup>6</sup> that the speaker didn't know the rest of the kids in the group, giving the object DP the equivalent of a subset relation. The absence of the specificity clitic on the object DP in (5)b indicates that the referents of the DP are *not* members of the group indicated in (4), rendering the sentence infelicitous in the context (indicated by '#').

According to Kamp (1981)/Heim (1982) the distinction between an indefinite, *a man*, and a definite, *the man*, lies in the Novelty Condition vs. the Familiarity Condition: an indefinite has no antecedent; a definite must have one. Enç's (1991:7) definition of specificity extends this analysis to a system of feature-bearing indices (discussion repeated from Art. #4). A DP has two indices: one is the referential index, *i*, which corresponds to the discourse referent, and the other, *j*, relates the referent of the DP to other discourse referents. The indices themselves bear a definiteness feature. The definiteness feature on the referential index *i* reflects the definiteness of the DP. That on the second index, *j*, constrains the relation of the referent of the DP to other discourse referents; i.e. it expresses the familiarity or novelty of the discourse referent to which the referent of the DP stands in a subset (or some other) relation; thus it reflects the specificity of the DP.

- |     |                                      |   |
|-----|--------------------------------------|---|
| (6) | the man <sub>i</sub> [+def],j[+def]  | identity relation with a discourse referent |
| (7) | a. a man <sub>i</sub> [-def],j[+def] | specific indefinite - D-linked, (5)a        |
|     | b. a man <sub>i</sub> [-def],j[-def] | nonspecific, (5)b                           |

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<sup>5</sup> (4) uses the word *çocuk* 'child' to refer to the group, and then Enç uses the word *kız* 'girl' in the following discourse. I added *çocuk* to the data to ascertain if the same results would obtain, and they do.

<sup>6</sup> Conversational scalar implicatures exploit the Gricean Maxims of Quantity (be only as informative as required) and Quality (say what you believe to be true). When a speaker utters *Some students passed* she implicates *Some students didn't pass*. Since the fact that all the students passed would be informative in the context, then if the speaker believed that to be true she would have said so. Since she didn't, one can infer that the speaker believes that it is not true. If the listener believes that the speaker has access to the full story, then it follows that the speaker had the intention of communicating that not all the students passed (Chierchia and McConnell-Ginet 1991:193).

According to Enç's analysis, a DP is specific if the j index is definite, whereby the Familiarity Condition requires that *the discourse referent to which the referent of the DP bears a subset (or other) relation be in the domain of discourse prior to the utterance of the DP*. As a result a definite DP is always specific because it bears an identity relation to a (previously mentioned) discourse referent, represented in the j[+def] index. It must be pointed out, however, that the anaphoric identity relation must be either attributed to a distinct index or to the 'i' index, since definites can also have a distinct D-Linking relation, as in *Every child opened the box in front of her*, in addition to the anaphoric relation and the 'j' index is needed for that. In Enç's analysis, an indefinite DP is only specific if its referent is a subset of (or related to) a discourse referent. In other words it must be included in (or related to an element in) the Common Ground, i.e. the propositions that constitute shared knowledge by the speaker and listener (Stalnaker 1978:281), and hence presupposed. According to her analysis, the j[+def] index is morphologically overt in Turkish in the form of the Accusative clitic. She equates (p.21) her notion of specificity to Pesetsky's (1987:107) notion of D-linking and nonspecificity to the cardinal/nonquantificational interpretation of *weak* determiners, i.e. those determiners that may appear in existential sentences (Milsark 1974; 1977).

Now consider another scenario in which the nonspecific DP represents an individual that *may be* in a subset relation to a plural discourse referent. I refer to this as the potential for *discourse congruity* by the nonspecific DP. In Scenario II the scene is set when the speaker tried to enter the library which was blocked by a group of (protesting) students. Later it was heard that the police had arrested some students. In this scenario if the DP that represents the arrested group is a nonspecific it carries no implicature of exclusion from the previously mentioned protesters. Each of the sentences in (9) and (10) is to be taken as discourse that immediately follows (8).

## Scenario II

- (8) Kütüphaneye girmek istediğim zaman, girişin bir grup  
 library-Dat enter I.wanted time entry a group  
 öğrenci tarafından bloke edilmiş olduğunu gördüm.  
 students by had been.blocked having.been I.saw  
 'When I wanted to enter the library, I saw that the entrance was blocked by a  
 group of students.'<sup>7</sup>
- (9) a. Daha sonra polisin 20 kız-ı/öğrenci-yi tutuklamış olduğunu duydum.  
 later police 20 girl-Acc/student-Acc having arrested I.heard  
 'Later I heard that the police had arrested 20 girls/students.'  
 (They were among the protesters.)
- b. Daha sonra polisin 20 kız/öğrenci tutuklamış olduğunu duydum.  
 later police 20 girl-/student-@ having arrested I.heard  
 'Later I heard that the police had arrested 20 girls/students.'  
 (They may have been among the protesters.)

<sup>7</sup> This example is purported to come from Diesing's UMass dissertation, but was omitted in the resulting book (1992).

- (10) a. 20 kız-/öğrenci-yi tanıyordum.  
 20 girl-Acc/studentl-Acc I.knew  
 'I knew 20 girls.' (They were among the protesters.)
- b. # 20 kız/öğrenci tanıyordum.  
 20 girl-@/student-@ I.knew  
 'I knew 20 students.' (They weren't among the protesters.)

When the specificity clitic is present in (9)a, it is not only implicit that the referents of the DP are members of the group mentioned in the immediately preceding discourse, but there is also the implicature that there is a contrast with the other members of the group, who were presumably not arrested; that is the clitic introduces a subset relation. It is crucial that there is a conversational scalar implicature (Enç's partitivity) with the specificity clitic when discussing a group. The absence of the specificity clitic in (9)b carries *no implicature whatsoever*. There is no implicature of group membership *or of exclusion* as in Scenario I. There is also no implicature of what happened to any other possible members of the group. (10)a and (10)b show that if the verb in the discourse immediately following (8) is *tanımak* 'know', then the implicature of exclusion created by the nonspecific object is the same as for Scenario I.

What is the difference? Why does the nonspecific object of the verb *tanımak* 'know' in (5)b/(10)b imply exclusion from the previously mentioned group, while that of the verb *tutuklamak* 'arrest' doesn't? A stative verb that follows an event verb usually indicates a state that originated previous to the event. In Scenarios I & II, knowing the girls/students/kids was pre-existent to entering the room or to the library protest. The result is that it would be impossible for the speaker to be unclear as to whether s/he knew the people in the room or the protesting students at the time of those respective events. Thus it is the pragmatics that are brought into play with the verb *tanımak* 'know' that disallows discourse congruity by the nonspecific DP in (5)b/(10)b, not the interpretation of nonspecificity.

Perhaps the possibility for discourse congruity may only occur if there is a sequence in time, as in (8)/(9). To clarify this issue consider a third scenario where the order of the two events is left obscure. (11) and (12) are continuous discourse.

### Scenario III<sup>8</sup>

The nonspecific argument in (12) *may* refer to a member of the group in (11).

- (11) Birkaç polis odama girip bilgisayarımı çaldı.  
 several.polis my.room entered my.computer-Acc stole  
 'Several police entered my room and stole my computer.'
- (12) Daha sonra ağabeyim merdivende iki polis gördüğünü hatırladı.  
 later my.brother on.the.stairs 2.police-@ having.seen remembered  
 'Later my brother remembered having seen 2 police on the stairs.'

The event of seeing the cops on the stairs may very well have been before or after the theft. At the same time it is very possible for the nonspecific object *iki polis* '2 police' to indicate the same police that were previously mentioned in the discourse. So the sequence of the events/states in and of itself has nothing to do with the potential for

<sup>8</sup> This example was suggested by Deirdre Wilson.

discourse congruity. In both (9)b and (12), regardless of the sequence, the interpretation of the nonspecific object retains the potential to violate Heim's Novelty Condition. Neither can Enç's indices allow for the possible discourse congruity. In Arts #4/#5 a system of binding is proposed with a more fine-grained appreciation of what (non)specificity is and how it relates to discourse structure, providing the ground for my theory of quantification which is anchored in discourse structure.

### 3.1 Specific Indefinites and D-Linking

Specific indefinites are a particular problem for the Heim/Enç analyses. According to their theory, all indefinites, including specific indefinites, must be New Information, presumably due to the fact that D-Linking has not had full recognition for its dependency and therefore binding relations. The analysis put forth in this dissertation attributes full binding status to D-Linking relations; anaphoric binding then simply becomes a particular case of D-Linking. The power of D-Linking to determine information structure is a central point in both Arts. #4/#5, and consequently to my theory of quantification. Under my analysis, specific indefinites may be either New or Given Information, depending on where the binder of the variable contributed by the specific indefinite DP resides. And that binding structure determines the capacity of the DP to participate in QDs.

Enç states that there are two types of specific indefinites: 1) (c)overt partitives, including all quantified expressions (p. 10 ft. 13 describes them as indefinites, which are partitives in her system), and 2) relational specifics, including those of the *a certain* NP variety. She states that the second type "involves linking objects to the domain of discourse in some manner or other. One acceptable way of linking is through this assignment function, by relating objects to familiar objects. Another acceptable way of linking is the subset relation." (p.21)

Fodor & Sag (1982) demonstrate that some specific indefinites (*a certain* NP, where the identity of the referent of the DP is known to the speaker or to the subject, though not to the listener) have a 'referential' status. This flavor of specific indefinite has been tagged a *have-in-mind* relation, in fact **epistemic specificity**, which has been eloquently explicated by Farkas (1994). She answers the query what a *have-in-mind* relation actually is. From Stalnaker (1978), the Common Ground  $P_0$  is a set of propositions that characterize a set of possible worlds,  $W(P_0)$ , the Context Set, which contains all and only those worlds of the model in which all the propositions in the Common Ground are true.

...Assume that the cognitive state of an individual  $i$  is represented by a set of propositions  $P_i$ , the propositions  $i$  takes as being true of the actual world. Let us call the propositions in  $P_i$  the *epistemic modal base* of  $i$ .  $P_i$  characterizes a set of worlds,  $W(P_i)$  containing all and only those worlds of the model in which all the propositions in  $P_i$  are true.  $W(P_i)$  will be referred to as 'the worlds epistemically accessible to  $i$ '.

Finally, let us assume that the context of a conversation contains information regarding the participants' epistemic modal bases, and that assertions have a secondary effect of affecting information concerning the epistemic modal base of the speaker. Their primary effect is, of course, affecting the common ground.

We may now characterize epistemic specificity in terms of the status of the referent of an indefinite with respect to the speaker's epistemic modal base, and not with respect to the common ground *per se*. Thus, if a speaker *s* asserts that "A student cheated on the exam" with respect to  $P_0$ , and the assertion is not objected to, the common ground is changed to  $P_1$ , by adding to  $P_0$  a proposition claiming the existence of a student who cheated on the exam, independently of whether the indefinite is epistemically specific or not. The indefinite will refer non-rigidly with respect to the context set: which individual the cheater is will vary from world to world in  $W(P_1)$ . If the indefinite is **epistemically specific**, the speaker will be taken to have fixed the referent of the indefinite, i.e. the indefinite will refer rigidly with respect to the worlds in the modal base of the speaker,  $W(P_s)$ . An **epistemically specific indefinite** refers non-rigidly with respect to the context set  $W(P_0)$ , and it refers rigidly with respect to  $W(P_s)$  (SK: or with respect to  $W(P_i)$ ), where *i* is the referent of an argument DP. An epistemically non-specific NP refers non-rigidly with respect to both sets of worlds. In order to implement these suggestions one has to allow assertions to affect the common ground and the representation of the cognitive state of the speaker (SK: or individual *i*) in different ways.... Under the assumption that the truth conditions of a proposition concern only its effect on the common ground, epistemic specificity does not affect them. Epistemic specificity affects only the information concerning the speaker's (SK: or *i*'s) cognitive state. (Farkas 1994:5)

Farkas (1994) takes it that epistemic and scopal specificity (a DP that cannot multiply) are distinct though related, while Farkas (2001) groups specificity as either partitive or non, thereby grouping epistemic and scopal specificity in one category.

In discussing epistemic specificity as elaborated by Farkas above, I follow tradition and call it a *have-in-mind* relation. Farkas assumes that it is only the speaker that may have a referent *in-mind* for the relevant argument of the logical predicate. However there are other participants in the discourse that could well be part of a *have-in-mind* relation with the relevant argument, such as a person denoted by the subject or by one of the other arguments. Farkas alludes to this in her query if there might be epistemically specific scopally nonspecific DPs. Hintikka (1986) had already provided an example.

Hintikka shows that specific indefinites may be specific with regard to some other argument in the sentence, i.e. D-Linked, with the linking determined within the sentence, giving the indefinite an *in situ* (i.e. local) interpretation; i.e. it can multiply. In relational specifics of the type in (13), the DP stands in the contextually relevant relation to some other object. This can be analyzed in terms of a relational function which takes 'wide scope', but the range argument of that function is *in situ* and takes 'narrow scope', as shown in the LF (Logical Form) representation in (13)b.

- (13) a. Every true Englishman adores a certain woman - his mother.  
 adapted from Hintikka (1986: 334)
- b.  $\exists f(\forall y( y \text{ is an Englishman} \rightarrow y \text{ adores } f(y)))$

Under the analysis presented in Arts. #4/#5, the specific DP in (13)a is locally bound within a D-Linking *mother* relation, rendering it New Information, and it is New Information that may multiply under QDs.

There is a parallel example from Turkish. In the following line of prose, an apparent nonspecific is unacceptable without the specificity clitic.

- (14) Dünyayı güzellik kurtaracak; [PROarb bir insanı/\*insan-@  
 the.world beauty will.save a person-**Acc**  
 sevmek]le başlayacak her şey. (Saîit Faik)  
 to.love-with will.begin everything  
 'Beauty will save the world, everything will begin by loving someone.'

The loved individual in (14) is the equivalent of *a certain someone* - it is not the case that an arbitrary individual must love any human being that can vary from time to time, from situation to situation; nor is there one unique *certain someone* that every arbitrary individual must love; it must be a specific someone with a relation to the individual that is doing the loving. It is simply that *belli* 'certain' is not overt, nor is there a pronoun to indicate a relational function as in (13)a. In sentences of the *a certain NP* type, such as in (14), it is the Accusative clitic that indicates a dependency relation, as proposed by Enç, but not necessarily the subset relation. The *certain someone*, here the loved individual, the range argument of the function, is not presupposed. However the lover, PRO<sub>arb</sub>, is part of the Common Ground in the same sense that *everyone* is. It is a case of local dependency, i.e. local binding. The specificity clitic is obligatory in (14), yet the Novelty Condition (Heim 1982) applies rather than the Familiarity Condition.

A proper name carries the intrinsic presupposition that the individual it denotes lies within the Common Ground. This is supported by the fact that one cannot introduce discourse using a proper name: *#Lee just arrived* if the listener does not already know who *Lee* is. It then follows that a proper name as the object in Turkish must occur with the specificity clitic.

- (15) Arapça-**yı**/\*Arapça unuttum.  
 Arabic-**Acc**/\*Arabic-@ I.forgot  
 'I forgot Arabic.'

However a proper name without Case may be preferred to the marked object.

- (16) Arapça/\*Arapça-**yı** okuyabiliyorum.  
 Arabic-@/\*Arabic-**Acc** I.can.read  
 'I can read Arabic.'

For Enç, specificity encodes either presupposition or a relation within the discourse, and since all proper names are presuppositional, the absence of the Accusative clitic on a proper name should be ungrammatical. (16) shows that is not necessarily the case.

If we consider specificity in terms of a relational or D-Linking interpretation, then the absence of the Turkish specificity clitic is the absence of a relation. Consequently the contrast between (15) and (16) is just that. The prediction then is that in (15) one intends that part of the language that is in relation to the subject, a 'slice' of the language, while in (16) there is no relation to the subject, there is no personal 'slice' of the language.<sup>9</sup> Consider the English translations of (15) and (16), adding a personal pronoun to indicate a relation to the speaker, and *what is written in Arabic* to indicate

<sup>9</sup> This analysis stems from a discussion with Arnim von Stechow.

the absence of any relation. There should be a contrast between the verbs *forget* and *can read* in terms of the possibility of a relational interpretation.

- |      |    |                                       |                       |
|------|----|---------------------------------------|-----------------------|
| (17) | a. | I forgot my Arabic.                   | my slice              |
|      | b. | * I forgot what is written in Arabic. | not my personal slice |
| (18) | a. | * I can read my Arabic.               | my slice              |
|      | b. | I can read what is written in Arabic. | not my personal slice |

(17) and (18) show that with the verb *forget* the possessive pronoun, indicating a relation, is felicitous with the name of a language, while it is not with the verb *can read*. At the same time, the impersonal *what is written in Arabic* is felicitous with *can read* but not with *forget*. This is exactly what the analysis of the Turkish specificity clitic in terms of a relational interpretation predicts: *forget* expresses a relational interpretation while *can read* does not.

*Can read* also has modality which could be the crucial factor that licenses the nonspecific proper name in (16). To test this we need a sentence that maintains the modality, but in which there is a clear 'slice' relation with the subject. If the object is nonspecific then modality is the issue; if the object is specific then modality is irrelevant. Like *forget*, the verb *remember* entails a relational interpretation of the object with respect to the subject; it should force the use of the specificity clitic in Turkish if the issue is the slice.

- |      |                          |                     |          |
|------|--------------------------|---------------------|----------|
| (19) | Arapça-yı/*Arapça        | hatırlayabiliyorum. | my slice |
|      | Arabic-Acc/*-@           | I.can.remember      |          |
|      | 'I can remember Arabic.' |                     |          |

The specificity clitic is obligatory. So we have support for the analysis that specificity in Turkish indicates a role-laden function in the discourse. If there is no functional interpretation, even a proper name may be nonspecific. Consequently Enç's analysis that specificity is D-Linking is solidly supported. In Arts.#4/#5 D-Linking is accredited its full power in determining the discourse role of a DP. It is evaluated in terms of a system of binding, in Art.#5 the evaluation makes use of Farkas' (1997) analysis of dependencies of functions that assign values to the variables contributed by DPs. The system of dependencies in the form of binding provides the building blocks for the definition of discourse structure, crucial to the analysis of QDs presented here.

#### 4. THE SYNTAX ARTICLES

Up until now this introduction has addressed the theoretical issues of (non)specificity, i.e. D-Linking, in order to support the claim in Arts. #4/#5 that it is this flavor of dependency that determines discourse structure, which in turn ascertains where QDs may obtain. Before returning in Section 5 to the issues in quantification, the central theme of the dissertation, we need to look at a brief summary of the first two articles since they set the stage for the issues developed into a theory of quantification in the later three. The first article addresses the specificity of the subject DP in Turkish, concluding that the  $\emptyset$  Nominative marker is an indication of specificity as is the Accusative marker in Turkish, except that all Nominatives are so marked, with the result that all Nominatives are specific. To arrive at this conclusion there is an investigation of RCs and subordination in Turkish, unfortunately ignoring the

importance of the predication. The second article looks at a structural position for the P-Focus argument, exclusively found left verb adjacent in the written language. Finally the importance of the predicate in the interpretation of nonspecifics is brought out. The article proposes that nonspecifics, including *Wh-Qs*, the elements that occupy the P-Focus position, are derived predicates and consequently are confined to a position that is contiguous with the verb. The main thrust of the article, however, is to argue for a syntactic position right adjoined to VP for the P-Focus elements, while the verb resides in I°. In terms of the later articles, it is the evaluation of the predicate relation that is the more interesting discussion. Art. #3 shows definitively that the interpretation of the multiple argument in QDs cannot be due to a consolidated VP, and the argumentation in Art. #2 sets the stage for that discussion.

#### **4.0 Article #1**

The first article addresses the problem of specificity of the subject in Turkish, claiming that a nonspecific DP is constrained to the internal object. Recall that in Turkish the object DP, distinct from other DPs, appears without the usual Case marker to indicate nonspecificity, rendering (non)specificity morphologically explicit. In this article specificity is still associated with a presuppositional and therefore anaphoric (van der Sandt 1992) interpretation; in the tradition of Diesing (1989) it is an implied partitive under a covert subset relation. This assessment of specificity is contested in Art.#4.

Art.#1 maintains that the  $\emptyset$  marker for Nominative Case also indicates specificity; that is all Turkish subjects are specific. Passives, existential sentences and those intransitives that are unaccusative – as opposed to unergative (Perlmutter 1978; Burzio 1986) – all pattern in the same fashion; they have logical subjects that are in fact the internal argument of the verb. Call this class of predicates ‘Unaccusative’. Whereas in a matrix assertion there is no morphological distinction between a nonspecific object DP and a Nominative DP (in the immediately preverbal Focus position), in a subordinate clause there certainly is; a subordinate subject takes Genitive marking with  $\phi$  features indicating number and person. When the logical subject of an Unaccusative assertion is nonspecific, and that assertion is subordinated, that subject does not take the usual Genitive marking **and** it must remain in the immediately preverbal Focus position; if Genitive marking is applied, then the subject loses its nonspecific interpretation and it may appear in a non-Focus position. In sharp contrast, in subordinate transitive and unergative propositions the logical subject obligatorily takes the Genitive Case and is without a nonspecific interpretation. These empirical data suggest that the nonspecific logical subject of Unaccusatives is not in fact the structural subject, located in Spec,VP (or possibly Spec,IP), but that it remains as the internal argument. If that is the case, then there must be another structural subject, even covert.

There are two RC strategies in Turkish, one for the relativization of the subject – termed the SP (Subject Participle) strategy - and one for the relativization of any nonsubject (Hankamer and Knecht 1976) – termed the OP (Object Participle) strategy (Underhill 1972). If the Locative argument of an existential proposition is the structural subject under what Bresnan & Kanerva (1989; 1994) term ‘Locative Inversion’, leaving the nonspecific logical subject as an internal argument, then that Locative argument should relativize with the SP strategy. And that is what occurs. If the OP strategy is used, the existential/nonspecific argument takes Genitive marking and loses its

existential/nonspecific interpretation. The same data are duplicated for passives and unaccusatives with a locational argument, but they cannot be duplicated for either transitives or for unergatives. For these, only the OP strategy is available for the relativization of the Locative argument. These data clearly indicate that the nonspecific logical subject of Unaccusatives in Turkish remains as the internal argument, posing a challenge for the analysis that the internal object of Unaccusatives must move into the subject position.

There is a disturbing piece of evidence, however, that is included in Art.#2. As solid as the data are that support the hypothesis that the Nominative is specific, as is the Accusative, at the same time the subject of a transitive verb may be ‘extracted’ by means of relativization to function as the nonspecific object of the matrix proposition.

- (20) [ t<sub>j</sub> Arabayı tamir eden] bir kadın<sub>j</sub> gördüm.  
           car-Acc repair           a woman-@ I.saw  
           ‘I saw a woman (nonspecific) who repaired the car.’ (Art #2, p.199)

Either the DP ‘bir kadın’ was specific within its original clause as the subject of a transitive verb and underwent a ‘transformation’ of its original interpretation to nonspecific once there was a relation with a matrix verb, or it would seem to be a counterexample to the analysis in Art.#1. But there is another solution to the problem. It is also possible that relativization in Turkish does not involve ‘extraction’ in the sense of movement. This latter seems the more plausible explanation of the facts. At the same time in Art.#2 it is pointed out that in the event of a nonmovement analysis of relativization, then it must also be explained why such relativization does not obtain out of adjunct clauses. This opens a long discussion of the relevant structures, which would carry the discussion here far afield. The data in Art.#1 indicates the analysis presented and the data are solid. But it is also important to include the counter evidence, leaving the problem as an open question.

A major shortcoming of the article is that it fails to carry through an analysis of the relation between the predicate and the nonspecific argument, given that the latter is confined to the domain of the former. There is clearly a reason for this. However the role of a predicate in determining the interpretation of a DP is briefly mentioned. English data are presented that show that an *individual-level* predicate (permanent property of an individual) imposes a presuppositional (and therefore anaphoric van der Sandt 1992) interpretation on the subject DP in English, while a *stage-level* predicate (temporary property of an individual, a spatiotemporal ‘stage’) does not. The example of the stage level predicate, an unergative, with a nonpresuppositional subject should then present a counterexample to the analysis of the Turkish data. However when the counterexample is translated into Turkish it does not permit the nonspecific interpretation of the logical subject that the English sentence does. The effect of the predicate on the specificity of a DP is also brought out by İşsever (p.c.) with a series of sentences in which the aspectual marking on the predicate, the dubitative *-miş*, render the Accusative marked object with a nonspecific interpretation. These facts clearly suggest that Diesing’s (1989) structural analysis, i.e. a nonspecific is confined to VP, and in Turkish to the inner argument, needs to be scrutinized for the motivation. Obviously there is a predicational role of the nonspecific itself. Art.#2 opens this discussion.

#### 4.1 Article #2

The second article carries on the syntactic analysis. One interesting proposal is that it amplifies the domain of nonspecificity to include all interrogative *wh*-DPs, including those with Case marking, since these are the two occupants of the immediately preverbal Focus position in Turkish. The crux of the article is to explain the fact that in Turkish a cardinal on the subject DP with a nonspecific object of a transitive verb does not permit a QDs interpretation, in marked contrast with English.

- (21) a. Üç çocuk/Çocuklardan üçü yeni bir araba almış.<sup>10</sup>  
 3 child/of.the.children 3 new a car-@ bought  
 'Three (of the) children bought a new car.'  
 (a new car is such that 3 (of the) children bought it)  
 \* (each of 3 (of the) children bought a new car)
- b. # Üç çocuk/Çocuklardan üçü taze bir çekirdek yemiş.  
 3 child/of.the.children 3 fresh a sunflower.seed-@ ate  
 'Three (of the) children ate a fresh sunflower seed.'  
 (a fresh sunflower seed is such that 3 (of the) children ate it)  
 \* (each of 3 (of the) children ate a fresh sunflower seed)

(21)a is unambiguous: there is only one car, indicating a 'wide scope construal' of the nonspecific object DP. If the subject cannot be treated collectively, as in (21)b where it is impossible for 3 (of the) kids to eat a unique sunflower seed, the sentence is anomalous. The absence of QDs in (21) is in fact a cumulative interpretation (Scha 1981), clarified in (22):

- (22) Üç kız üç sepet kaldırmış.  
 3 girl 3 basket-@ lifted  
 '3 girls lifted 3 (nonspecific) baskets.'  
 Cumulative reading: <girl x, basket y>: x lifts y, |x| = 3, |y| = 3

It is not the case that cardinals cannot operate as BPs, since a BP interpretation is available as one of the readings of (23)a, where, under a syntactic analysis, the *Wh-Q* and the subject DP have a mutual c-command (or m-command) relation.

- (23) a. (Bu) Üç çocuk kimleri gördü?  
 this 3 child who-pl-Acc saw  
 'Who did the(se) 3 children see?'  
 [who are the individuals such that 3 children saw them]  
 [for each of 3 children who did they see]
- b. Deniz'i ve Ufuk'u  
 Deniz-Acc and Ufuk-Acc
- c. Deniz Ufuk'u, Uğur Ümit'i ve Remzi'de Ahmet'i gördü  
 Ufuk-Acc Ümit-Acc and Remzi-also Ahmet-Acc saw  
 'Deniz saw Ufuk Uğur saw Ümit and Remzi saw Ahmet.'

'Scope construals' of interrogatives are disambiguated in their possible answers. In

<sup>10</sup> The indefinite determiner interpretation of *bir* 'a/one' is forced when it follows an adjective. After a cardinal the noun takes the singular form in Turkish, as does the predicate.

response to (23)a either (23)b or the pair-list response in (23)c is a felicitous response, indicating an ‘absence of scope’ between the subject and the *Wh-Q* in Focus position, but also that a BP interpretation of the cardinal subject in (23)a is possible, seen in (23)c.

One of the issues brought out by the Turkish data above is the importance of cumulativity in considering quantificational interpretation, i.e. in support of Verkuyl’s Law of Quantification. The article proposes that Focused elements, here the nonspecifics including *Wh-Qs*, are derived predicates and consequently are confined to a position that is contiguous with the verb, the inherent predicate of a proposition. One of the more articulate parts of the article is the argumentation against an analysis of predicate-noun incorporation, which makes use of Turkish data. When the nonspecific object in Focus position is without a determiner, it behaves as an incorporated noun, in prosody and in the refusal of more than one adjective. However once a determiner is added, then the nonspecific alters behavior and cannot be construed as incorporated. There is also a distinction between a nonspecific  $\pm$ determiner with regard to truth conditions if the progressive is used on the verb, whereby +determiner one cannot catch a fish all day, but –determiner one can certainly undertake the activity of ‘fish-catching’ i.e. fishing, all day.

The article proposes a Focus position adjoined to VP, that maintains a mutual M-Command relation with the subject in Spec, VP. There is solid support of the proposal of verb movement to I<sup>o</sup>, making use of the positioning of sentential and verbal adverbials. Thereby the rule of contiguity for the Focused elements suggest a left-adjoined Focus position. The inability to extract out of Focused elements lends further support for the adjunction analysis. The claim is that since a strong quantifier on the subject results in a QDs construal, then those subject DPs undergo movement out of Spec,VP to Spec,IP where they take ‘scope’ over the Focused nonspecifics. That is the article proposes an overt form of Quantifier Raising (QR) (May 1985).

To anticipate for a moment, Art.#5 takes up the data in (22) again, querying whether there is in reality a distinction between English and Turkish in the QDs construal. Given that under contrast, a QDs construal for (22) obtains in both languages, it is suggested that linguists doing research check data with other linguists, who are adept at context accommodation. That is, it is proposed that the English QDs construal obtains only within a contrastive context, as occurs in Turkish. Then Art.#5 elaborates an analysis of how contrast effects QDs, taking (13) as the prototype of QDs. Given that a multiple predicate does not entail a QDs construal, it is proposed that it is a D-Linking relation that embodies the dependency relation of QDs, always under a functional interpretation. In the case of contrast, the assertion of the proposition is the negation of the contextual relevant alternatives, leaving the original predicate as a D-Linking relation. Without a functional predicate relation imposed by a strong determiner, it is only under the demotion of the assertive predicate to a non-assertive DP defining D-Linking relation, parallel to the *mother* relation in (13), that it may sustain the dependency that defines the quantificational force of QDs. Thus all nonspecific multiple DPs take on a specific interpretation under QDs. Clearly this is a very different approach than that taken in Art.#2.

Rather than continuing this introduction with summaries of the final three articles, the following three sections present a discussion of quantification that includes background for the issues at stake, as well as the proposals grounded in those issues.

The crucial connection between these first two syntax articles and the latter three is (non)specificity and predication. Henceforth specificity is referred to as D-Linking, which is the crucial issue in the binding that determines discourse structures, which in turn determine quantificational structures.

## 5. BACKGROUND ON QUANTIFICATION

In addition to the semantics of the two DPs involved in QDs, which include (non)specificity and (in)definiteness, the problems confronted in the last three articles are limited to those of locality, discourse structure defined by binding structures, contrast and predicate relations. These factors all play decisive roles in the analysis of QDs presented here, always within the general framework of polyadic quantification reflecting (my extension of) Verkuyl's Law.

At the end of the last century the analysis of sentences like those found in (24) came under scrutiny:

### Quantification and Pluralities

- (24) a. Every child opened a box.  
 b. Both children picked two flowers.  
 c. Three children opened two boxes.  
 d. Some children picked 4 flowers.

The scope of the various studies was to develop an adequate theory of plurality and quantification, which was problematic based on the 1<sup>st</sup> order logic employed at that time. Sentences like (24)a can be handled with universal and existential quantifiers within a 1<sup>st</sup> order system while (24)b-(24)d cause serious problems for a formal analysis of plurals. To deal with such difficulties Mostowski (1957) introduced the idea of a Generalized Quantifier (GQ) based on 2<sup>nd</sup> order logic.

Subsequently Montague (1973) elaborated GQ theory. His strategy was to maintain the connection between higher order representations and first order representations, at the same time preserving the idea that DPs are semantic as well as syntactic units. In other words, if (24)a is analyzed as in (25) with standard predicate logic, then a DP is analyzed as a) an operator, b) a variable and c) the Descriptive Content (DC), indicated in the underlined parts for *every child*:

$$(25) \quad \forall \underline{x} (\underline{\text{child}}(\underline{x}) \rightarrow \exists y (\text{box}(y) \wedge \text{open}(\underline{x}, y))) \quad = (24)a$$

The advantage of the Montagovian approach is that *every child* can be taken as a semantic unit, represented as in (26):

$$(26) \quad \lambda P \forall x(\text{child}(x) \rightarrow P(x)) \quad = (24)a$$

Montague used the lambda-operator to maintain the 1<sup>st</sup> order information, thereby fashioning a representation mechanism that can contain diverse information orders of the DP within one unit. Then Barwise & Cooper (1981) developed Mostowski's and Montague's ideas into a system of quantification appropriate for plurals.

Following Wittgenstein's (1921:1.1) proposal that the world is made up only of propositions, since only propositions have a truth value, it is crucial to point out that a theory of plurality requires techniques for operations on predicates, *P* in (26). Under GQs, the work that a quantifier performs is to construct a proposition from a

propositional function with one argument. Another way to think about it is that under GQ theory a quantifier determines the relation between the sets of the NP and VP. *Three children sleep* can be treated as a binary relation between the set of children and the set of sleepers where the proposition is held to be true if and only if the intersection of the two sets has 3 members. One offshoot of this traditional application of GQ theory is that information internal to the VP is not available externally. Under the traditional GQ approach (25) is analyzed either based on the semantics of the determiner on the NP or based on an operator of some kind on the entire VP, thereby treating the VP+internal argument as a consolidated or incorporated unit. The final three articles provide empirical evidence that contests this traditional GQ approach.

Since higher order representations are derived from 1<sup>st</sup> order it has been natural to maintain the well-known scopal ambiguity approach applied in standard first order logic. That is, in text books of standard logic (24)a is still to this day considered ambiguous between two readings, represented in (27):

**First Order Representations of (24)a**

- (27) a.  $\forall x (\text{child}(x) \rightarrow \exists y (\text{box}(y) \wedge \text{open}(x,y)))$  = (24)a  
 b.  $\exists y (\text{box}(y) \wedge \forall x (\text{child}(x) \rightarrow \text{open}(x,y)))$

(27)a has been termed the 'narrow scope' reading for *a box* while (27)b has been called its 'wide scope' reading whereby the indefinite has 'escaped the scope' of the universal quantifier *every child* with covert movement, i.e. scopal shift at Logical Form (LF). The form of representation in (27) has been carried over to the domain of plural quantification, and has been applied in many theories of plurality to sentences such as (24)b-(24)d to represent the ambiguities.

In addition to other problems to be discussed with this representation, it also does not capture the asymmetry in sentences like (24)c where there may be 6 boxes but there is no reading with 6 children. If DP1 and DP2 are used to indicate the left-to-right linear ordering of the arguments, then for the reading of (24)c with 6 boxes, for each element within DP1 there is a multiple of DP2, but not vice versa. This asymmetry seriously challenges whether the discussion of 'scope' and 'scopal shift' is suitable to express the dependencies that define the multiplication of a DP. To further confuse the issues, for (24)a there is no distinction between a 'wide scope' reading of DP2, as represented in (27)b, and a scope independent reading. Consequently, unless I add quotes to indicate a traditional use of the word 'scope' with reference to quantification, I will constrain the use of the term *scope* to address hierarchical structures such as negation and modality.

Certainly sentences like (24)a-(24)d may express dependencies that are not immediately available in sentences like *Kim opened a box*. The salient reading of (24)a where there is co-variation of the two arguments and the variation of one is dependent on that within the other, represented in (25), has been termed here 'Quantificational Dependencies' (QDs). The term *Inverse QDs* is used to indicate the multiplication of DP1 with DP2 as the Base Plural (BP). It is the Inverse QDs reading for (24)c with 6 children that is not available. The QDs in (24)a-(24)d are functional in the mathematical sense (de Mey 1990:30). That is, in the reading of (24)c *Three children opened 2 boxes* expressing that six boxes were opened, it means that for all the children in the set of three, each one opened two boxes. This can be accounted for in terms of

the predicate function assigning to each of the three children a unique value. Based on this format, in describing the dependency between that quantity expressed by DP1 and the quantity expressed by DP2, several questions arise:

- A. **Is there a law of quantification in natural language that determines the calculation of quantities of the DPs for 2 place predicates?** My proposal is that (my extension of) Verkuyl's Law is fundamental to an appreciation of quantification, and the immediately following parts of Section 5 are dedicated to that discussion.
- B. **What kinds of DP semantics are relevant to QDs? How does the semantics of the DPs determine the interpretation of the predicate and with what effect?**
  - **What is the role of 'distributivity' in QDs? Is distributivity inevitably atomic? Does a 'distributive' DP mean that QDs necessarily obtain? Under what conditions does a 'distributive' DP2 result in Inverse QDs with a multiple DP1?** The first three questions have been briefly touched on in the first three sections, where it has been noted that a distributive DP1 results in a functional predicate, but not necessarily in a QDs construal, and that distributivity is 'usually' but not necessarily atomic. The discussion is continued in the following parts of Section 5. The final question is addressed in Art. #4 where the role of the predicate in Inverse QDs is highlighted.
  - **What is the role of (in)definiteness and (non)specificity with respect to QDs?** To a certain extent this has already been discussed in the previous three sections. The discussion is developed in the following parts of this section of the introduction.
- C. **What is the role of Discourse Linking (Pesetsky 1987) with respect to QDs?** This is an extension of Question B, since D-Linking is specificity. In Art. #5, where it is defined, D-Linking is viewed as the quantificational force in QDs.
- D. **If discourse structure within an assertion is a mapping from *Given* to *New Information*, then does a functional mapping from a BP to a multiple DP translate directly into discourse structure? Can *Given* and *New Information* be effectively defined? What is the role of (in)definiteness and (non)specificity with respect to discourse structure?** Discourse structure is attributed with a crucial role in QDs, with the definition of discourse roles given in terms of binding in Art. #4. The role of specificity is fundamental in establishing the binding structures that determine discourse structure; there is a definition of specificity in Art. #5. (In)definiteness also comes into play, but the across the board rules of Heim (1982) are challenged in this introduction and in Art. #4.
- E. **The predicate expresses a 2 place relation which is not necessarily a function. How is the functional dependency expressed in the sentences under investigation? In (24)c why is it that the DP *three children* is fixed**

**in that it must pertain to three children, whereas it is possible for the DP *two boxes* not to be taken at face value and multiply? Empirically, can there be a variation in the subgroupings of the children under QDs and what does this indicate about the predicate relation?** Both Section 5.1.0 of this introduction and Arts.#4/#5 address the functional predicate relation in QDs including the question of subgroupings. The (im)possibility of Inverse QDs is addressed in Art. #4.

- F. **Does a functional interpretation of the predicate always result in QDs? If not, what determines the difference? Are QDs necessarily defined by the predicate relation? Is there another dependency relation between the two DPs of QDs that might define that dependency? What are the primitives in QDs?** The first two questions are discussed in Section 5.1.0. The other issues are addressed in Arts. #4/#5; in the final article the D-Linking (specificity) relation is attributed as the definition of the dependency in QDs.
- G. **Can the functional predicate of QDs be induced only from the domain argument, or can it also be induced from the co-domain? If so, can a theory of GQs, which does not allow access to information within the VP, be maintained or must it be rejected? Is there a theory of quantification that allows access to all the elements within QDs?** These issues are addressed in Section 5.1.4, 6.2, and 7.2 on polyadic quantification, as well as in Art. #3.
- H. **Under QDs, what happens if both the BP and the multiple DP are VP internal, the VP is a consolidated unit and no covert movement, i.e. scopal shift applies?** The result is an infinite generation of QDs, and is discussed in Section 5.1.1 as well as in Art. #4.
- I. **Associated with the traditional application of GQ theory and a consolidated VP is the evaluation of the fundamental opposition in natural language as distributivity vs. collectivity. If the VP cannot be taken as a consolidated unit and if distributivity does not necessarily impose QDs, is there another opposition that is more appropriate for what obtains under quantificational structures, that perhaps reflects the natural law alluded to in (A)?** Under Verkuyl's Law, discussed in Section 5.0, the opposition in natural language is Cumulativity vs. QDs. Polyadic quantification is discussed in Section 7.2 and in Art. #3.
- J. **If scopal shift is to be abandoned, can a system of binding deal with the same problems that scopal shift was designed to solve?** This is the proposal in Art. #4.
- K. **Is there a way to discuss readings of natural language that do not have QDs, that is also compatible with a discussion of QDs?** Cumulativity is addressed in Art. #3 as well as Section 5.00 and in 7.2 on polyadic quantification.

- L. Is there a framework that successfully distinguishes between the input of the discourse immediately before an assertion and the input from the assertion?** Discourse Representation Theory (DRT) is given this role in Art. #5, where it crucially allows a distinction between Given Information that is or is not part of the immediate assertion.
- M. Is the dynamic evaluation of input to an assertion the optimal way to analyze that assertion?** The binding of Information within the assertion to Given Information also within the assertion as opposed to Given Information that is not within the assertion is seen as crucial in analysis of QDs. Therefore all binding structures must be ascertained before an assertion can be analyzed, negating the value of dynamic evaluation, sustained in Art. #5
- N. How does contrast induce QDs?** This is precisely the subject of Art. #5

These are the sort of questions that are addressed in the final three articles, together with questions generally posed by the theories of plural quantification recently developed. Preconceptions examined and contested in the last 3 articles are:

- a. That the semantics of a determiner as a Distributivity-Operator (D-Op) defines that DP as a BP, thereby inducing QDs;
- b. That QDs are induced by a single Operator, wherever it may be posited;
- c. That the multiple DP is necessarily an indefinite and/or a nonspecific.
- d. That discourse structure can be analyzed in terms of Novelty/Familiarity Conditions which reflect indefinite and definite DPs respectively (Kamp 1981/Heim 1982) or that Given Information can be analyzed as [+anaphoric];
- e. That 'scope' is the most appropriate way of discussing QDs together with the requirement that a potential multiple DP that does not multiply must in some way 'escape' the scope of a quantified DP;
- f. That QDs are the result of consolidation of the multiple noun and the predicate, i.e. predicate-noun incorporation;
- g. That a proposition may be interpreted as it unfolds, i.e. dynamically.

Fundamental to an understanding of QDs and the role the semantics of the DPs play is the fact that any determiner may appear on either argument of QDs, seen in (28). This empirical fact counters the proposal that the semantics of the DPs uniquely determines quantificational structures, maintained by many including Scha (1981), van der Does (1992), and Verkuyl (1993; 1994).



clause (a) cumulative reading and a clause (b) QDs reading. Then functions are defined and discussed with the conclusions that a) under clause (a) the internal organization of a plural is underspecified and therefore that a functional predicate is possible but cannot be ascertained without precise knowledge of a particular model; and b) under clause (b) the predicate is necessarily a function. In an atemporal framework, D-Ops impose a functional predicate which is one requirement for QDs, but not the only one. This distinction seriously challenges the assessment of the opposition in natural language as that between (kolkhoz) collectivity and distributivity, together with the assessment of the VP as a consolidated unit. In setting aside these preconceptions about QDs the door is then open to a multi-factor analysis of QDs. Monotonicity, previously linked to QDs, is also shown not to be a factor in inducing QDs. Furthermore, data show that the semantics of (pairs) of determiners cannot be used as the sole motivation for QDs without taking binding structures into consideration. Finally Inverse QDs are defined and discussed. They are used in this volume to challenge many preconceptions about QDs, including a) that the VP can be considered a consolidated unit, which goes part and parcel with the collective/ distributive opposition; b) the scopal shift approach; and c) that argument structure, c-command, and/or linearity are crucial to QDs. In Art. #4 Inverse QDs are used as a diagnostic to ascertain which conditions do contribute to QDs.

#### 5.0 (My extension of) Verkuyl's Law

In the traditional application of the theory of Generalized Quantification (GQ) the VP is treated as a consolidated unit, the equivalent of the incorporation of the predicate and the VP internal argument, with the result that QDs are induced either due to the semantics of the BP (Scha 1981; van der Does 1992; Verkuyl 1993/4) or due to an operator on the VP (Link 1983; 1984; 1986; Löbner 1987; Lønning 1987; Roberts 1987; 1989), although Link acknowledges that the BP does have some input. A consolidated VP analysis is reflected in the evaluation of quantification as the opposition between **collectivity and distributivity**: a distributive external argument DP results in distributive i.e. multiple predication; so with a consolidated VP then the inner argument would also multiply. In sharp contrast, Arts. #3,#4,#5 argue that the fundamental opposition in natural language quantification for 2 place predicates is between **cumulativity**, in the sense of 'scope' independence (Scha 1981; van der Does 1992; Verkuyl 1993), and **quantificational dependencies (QDs)**. It is further argued that each of three distinct elements participating in QDs, the BP, the multiple DP and the predicate relation, all weigh equally in determining whether QDs obtain or not. Then independent criteria can be sought for the participation of each element. This is termed the *multi-factor approach*. A multi-factor approach to QDs is the antithesis of a consolidated VP analysis since it requires independent access to each of the participants in QDs. The multi-factor approach provides an alternative to the traditional application of GQ theory together with the collective/distributive dichotomy.

Fundamental to the proposal that the opposition in natural language is between cumulativity and QDs, which goes hand-in-hand with the multi-factor approach, is Verkuyl's (1988; 1995; 1999) claim of the existence of a natural "law" governing the organization of quantificational information in transitive propositions. Originally noted only for left-to-right QDs and for cardinals, I generalize his law to also apply to

a) Inverse QDs as well as to b) all quantifiers, positing in Art. #3 a distinct Dyadic Quantifier for clause (a) and for clause (b):

**(my extension of) Verkuyl's Law of Quantification in Natural Language (1988)**<sup>11</sup>

(29) For a proposition with a 2 place predicate the quantification of the two DPs  $[_{NP_a} Q_a N_a]$  and  $[_{NP_b} Q_b N_b]$  (order irrelevant) is tightly constrained.

Call: the quantity of the set of individuals denoted by  $DP_a$   $k$  and  
the quantity of the set of individuals denoted by  $DP_b$   $m$ .

Then: the quantity of entities denoted by  $DP_a$  involved in the predication is fixed for  $k$   $N_a$ s;

the quantity of entities denoted by  $DP_b$  involved in the predication is either

a)  $1 \times m$  or

Proposal: Cum Dyadic Quantifier

b)  $k \times m$ .

Proposal: QDs Dyadic Quantifier

In the following discussion I refer to Verkuyl's Law, intending my extension of it seen in (29). From Turkish and English data within an atemporal framework, I argue that Verkuyl's Law is far more fundamental to natural language than Verkuyl himself gives it credit for, i.e. that it is not only pertinent to cardinals but that it is the backbone of all quantificational interpretation. That is, I claim there are only two options in quantification, that in clause (a) or that in clause (b), although clause (b) may be applied in either 'direction', and furthermore that for each option there is one symmetrical Dyadic Quantifier.

The application of Verkuyl's Law is not as straightforward as it might seem at first blush. Its application depends on how the structure of quantified assertions is perceived, with distinct points of view on the role of the VP. The result is that two distinct oppositions in natural language are highlighted. For Verkuyl (1993/4) his Law reflects the opposition between collectivity in (a) and distributivity in (b), with the consequence that it is the multiplication of the entire VP that is crucial under QDs. This is consonant with the traditional use of the Generalized Quantification framework. That is, distributivity and QDs then go hand-in-hand. Verkuyl's adds that *the law is crucially dependent on an identity criterion determined by time* (p.c.). Such an analysis categorizes propositions such as (30) as falling under clause (b), although even Verkuyl notes (1993/4:26) that the role of *each/every* may be *less quantificational than suggested in the literature*. The unique DP2 (set) results from its underspecification.

**Universal Quantifier DP1 + Anaphoric DP2 - Multiple Predicates but no QDs**

(30) Every child opened the/those/all/both box(es).

(no QDs; unambiguous multiple openings)

But there is another way of looking at the distinction between clause (a) and (b) of Verkuyl's Law. If the VP is not taken as a consolidated unit, then either one DP multiplies under clause (b) or it does not under clause (a). In that case the opposition

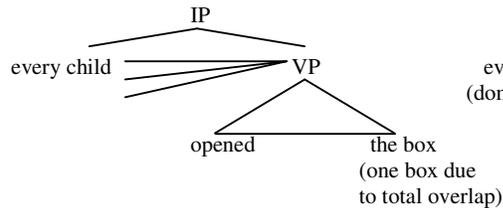
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<sup>11</sup> Verkuyl used 'NP' where I have used DP. His formulation only considers  $DP_b$ . I have taken the liberty of adding that the quantity of  $DP_a$  remains fixed, which he addressed with a distinct principle, as well as rendering the two DPs without linear or syntactic order to handle Inverse QDs, which he did not address.

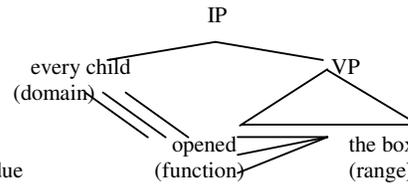
between (a) and (b) is the distinction between cumulativity, the category that includes collectivity for a 2 place predicate (elaborated in (38)b), and QDs. Consequently sentences of the type seen in (30) would be included in the clause (a) cumulative category, in spite of the multiplication of the predicate, since there is no multiplication of DP2 and consequently no QDs. My analysis claims that in (30) this is due to the definite, anaphoric interpretation of DP2 which has a fixed quantity. First take a brief form of (30) in (30)\*, and then the two points of view are sketched in (30)\*\*:

(30)\* Multiple Predicates; \* QDs  
Every child opened the box.

(30)\*\*a. **Consolidated VP**  
dist of DP1 = mult VP = mult DP2



b. **Cumulative**  
dist of DP1 imposes functional predicate



Let the distinctions be clear. The analysis of a consolidated VP goes hand-in-hand with the analysis of quantification in terms of distributivity and also *vice versa*. Consequently any argumentation that counters distributivity as the determining factor in quantificational structures is also an argument against the analysis of a consolidated VP. In the same vein, any argumentation that counters a consolidated VP is also an argument against distributivity as the determining factor in quantificational structures.

To recap, since the distributivity of a potential BP results in multiple predication, then the fact that multiple predication does not always result in a multiple DP has two distinct analyses: 1) Verkuyl (1993/94), considering the VP a consolidated unit, takes the position that the non-multiple DP is an example of total overlap due to underspecification of the range argument of a functional predicate. 2) In Arts. #3/#4/#5, on the other hand, QDs are defined precisely in terms of the multiplication of one DP under clause (b) of Verkuyl's Law. If no multiple DP, no QDs.

Note that in Verkuyl's Law one DP is fixed in its quantity. In Art. #3 it is shown that one argument in a cumulative predicate relation must be fixed in the discourse. Kempson & Cormack (1980) and Ertshik-Shir (1999) independently propose that the BP in QDs is Given Information, which is adopted here as another condition on QDs. Van der Sandt (1992) was the first to introduce pragmatics into semantic structure by means of binding theory. He proposes that presupposed information, i.e. the Given, is subject to anaphoric binding, which means, of course, that it must have a fixed quantity. Combining the three analyses, one argument in every proposition is Given Information, with a fixed quantity, consonant with Verkuyl's Law. It is proposed in Art. #4 that forms of binding other than anaphoric may render a DP Given Information, but the fixed quantity analysis for a Given Information DP is upheld, as is Verkuyl's Law.

There is only a distinction between clause (a) and (b) if  $k > 1$ . Then we can conclude that clause (b) only applies if  $DP_a$  is plural. In clause (a) the quantity of  $DP_b$  is calculated independently of that in  $DP_a$ , that is 'scope' independence or cumulativity, while in clause (b) the quantity of  $DP_b$  is dependent on that of  $DP_a$ , that is QDs.

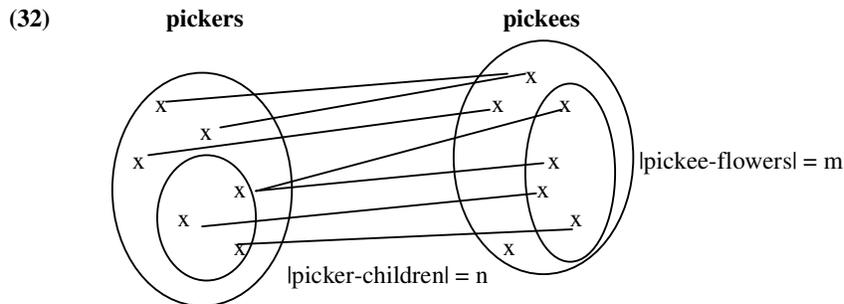
To exemplify Verkuyl's Law, consider (31):

- (31) Verkuyl's Law Applied  
 3 children picked 4 flowers.  
 (ambiguous: (a) 4 or (b) 12 flowers)

Let  $DP_1$  and  $DP_2$  refer to the linear order of the arguments. For (31) assume  $DP_a = DP_1$  and  $DP_b = DP_2$ , then  $k = 3$  and  $m = 4$ . According to Verkuyl's Law the quantity of  $DP_1$  is fixed as  $k = 3$ .

### 5.0.0 Clause (a) - Cumulativity

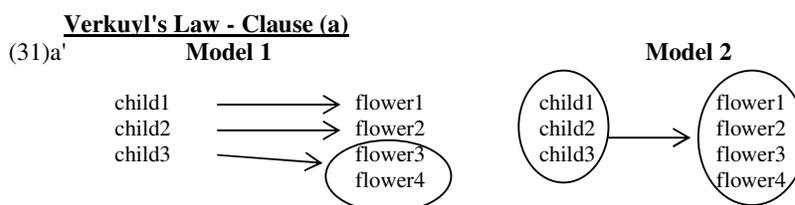
Under clause (a) of Verkuyl's Law, applied to (31), the quantity of  $DP_2$ , i.e. flowers that participate in the predication, is  $1 \times m = 4$ ; the quantity of  $DP_2$  and of  $DP_1$  are determined independently. Using Scha's (1981) terminology, this is referred to as the cumulative reading, also referred to as 'scope independent'. The formal definition of cumulativity is presented in Art. #3 in the form of a Dyadic Quantifier, drawing on the explication of Monadic Quantifiers. In anticipation of that discussion in Section 5.0, to get a clear notion of the relations in a cumulative reading, for (31) each of the children picks at least one flower and each of the flowers is picked by at least one child. Then the number of flower-picking children is three and the number of flowers picked by children is four. This is depicted in (32).



Essential for clause (a) cumulativity is that the DP semantics be kept out of the predication itself such that quantifiers don't have scope over each other and the predicate is crucially external to the evaluation of quantification. Verkuyl (1995/6) questions if it isn't a loss of a generalization to analyze cumulativity in terms of quantifiers not having scope over each other rather than in terms of the predicate having no access to the cardinality information of the argument DPs. But his query is grounded in the idea of a consolidated VP, which cannot be upheld.

Under cumulativity if both DPs are plural then there are many distinct models that satisfy the truth conditions for the same proposition; that is the two DPs are

underspecified with respect to their internal organization. This is obvious in the fact that there is no way to pre-determine the number of predicate 'instantiations' or applications without considering the particular model the linguistic expression is to apply to. In (31) it may exceed the number of children but because no flower can physically be picked more than once (i.e. a 'lexical' idiosyncrasy, not upheld by all cumulative propositions), the number of predicate instantiations may not exceed the number of flowers. Two of the many ways to interpret the predication in (31) are illustrated in (31)a'.



In model1 two children picked one flower each and one child picked two flowers, say two in one grab or two flowers on one stem, resulting in a total of four flowers picked by the three children. In Model2 the three children collectively picked all four flowers together such that no one child picked a flower by herself, say they are large flowers that are difficult to pick. The crucial point for both models is that the quantity of the children is fixed and the quantity of the flowers is 1 x 4, clause (a). It is important to underline that in neither of the models in (31)a' can any of the children say *I picked four flowers*. This means that the full predicate power is restricted to the set as a whole.<sup>12</sup>

As noted in the Model2 interpretation of (31)a' collectivity in a 2 place predicate is a particular case of cumulativity, first mentioned by Verkuyl (1993/4:28). Under clause (a) of Verkuyl's Law, any quantificational interpretation without a multiple DP is just one of the many cumulative readings available. In propositions such as (31) it is the model that the assertion is applied to that determines the instantiations of the predicate, not the assertion itself. Verkuyl pointedly notes Link's (1984:23) query as to where exactly the line of demarcation runs between proper readings and mere models realizing a reading. Link's query is relevant to the concept of collectivity, which can be seen as simply a particular model that realizes the cumulative reading.

The term *collective* is frequently used to refer to a joint action, joint intention, satisfying the predicate at the same time and location. Verkuyl posits a more stringent use of the term, using it only for single predicate instantiation whereby the predication is in terms of totality so that the speaker is not committed to warrant any closure under subset for the collection. He uses the term *collective* to indicate that no one individual, nor any subcollection of individuals, within the plural external argument DP1 can be said to have satisfied the predicate independently. His example makes this use crystal clear (Verkuyl 1995/6: 54, ex. (9a)):

<sup>12</sup> If a different predicate is used, such as *moving a piano*, then participation or involvement in the predication, such as opening the door to help in the moving, is also included in predicate satisfaction.

**Kolkhoz Collective**

(33) All the angles of a triangle are 180° (=together).

No single angle is 180°, the kolkhoz collective interpretation results in one predicate instantiation where no subcollection or partition of the plural DP1 can be said to have satisfied the predicate. Now assume the set A. Collectivity is then said to be a property of a DP, where there is total overlap, the equivalent of the union of the covers.

**Collective DP**

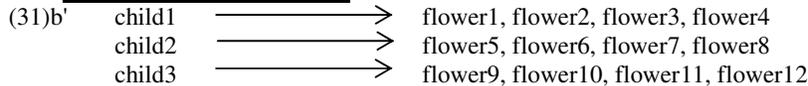
(34) Collective DP := UcovA

Verkuyl's definition of collectivity as one predicate instantiation for a plural DP is adopted here and the term is used in the sense of kolkhoz collectivity. In an atemporal structure for a 2 place predicate, if DP2 is interpreted collectively, then there is only one instantiation of the predicate relation, 'collective' predication. This means that DP1 must also be interpreted collectively. For instance in *3 children lifted 4 baskets* under the reading with only four baskets, if the baskets are in a collection, say one inside the other, in an atemporal setting there would only be one act of *lifting* and as a result the three children would also have to be considered collectively. In an atemporal framework, collectivity of either argument results in one instantiation of the predicate, a clause (a) reading.

**5.0.1 Clause (b) - Quantificational Dependencies**

Under clause (b) of Verkuyl's Law applied to (31), there is multiplication of the two quantities to obtain the quantity of DP2s, i.e. flowers that participate in the predication,  $k \times m$  or  $3 \times 4 = 12$ ; the quantity of DP2 is dependent on that of DP1. In Art.#3 this dependency is formulated as a Dyadic Quantifier that is built from the function composition of two Monadic Quantifiers, but it abstracts away from the asymmetrical representation.

**Verkuyl's Law - Clause (b)**



As pictured in (31)b' clause (b) of Verkuyl's Law results in the functional interpretation of the predicate relation such that there is co-variation of the two arguments and the variation of one is dependent on that within the other.<sup>13</sup>

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<sup>13</sup> Verkuyl (p.c.) clarifies his position by stating that *in (31)b' one of the many configurations making sentence (31) true is given. Note that this sentence does not give any information about whether or not child1 picked the four flowers in one swoop, whereas child2 picked them one by one and child3 two by two. My aspectual theory paid attention to this variety of possible configurations. Suppose that the flowers are artificial flowers which can be set back in their original position so that they can be picked again. In that case a configuration as in (31)b'' is possible:*

Under clause (a) if both of the DPs are plural they can be analyzed in terms of their underspecification in their satisfaction of the predicate. In sharp contrast, under clause (b) the quantificational interpretation is tightly constrained, with the quantity of one DP dependent on that of the other. Arts. #3/#4/#5 elaborate the thesis that neither scope nor the semantics of the individual DPs is the mainstay of the analysis of quantification, but rather that Verkuyl's Law is. Consequently there are only two options in processing natural language quantification. Based on the fact that a) QDs are the more constrained form, and b) in Turkish if both DPs have cardinals a QDs reading requires either additional morphology or additional context, the conclusion is that cumulativity is the base case and that QDs are derived. Then all readings in natural language without a multiple DP, that is in which clause (b) QDs does not apply, are taken as examples of clause (a) cumulativity. Clearly singulars cannot be BPs. If a singular does not multiply it is treated as pertaining to the base case, cumulativity, under clause (a). In Turkish it requires extra morphology to 'induce' QDs (see (70)), supporting the proposal that cumulativity is the base interpretation of a proposition.

### 5.1 Functional Predicate Relations and Distributivity

The remainder of Section 5 of the Introduction continues to present the background for Verkuyl's Law in terms of functional predicate relations, determiner semantics and basic approach, discussing a) functions, which crucially allow overlap of (elements in) the range argument; b) distributivity as a characteristic of a class of determiners; c) (non)monotonicity, which does not effect QDs; and d) Inverse QDs, a crucial diagnostic for the multi-factor approach. It is claimed here that determiner semantics is not the only issue in the determination of QDs, but neither can it be totally discounted. Drawing on GQ theory, Scha's (1981) trio of DP semantics – collective, cumulative, distributive – comes under fire for imposing too many readings. Then the Introduction continues to discuss dependencies in the form of binding which determine discourse roles, crucial to quantification and presented here in the Introduction in Section 6.

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(31)b" child1 -> flower1,1, flower2,1, flower 3,1, flower 4,1  
 child2 -> flower5,1, flower6,2, flower3,3, flower1,4  
 child3 -> flower7,4, flower8,4, flower9,5, flower3,5

*Flower1,1 means that flower 1 is picked at a certain index 1, which offers the possibility to express in the first line of (31)b" that all four flowers picked by child 1 were picked simultaneously at index 1 (which by tense is taken as a certain point or interval in time). At the same index, child2 picks flower 5 and at three consecutive indices the other three flowers. Flower 3 which was picked up by child1 at index 1 is now picked up by child2 at index 3, whereas flower 1 is picked up for the second time at index 4. The third child executes the picking in two steps.*

*It is important to see here that in (31)b" there are 9 flowers and 12 flowers at the same time. Of course, there are just nine object-flowers, but at the index-dependent count flower 3 counts as a flower for child2. Verkuyl's Law is intended to capture this richness of combinatorial possibilities. It opens up the possibility of introducing an individual perspective for the three children with respect to the predication: for each of the children the flowers they pick are unique. So each of them may say I picked four flowers, the ontological status of the flowers they picked not being their problem.*

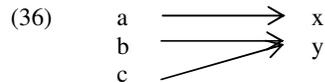
### 5.1.0 Functions

Fundamental to the analysis of quantification presented here is the concept of a function. Both Verkuyl (1988; 1993) and de Mey (1990:36) have analyzed QDs as a functional interpretation of the predicate, which is adopted in Art. #4. At the same time, the crucial dependency in QDs without a D-Op on the BP is analyzed as a D-Linking (specificity) relation rather than the main predicate relation. This does not alter the fact that under QDs the predicate relation must also be functional. Assume the sets A,B. A function is a binary relation, constrained to one and only one mapping into B for each  $\alpha \in A$ . This means that the elements in the domain argument can be regarded as discontinuous parts of a plurality.

- (35) **Function** from A into B is a relation  $R_f$  such that:
- a.  $\text{dom } R_f = A$
  - b.  $\forall \alpha \in A \exists ! \beta \in B: \langle \alpha, \beta \rangle \in R_f$

For all elements  $\alpha$  in A there is a unique  $\beta$  in B such that  $\langle \alpha, \beta \rangle$  is a member of the function  $R_f$  from A into B. This does not mean that the function applied to distinct  $\alpha$ s cannot map onto the same  $\beta$ ; it is not necessarily a one-to-one mapping, an injective function.

Assume that  $A = \{a,b,c\}$  and  $B = \{x,y\}$



(From Art.#4) It is crucial that for the three elements in A, there are three distinct mappings, although two of those mappings into B map onto the same element in B. Say that A is the set of kids in a room and R is the ‘mother’ relation, while B is the set of the mothers of the kids. The mother of Alejandro is Xena, the mother of Bert is Yolande, and the mother of Constance is also Yolande, so Bert and Constance are siblings. But there are three distinct mother relations for the three elements in A even though they map onto only two individuals. In the situation where there are three boys who are said to own a boat, if there are only two boats it is not the case that each boy individually stands in the *own* relation with a boat, and that two of the boats happen to be the same; in this case one possible scenario is that two of the three boys each half (or partially) owns a boat. Then the English sentence *Three boys own a boat* cannot be used to express that situation. For the English sentence there is either one boat, the clause (a) interpretation, or three boats, the clause (b) interpretation, with a functional predicate in the mathematical sense and three mappings.

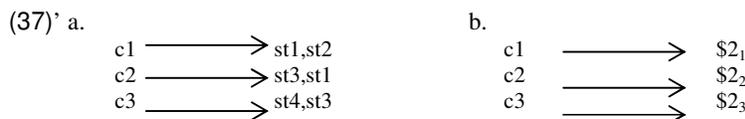
However Verkuyl himself (1993/94:14/61) posits a counterexample to his law in Dutch: *Drie taalkundigen van ons instituut hebben een boek geschreven dit jaar* "Three linguists in our department wrote a book this year" may apply to a model where a total of two books were written, indicating that at least two of the professors each only wrote a part of one book. This reading is highly marked and not available for the English sentence, or for the Turkish equivalent under contrast. Either Dutch is a counterexample to Verkuyl's Law, or something else is going on. In Dutch incorporation structures are readily generated (Koster 1993). The interpretation of an

incorporated singular is number 'neutral', available for many distinct interpretations of the quantity (Dayal 1992). To appreciate this, notice that if the determiner on the potential multiple DP in English and/or Turkish is eliminated you get an incorporation reading which has the same effect as if it were neutral in number:<sup>14</sup> *3 linguists wrote books; 3 dilci kitap yazmış*. Since the two book reading for the Dutch proposition is not available in all languages, and even in Dutch it is both highly marked and only one example has been found, then it does not seem to pose a serious threat to Verkuyl's Law.

Under a QDs reading, whether overlap of the range argument is possible or not depends on the lexical items. That is, there is underspecification with QDs in a proposition such as (37)a, where some of the children may have crossed some of the same streets, resulting in fewer than six streets crossed.

**± Overlap (Accidental Coreference) of Elements Within the Multiple DP**

- (37) a. 3 children crossed 2 streets.  
(under QDs maximally 6 streets, √possible overlapping streets)
- b. 3 children earned 2 dollars.  
(under QDs necessarily \$6, \*possible overlapping dollars)



The underspecification in (37)a is lexically determined, presumably by meaning postulates, since the possibility for that form of 'accidental co-reference' is not available in (37)b. Two people cannot independently earn the same \$2 while two people can independently cross the same street. This is pictured in (37)'a where street1 was crossed by child1 and child2 while street3 was crossed by child2 & child3, with a total of four streets crossed instead of six, but still under the functional use of the predicate. Any formulation of QDs must allow for overlapping elements in the multiple DP and disallow overlap in the BP, precisely the mathematical definition of a function.

As mentioned, a functional predicate does not necessarily result in QDs. Although under clause (b) the predicate is necessarily a functional predicate, under clause (a) one proposition with two plural DPs such as (38) may be ambiguous between a ±functional predicate relation. Consider various models or situations that are held to be true under the cumulative clause (a) reading of (38):

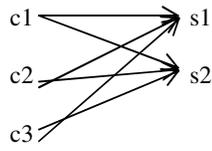
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<sup>14</sup> Number neutrality is a simplification of what is occurring since the 'number' may also be 0.

**Cumulative Reading with Possible Functional Predicate**

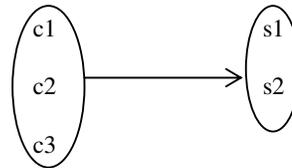
(38) 3 children crossed 2 streets. parallel to (31)a; = (37)a  
 (cumulative: 2 streets)

**a) fully connected, in sequence,  
 \*(sub)groupings of children**

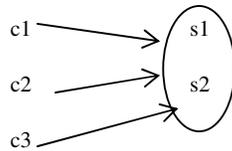


binary branching

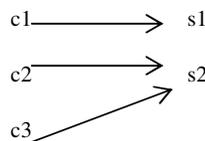
**b) collective, 2 streets in one**



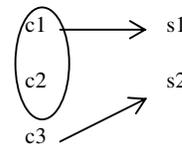
**c) function<sub>1</sub>  
 \*(sub)groupings of ch.**



**d) function<sub>2</sub>  
 \*(sub)groupings of ch.**



**e) √(sub)groupings of ch.**



The diagrams make clear that there are many different organizations of  $\langle child, street \rangle$  pairs possible under a cumulative reading of (38), which may also include a functional predicate or other forms of multiple predication, but crucially without multiplication of a DP, and therefore without QDs. (38)a/b/e exemplify predicate relations that are not functional. On the other hand, (38)c/d exemplify predicate relations that are functional but which do not result in QDs and therefore come under clause (a); they are cumulative. In (38)a each child crosses each of the streets, presumably in sequence. This is an example of fully connected binary branching (Hintikka 1982). (38)b indicates that the three children collectively crossed both streets such that no one child crossed any one of the streets by her/himself - say two children were in a wagon and the third was pulling it - and that the crossing of the two streets for each child was the satisfaction or instantiation of one predication - say that in the crossing of one street the other is somehow exactly alongside and that the two are then crossed 'simultaneously'. In (38)c from the diagram it is understood that there is one mapping of the predicate for each child, resulting in a functional predicate, but there is only one crossing per child of two streets simultaneously. (38)d indicates that each child crossed one and only one street, with 3 distinct *crossings*, one per child, whereby one street was involved in two crossings by two distinct children. Finally, in (38)e, subgrouping of children occurs, say only one child is in the wagon that one child is pulling, such that two children perform their crossing together, while the other child crosses independently. While a functional interpretation of the predicate may be available under a clause (a) cumulative reading, as in (38)c/d, there is also a non-functional relational interpretation available, exemplified in (38)a/b/e. If there is no sequencing, as in an atemporal system, then individual satisfaction of the predicate in (a) collapses to (c), a function. That is, in an

atemporal framework, a determiner that imposes an individual satisfaction of the predicate for each individual in a plural DP also imposes a functional predicate. There may be multiple predication but without a multiple DP there are no QDs and it is a cumulative clause (a) reading.

If you treat *cross* in (38) as a relation you are forced to stay at the individual level. As soon as you take it as a function you may relate the three individuals to one set, as obtains under clause (b) with QDs. This is a crucial point. Without an adverb such as *all together* or *collectively*, the linguistic expression in cumulativity needs to give access to the individuals within a plural DP which allows subgroupings to the point of collectivity. Under QDs a functional predicate treats the range argument as a single individual, possibly a plural individual, as in the QDs reading for (38) where there are (maximally) six streets. In this case there is no access to the internal constitution of the range argument since each child is mapped to the **set** of two streets. Consequently it is impossible to discern the contribution of the individual street to the predication as a whole. Multiplication results in a closed set interpretation of the multiple DP.

For a 2 place predicate with two plural DPs: a) a clause (a) cumulative reading cannot force a functional interpretation of the predicate relation since there must be access to the individuals within those pluralities which allows subgroupings, although a particular model may have a functional interpretation of the predicate in that there is a distinct and unique mapping from each of the individuals within the domain, as sketched in (38)c/d; b) a clause (b) QDs reading obligatorily has a functional predicate whereby the multiple DP, if plural, is a closed set, a plural individual.

### 5.1.1 Distributivity - A Class of Determiners

The analysis proposed here in terms of Verkuyl's Law is that the opposition in natural language is not collectivity vs. distributivity but rather cumulativity vs. QDs, such that the predicate and the multiple DP are seen as distinct participants in QDs, paving the way for the multi-factor analysis presented in Arts. #4/#5. Intrinsic to the analysis of a non-consolidated VP unit is the claim that distributivity is simply a characteristic of a class of determiners, also seen in reciprocity (de Mey 1990).

Indicative of the work a distributive determiner performs is the fact that a DP with a distributive determiner, call it a D(istributivity)-Op(erator), does not combine with a one place predicate that requires a collective subject, such as *quarrel*, *come together*, or *be a happy couple*, exemplified in (39).

#### Distributive Determiners

- (39) a. ? At most 2 girls quarreled. (van Benthem 1986:54)  
 b. ? Most boys came together. (Roberts 1987)  
 c. ? Both students are a happy couple. (de Swart 1998:185)

A DP with a D-Op imposes a distinct predicate satisfaction, i.e. instantiation, for each individual within that noun set, whether it is the external, oblique or internal argument, exemplified in (40) and (41):

#### VP Internal BP and Multiple DP Results in Infinite Loop

- (40) Lee [<sub>VP</sub> gave 3 children 2 presents (each)]. parallel to (58)b  
 (6 presents)

√Multiple Predicates; \* QDs

- (41) a. The child opened every box.  
(unambiguous multiple openings)
- b. Every child opened the box. parallel to (30)  
(unambiguous multiple openings)

Certainly there is a distinct giving for each child, i.e. the oblique argument in (40), a distinct opening for each box, i.e. the internal argument in (41)a, and for each child, the external argument in (41)b. In all cases there is a functional predicate, but in (41)a that function is in the inverse direction. At the same time it not an Inverse Function as that would be injective, requiring a one-to-one relation.

(42)a/b exemplify other D-Op determiners on DP1 with the functional predicate, even when DP2 is a unique element, as it is in (41)b.

Distributive Determiners

- (42) a. All boys lifted the piano. (van Benthem 1986:54, parallel to (30)/(41)b  
(multiple liftings but one piano)
- b. Few men can lift this stone. (Hoeksema p.c.)  
(multiple liftings but one stone)

The D-Ops noted are: *each, every, all, both, most, at most, and few*.

Reciprocity is another example of distributivity without a multiple DP (de Mey 1990) and therefore without QDs, seen in (43).

Reciprocity - Distributivity Without QDs

- (43) The children read to each other

Under the Heim, Lasnik, May (1991) analysis *each* undergoes movement at LF to affiliate with and operate on the external argument DP.

Although a D-Op on DP1 and QDs coincide in propositions such as (24)a, repeated below, for (41), (42) and (43) they don't.

Distributivity With QDs

- (24)a Every child opened a box.

The only distinction between (24)a and (41)b is in DP2, which participates in QDs in (24)a but does not in (41)b, indicating that the (potential) multiple DP plays an equal role in determining whether QDs obtain or not. Distributivity of a DP imposes multiple predication, a functional predicate in an atemporal framework. If the VP is a consolidated unit then multiple predication is reflected in a multiple inner argument, which Verkuyl, together with many others, claims is the case under QDs. If it can be shown that a) the VP is not a consolidated unit, trivially obvious if both arguments are VP internal as in (40), and that b) there is no scopal shift, discussed in Section 5 of the Introduction, then QDs and distributivity must be distinct phenomena.

What is distributivity? Traditionally it is the universal quantifier on DP1 in (24)a and (41) which partitions that noun set to the level of atomic individuals. Partitions are defined by Landman (1993:88) in (44).

### Partitions

(44) A **partition** of a set  $A$  is a set  $P$  such that:

- a.  $P \subseteq \text{pow}(A) \wedge \emptyset \notin P$
- b.  $A = \cup\{B: B \in P\}$
- c.  $\forall X, Y \in P: X \cap Y = \emptyset \vee X = Y$

a)  $P$  is a set of nonempty subsets of  $A$ . b) If the elements of  $P$  are 'cells' of  $P$  then  $A$  is the union of all cells in  $P$ . c) The partitions of a set do not overlap;<sup>15</sup> Another way of thinking about it is that partitions of a plurality have discontinuous parts. The larger category is *covers* which do allow overlap, satisfying conditions (a) and (b) in (44).<sup>16</sup>

Inherent to a partition is a cardinality requirement since the number of the cells never exceeds the cardinality of the set it partitions (Verkuyl 1993/4:11), in keeping with Landman's definition of partitions, whereas the number of covers may. Therefore the use of covers is usually constrained in some way or it will overgenerate. To this end Verkuyl & van der Does (1995:347) came up with a pseudo-partition:

### Pseudo-Partitions

(45) A set  $P \subseteq \text{pow}(A)$  is a **pseudo-partition** of  $A$  if  $\cup P = A$  &  $|P| \leq |A|$

This allows a(n) (collection of) individual(s) within the noun set to participate in an instantiation of the predicate more than once, while maintaining the same cardinality on the partition. That is the pseudo-partitioning does not determine the number of predicate instantiations, only the cardinality of the DP. The pseudo-partition  $P$  of  $A$  exhausts all the elements in  $A$  but the members of  $P$  itself may overlap. The result is that the number of cells of the collection  $P$  construed from  $A$  does not exceed the cardinality of  $A$ . Although pseudo-partitions are not used here in an atemporal framework it is nevertheless important to grasp the cardinality problems involved in partitions and covers.

Distributivity has been taken as the atomic partitioning of a set which induces QDs (Scha 1981; van der Does; 1992; Verkuyl 1993/4), with an ATomic Operator defined in (46) by Verkuyl & van der Does (1995/6:365):

### AT Operator

(46)  $AT := \lambda X_{\langle e,t \rangle} \lambda Y_{\langle e,t \rangle} [Y \subseteq X \wedge |Y| = 1]$

The type indicators of both  $X$  and  $Y$  are  $\langle e,t \rangle$ , which simply identify them as sets of individuals. The AT Operator reduces a plurality to atomic individuals with the cardinality of one, resulting in a distinct instantiation of the predicate for each atomic individual.

First of all atomic partitioning of DP1 does not necessarily result in a multiple DP, the criterion used here for QDs, seen in (38)a/c/d, (41), (42) and (43). At the same

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<sup>15</sup> See Gillon (1987) for a discussion.

<sup>16</sup> Verkuyl & van der Does (1995/6) also posit a minimal cover: A set  $P \subseteq \text{pow}(A)$  is a **minimal cover** of  $A$  iff  $P$  covers  $A$ , but  $P$  does not contain covers as a real part. ( $\neg \exists Z: Z$  covers  $A$  &  $Z \subset P$ ). Then they define partitions as minimal covers whose elements do not overlap. Landman's definition which is not necessarily minimal is used here as **minimal partitions** are independently needed in (48) in any event.

time, under QDs, the BP is not necessarily partitioned to the atomic individual. QDs can also obtain in (47) with *the boys* as one plural individual and *the girls* as another, resulting in a total of four flowers picked under one of the available QDs readings.

**Partitioning for QDs is not necessarily Atomic**

- (47) The boys and the girls picked two flowers each.  
(4 flowers, or 2 flowers for each child)

For QDs a minimal Partition Operator is needed, partitioning down to the smallest possible cell, i.e. down to individuals, which are not necessarily atomic individuals in the presence of a conjunction. This allows sensitivity to a plural individual that constitutes a conjunct, as in (47).

**Minimal Partition Operator**

- (48) MP Op := a)  $\lambda X_{\langle e,t \rangle} \lambda Y_{\langle e,t \rangle} [Y \subseteq X \wedge |Y| = 1] \vee$   
b)  $\lambda X_{\langle \langle e,t \rangle, t \rangle} \lambda Y_{\langle \langle e,t \rangle, t \rangle} [Y \subseteq X \wedge \neg \exists Z_{\langle \langle e,t \rangle, t \rangle} (Z \subset Y)]$

where  $\langle \langle e,t \rangle, t \rangle$  simply identifies X, Y and Z as sets of sets. (from Art. #5)  
Consequently there is a hierarchy of the organization of a plurality:

**Covers and Partitions**

- (49) minimal partition  $\subset$  partition  $\subset$  pseudo-partition  $\subset$  cover

There are many distinct criteria for classifying natural language determiners: strong vs. weak (Milsark 1974; 1977), (in)definiteness, (non)specificity (Enç 1991). For the present purposes determiners fall into two classes a) those that obligatorily have a distributive interpretation, minimally partitioning a plurality: *each, every, all, both, most, at most*, and *few*, among possibilities, and b) those that, if applied to a plural noun set, are underspecified, i.e. neutral, in that they may be distributive only as one of the many potential covers; they may be organized in terms of partitions, covers or collectively. D-Ops minimally partition a plurality.

**D-Op**

- (50) D-Op is the term used for a determiner that minimally partitions a plural noun set.

With a functional predicate there is, by definition, minimal partitioning of the domain argument which cannot obtain if a) there are overlapping covers; that is where the same element in the domain participates in more than one mapping, if b) there is one mapping for a (sub)collection, or if c) there is more than one mapping for any element within the domain. If clause (b) of Verkuyl's Law is taken as the application of a functional predicate, as Verkuyl and de Mey propose, then QDs require minimal partitioning of the domain argument. But minimal partitioning does not impose a functional predicate, sketched in (38)a, unless there is an atemporal framework, which is what is used here. So for our purposes, to define the predicate relation in QDs as a function does the same work as a Minimal Partition Operator, and to define the potential BP as an Minimal Partition Operator imposes a functional predicate, as sketched in (38)c. Therefore the role of a D-Op, i.e. a DP with a distributive determiner, is to

impose a functional predicate, which is one, but only one of the conditions necessary for QDs to obtain.

### 5.1.2 Monotonicity, Distributivity and QDs

It has been suggested (Beghelli & Stowell 1997; Szabolcsi 1997) that downward entailing ( $\text{MON}\downarrow$ ) determiners such as *at most* only lead to a distributive interpretation and therefore the implication is that they induce QDs. First consider the definition of monotonicity. The property of monotonicity is based on increasing or decreasing the number of entities in the relevant sets *A* (NP-interpretation, the lefthand set) and *B* (VP interpretation, the righthand set). If we have the information that some birds fly, and add more birds, increasing *A*, we still maintain the information that some birds fly, as in (51)a. If more fliers are added, increasing *B*, again nothing is changed, as in (51)b. If few birds fly, and we restrict the set of birds to a subset of the original set of birds, it is still true that few birds fly, just fewer than before, as in (c). And if no birds fly, then a subset of fliers will not contain any birds, so the information is preserved as in (d).

- (51) a. **Left Monotone Increasing ('persistent')**:  $\uparrow\text{MON}$   
 If Det NP<sub>1</sub> VP, then Det NP<sub>2</sub> VP (where NP<sub>1</sub>  $\subseteq$  NP<sub>2</sub>)  
 e.g. If *only/several/some/both/4* girls with red hair run, then *only/several /some/both/4* girls run.
- b. **Right Monotone Increasing** :  $\text{MON}\uparrow$   
 If Det NP VP<sub>1</sub>, then Det NP VP<sub>2</sub> (where VP<sub>1</sub>  $\subseteq$  VP<sub>2</sub>)  
 e.g. If *every/all/both/4* bird(s) flies/fly fast, then *every/all/both/4* bird(s) flies/fly.
- c. **Left Monotone Decreasing ('anti-persistent')**:  $\downarrow\text{MON}$   
 If Det NP<sub>1</sub> VP, then Det NP<sub>2</sub> VP (where NP<sub>2</sub>  $\subseteq$  NP<sub>1</sub>)  
 e.g. If *every/all/few* girl(s) run(s), then *every/all/few* girl(s) with red hair run(s).
- d. **Right Monotone Decreasing** :  $\text{MON}\downarrow$   
 If Det NP VP<sub>1</sub>, then Det NP VP<sub>2</sub> (where VP<sub>2</sub>  $\subseteq$  VP<sub>1</sub>)  
 e.g. If *no/at most 4/less than 4* birds fly, then *no/at most 4/less than 4* birds fly fast.
- (52) **Nonmonotonic**:  
 e.g. \*If *exactly 3/more than 3 less than 10* (blue) birds fly (fast) then *exactly 3/more than 3 less than 10* (blue) birds fly (fast).

Note that in (51)a *only*, which indicates a subset relation between the VP and NP (in terms of quality), is left monotone increasing while *every*, which indicates a superset relation between the VP and NP is both left monotone decreasing and right increasing.

It has been shown that distributivity does not induce QDs, seen in (41), as well as in reciprocals, seen in (43). In addition, it is not true that  $\text{MON}\downarrow$  determiners only have a distributive, i.e. minimally partitioned interpretation. Van der Does (1992: 41 e.g. 24) gives a counterexample to this, noting that (53)a can be interpreted the same as in (b) or in (c), i.e. with non-distributive collections. Recall from (39)b that *come together* is infelicitous with a distributive subject.

**Non-Distributive MON↓Determiner (van der Does 1992:41)**

- (53) a. Not all heroines came together.  
b. Some heroines came together, but not all.  
c. All collections of heroines that came together, lacked some heroine.

Hoeksema (p.c.) has noticed other downward entailing determiners that support a non-distributive interpretation:

**Non-Distributive MON↓Determiner (Hoeksema p.c.)**

- (54) Less than 3 men can lift this stone.  
(ambiguous: each of the men can lift the stone, or collectively they can)

So if the downward entailing *few* and *at most n* are D-Ops, it is not their monotonicity that is at stake. That is monotonicity, frequently linked to quantificational structuring, does not determine distributivity, and furthermore distributivity does not determine QDs. In Art.#5 Turkish data confirm that monotonicity and QDs are independent.

**5.1.3 Semantics of the (Pairs of) Determiner(s) and QDs**

Under many analyses QDs are motivated by the semantics of the BP (Scha 1981; van der Does 1992; Verkuyl 1993/4; Farkas 1997, 2001). Fundamental to an understanding of QDs and cumulativity is the fact that any determiner may appear on either argument of QDs, seen in (28), and any pair of determiners may have a cumulative reading, seen in (55) and (56) below. Only and all quantified DPs with a lexical NP can multiply. These data are brought into the discussion again and again throughout the articles. The local binding of the multiple DPs in (28)a/b is used to argue in Art. #4 that it is exactly this binding that renders them New Information to the discourse and consequently potential multiple DPs. If the potential BP is Given Information and the predicate also has a functional interpretation with one unique mapping for each individual in the domain then QDs obtain.

In addition, there is the claim that there are pairs of determiners on DP1 and DP2 that only have a QDs interpretation. Empirically this is not the case. Consider some classic examples where the QDs reading is highly salient, but not exclusive:

**Salient QD Readings Maintain Possible Cumulative Interpretation**

- (55) a. At most 4 boys dated at least 3 girls.  
(ambiguous: QDs with multiples of 'at least 3 girls' or cumulative)
- b. Most  
Many  
At most 3 children<sub>i</sub> opened a box in front of them<sub>i</sub>. It was the box with  
At least 3 the red ribbon around it. Each child carefully closed  
Few the box after inspecting it.  
Both

In (55)a imagine there were seven boys and eight girls. We know that three boys did not go out and that two of the girls didn't either. We are unsure about one of the other boys and about three of the girls. The rest definitely went out with one another. So how many boys dated how many girls? Answer: At most four boys dated at least three girls. Envision the children in (55)b on one side of the table, all facing several boxes, and

each one opening and then closing, one after the other, the same box.<sup>17</sup> The cumulative reading cannot be excluded. Similarly, scenarios can be found to elicit the cumulative reading for the sentences in (56), with the scenarios in the (a') and (b') examples:

**Salient QD Readings Maintain Possible Cumulative Interpretation**

- (56) a. Every child opened 200 boxes.  
 a'. That is, every man, woman and child was busy opening (a total of) 200 boxes.  
 b. At most 10 children opened 200 boxes.  
 b'. These 200 boxes were opened by at most 10 children, so if at most 10 children opened 200 boxes, I bet these adults opened at least double that amount.

So there are no determiners or pairs of determiners that unequivocally induce QDs, as in (55)/(56), or prohibit QDs, as in (28). This is evidence that QDs do not stem solely from the semantics of a (pair of) determiner(s).

At the same time, I claim that there are fundamentally three criteria for QDs to obtain. One is a functional predicate, a valid condition although it is claimed in Art. #5 that the crucial dependency relation in QDs is a D-Linking relation which may be distinct from the predicate relation, seen in (28). This can be imposed by a D-Op on the potential BP. Based on the suggestion of Verkuyl (1993/4:28) that collectivity comes under the cumulative umbrella, Scha's (1981) trio of definitions of determiners reduces to  $\pm$ D-Ops, which do or do not impose a functional predicate. The second criterion is that the BP be Given Information, from Kempson & Cormack (1980) and Erteshik-Shir (1999). The third is that the multiple DP be New Information, supported in Art. #4. Discourse roles are defined by dependency relations in terms of binding. Various semantic classes of determiners condition which binding structures are available to a DP. In this sense then the semantics of determiners does in fact play a crucial role as to whether QDs obtain or not, discussed in Art. #4.

**5.1.4 Inverse QDs**

If the dependency relations are inverted linearly, such that DP<sub>2</sub> is the BP and DP<sub>1</sub> the multiple DP, it is referred to here as Inverse QDs, exemplified in (57):

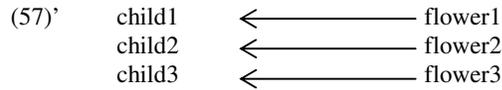
**Inverse QDs**

- (57) A child picked every flower.  
 (ambiguous, the Inverse QDs reading has multiple children)

For Verkuyl's Law  $DP_a = DP_2$  and  $DP_b = DP_1$ . Recall that under Verkuyl's Law the quantity of  $DP_a$  remains fixed. In (57) the quantity of  $k$  is determined by the particular model such that every member of the relevant set of flowers is counted. The quantity of  $m$  is 1, so  $|children| = k \times m = |flowers| \times 1 = |flowers|$ . For a model with three flowers we can visualize the QDs reading of (57) in (57)':

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<sup>17</sup> The contexts for both examples in (55) as well as in (56) were supplied by J. Hoeksema (p.c.).



Verkuyl (1993/4) claims that QDs map from the external to the internal argument and therefore that Inverse QDs reflect a passive interpretation. He is then grounding his analysis of QDs in argument structure which, in English, amounts to c-command. But Verkuyl himself comes around to another point of view, providing us with a counterexample in 1999:

**\*QDs Map from External to Internal Argument; \*QR or ‘Scopal Shift’**

- (58) a. A book was available to John and Mary during their examination.  
 (ambiguous: 1 or 2 books) (Verkuyl 1999:215)
- b. Lee gave 2 presents to (each of) 3 children. parallel to (40)  
 (6 presents)

Under the Inverse QDs reading with two books in (58)a it is the external argument that is the multiple DP, clarifying that Inverse QDs cannot be analyzed as the passive. (58)b also has Inverse QDs where both quantified DPs are VP internal. (58)a/b, with the multiplication of the linearly initial c-commanding external argument in (a) and with the oblique argument as the BP in (b), are evidence against the following preconceptions:

- A. Only the external argument can act as a BP and only the internal argument can multiply.
- B. The VP is a consolidated unit in QDs. Since both quantified DPs are VP internal in (58)b, a consolidated multiple VP would result in an infinite loop of multiplication. The only way to save the consolidated VP analysis would be to posit covert movement of the BP out of the VP under scopal shift.
- C. A scopal shift approach to QDs such as QR operates at LF. For (58)a, *proper names are not supposed to undergo QR, but on a QR-analysis (scopal shift) one would be forced to move ‘John and Mary’ into a wide scope position with respect to the external argument in order to obtain the reading that they each were assisted by a book* (Verkuyl 1999:215). Since scopal shift cannot apply, then the BP under Inverse QDs is confined to its VP internal position at all levels of representation.

Since scopal shift must be abandoned, discussed also in Section 5, then two other proposals also come under scrutiny:

- D. C-command is relevant to QDs, contested in Art.#4.
- E. Linearity is relevant to QDs, proposed by Göksel (1998) and Kempson & Meyer-Viol (1999) and in Verkuyl’s original formulation of his Law. In Art. #4 it is proposed that discourse structure and linearity interact in QDs.

**6. DISCOURSE STRUCTURE**

In order to evaluate quantification in terms of discourse structure the latter is taken here –for convenience and arbitrarily - as a binary partitioning of an assertion (Strawson 1956; Danes 1960; Firbas 1970; Jackendoff 1972; Wilson and Sperber 1979;

Reinhart 1982; Rullman 1995), among many others.<sup>18</sup> The Turkish data presented in Art. #4 eloquently support the proposal that discourse structure in terms of Given vs. New Information plays a crucial role in determining quantificational structures. A functional predicate relation results in QDs if and only if the potential BP is Given Information and the potential multiple DP is New Information, where the latter is defined in terms of local binding. However if the potential multiple DP is Given Information in the discourse, with non-local binding, including but not exclusively anaphoric binding, it results in a fixed quantity and QDs cannot obtain. In Turkish, as in most languages, the initial position in the proposition is the default position for Given Information. It is only under contrast that DP1 can be New Information. And it is precisely under contrast that Inverse QDs may obtain in Turkish, discussed in Art. #4. Hence the occurrence of Inverse QDs is used not only to discount previous assumptions about QDs, as in (58), but also as a crucial diagnostic tool in the investigation of how QDs do obtain.

## 6.0 Locality

With reference to the Turkish data in Art.#4, it is only a New Information DP that can multiply under QDs. Then the crux of the discussion is how to concretely define New Information. Based on data such as that drawn from Hintikka (1986) in (13)a, *Every Englishman<sub>i</sub> loves a woman, his<sub>i</sub> mother*, I propose in Art.#4 that New Information be analyzed as a locally bound DP. But what is the definition of 'local'? There emerged two distinct flavors of locality that are relevant to a discussion of QDs, both locality of the functional predicate relation, constraining the arguments to the local predicate domain, as well as the  $\pm$ local definition of a DP. The latter is the more interesting so let me first address the former.

Since QDs are subject to the functional role of the predicate (Verkuyl 1988; de Mey 1990:36) the discussion of locality constraints must also address 'intermediate readings', claimed to be flagrant violations of the locality of QDs.

### Intermediate Readings

- (59) a. Every witness alleged [that every suspect had some connection to a well-known movie star]. (a distinct star for each witness) (Farkas 1994: 7 ex. 9)  
 b. Each student has to come up with three arguments [which show that some condition proposed by Chomsky is wrong]. (a distinct condition for each student) (Farkas 1981: 64 ex.17a)

The analysis presented in Art. #4 is functional, along the general lines of Farkas & Giannakidou (1996) and Steedman (1999) for long distance Inverse QDs, which maintains the locality of the QDs. Note the following data:

- (60) Every professor rewarded every student [who read *a recommended book*].  
 \* 5 professors, 1 student, 5 books (Kennelly, 2000)

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<sup>18</sup> This is not to say that discourse cannot be organized under a tripartite system, but only that the binary organization is useful in discussing QDs. Here Topic = Given, Focus = New and the Background Information may contain both Given and New components.

(From Art. #4) Under a five book 'Intermediate' reading there should be a relation between professors and books without any regard for the students. Under a functional predicate approach, the number of books can only vary in terms of the *read* relation with the students. Therefore the fact that there is no five book reading without a variation in students is taken as support of the functional predicate analysis of quantification.

The next question to address is how to define the local binding of a quantified DP that identifies it as New Information such that it may multiply. I propose that the locality that is crucial to discourse structure, and therefore to QDs, is not defined in terms of where a DP resides syntactically, but where it is 'defined' (from Art. #4). It is assumed that all DPs, whether definite or indefinite, contain variables that need to be bound. If their binder lies internal to the immediate predicate domain, defined in (61), then they are 'locally defined', indicated with a *l* index, the equivalent of an *in situ* interpretation.

**'Locality' is defined with respect to a unique Predicate Domain**

- (61) The predicate domain is defined as the predicate, its arguments and adverbs, i.e. a clause. DPs within a single predicate domain are said to be 'local' with respect to one another and DPs external to any given predicate domain are said to be at 'text-level' with respect to that predicate domain.

**Locally Bound Element Carries *l* Index**

- (62) A DP may be locally bound either a) (in)directly by D(iscourse)-Linking, which includes anaphoric binding, or b) directly by existential closure. A DP that is bound within its local predicate domain carries a *l* index: DP<sub>*l*</sub>.

Recall that D-Linking is specificity, introduced in Sections 3 and 4. If not locally defined, if no *l* index, a DP is defined at 'text-level' with respect to its immediate predicate domain, in some respects the equivalent to a 'wide scope' interpretation, without a hierarchical sense of 'taking scope over x' and without resorting to fictitious covert movement.

- (63) a. Kim opened the box.  
b. Kim<sub>*i*</sub> opened the box<sub>*l*</sub> in front of her<sub>*i*</sub>.

In (63)a DP2 *the box* is definite and therefore has an anaphoric relation with an element external to the clause, such that it has a text-level definition, analyzed as Given Information. *Kim* is considered here a rigid designator and therefore Given Information. The next section probes the binding that determines New vs. Given Information, and consequently the binding relevant to QDs, both the BP and the multiple DP.

**6.1 Discourse Structure and Binding**

In (63)b DP2 *the box* has a D-Linking (specific) locational relation *in front of her* that has a local binder *Kim* such that *the box<sub>l</sub>* is locally defined, analyzed here as New Information. In (28) it was seen that a definite DP2, such as seen in (63)b, can multiply. From the data such as that in (28) I reached the conclusion that the binding relations relevant to discourse structure, and therefore to quantification, are either direct or

indirect; direct in the form of a) anaphoric binding, DP2 in (64) below, or b) existential closure, or indirect due to c) D-Linking, DP2 in (13) and (28). It is assumed that nonspecifics are subject to clause internal existential closure so they always carry a *l* index and therefore may multiply. It is argued that there is an airtight locality constraint on the dependent, multiple DP. It must be locally defined, i.e. locally bound and consequently it bears a *l* index, i.e. DP<sub>*l*</sub>. It is shown in Art. #4 that a locally resolved D-Linking relation takes precedence in determining both discourse structure (Turkish data) and QDs (English data), where it prevails over anaphoric binding, based on data such as that seen in (28) and (64) below. Since specificity has been defined as a D-Linking relation, this proposal then amounts to saying that a) nonspecifics may always multiply, coerced to a specific interpretation by the relation to the BP under QDs (Art. #5) and b) specifics, including definites, may multiply if they are locally bound by a D-Linking relation, evidenced in (28). Recall that any determiner may appear on either argument of QDs, seen in (28) and repeated here.

**Any Determiner May Appear on the BP or Multiple DP**

(28) a.		the	
		those	
		every	
		each	
		all	
	Every	both	
	Each	child, opened	most (of the) box(es) in front of her,
		many	
		exactly 3	
		at most 3	
		at least 3	
		3	
		few	
		a	
		some	
	(unambiguous QDs)		

- b. The the  
 Those those  
 All every  
 Both each  
 Most all  
 Many (of the) children<sub>i</sub> opened both (of the) box(es) in front of them<sub>i</sub>.  
 Exactly 3 most  
 At most 3 many  
 At least 3 exactly 3  
 Three at most 3  
 Few at least 3  
 3  
 few  
 some  
 a  
 (ambiguous QDs with  $\pm$  multiples of boxes)

- c. Each child met Kim and Lee (\*in front of her). (no QDs available)

It is only rigid designators that cannot multiply since they refuse a local definition; they cannot be New Information and they cannot bear a *l* index, seen in (28)c.<sup>19</sup> In (28)a/b rather than the semantics of any of the determiners, including all definites and all classes of indefinites, the crucial issue is obviously that the locational D-Linking relation is locally bound, constraining the definition of DP2<sub>*i*</sub> to the local domain and QDs obtain. Note what occurs in a sentence similar to (28)a with a definite DP2 that has a text-level definition, without the locational D-Linking relation, no QDs obtain:

**\*QDs with a Text-level Definition of DP2**

- (64) Every child opened the/both box(es).

The ambiguity in (28)b is attributed to the ambiguity of the anaphoric pronoun *them*, which reflects the interpretation of the plural subject DP1. It may mean a collective 'all of them together', Verkuyl's (1993/4) *kolkhoz* collective, or it may mean a total partitioning of the individuals, i.e. 'each one of them individually'. In the first case it constrains the predicate relation to a single instantiation, resulting in a cumulative reading which includes collectivity (Verkuyl 1993/4:28), while in the second case there is individualized predication, i.e. a functional predicate, and QDs.

In all cases in (28)a/b DP2<sub>*i*</sub> is locally defined. Nevertheless the locality in (28)b does not necessarily result in QDs while in (28)a it consistently does. In this case the difference is clearly the D-Op *each/every* on DP1 in (28)a which imposes a functional predicate. I argue that once a functional predicate is induced, as long as locality is adhered to, that is iff the potential multiple DP is New Information with a *l* index, then QDs necessarily obtain. In (28)a although the role of the D-Op on DP1 is not that of the QDs inducing Operator, neither can it be excluded as a crucial contributing factor.

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<sup>19</sup> When a proper name is used as a title, as in *Three students bought Ulysses* or *There are 3 Andreas invited* it is not used as a rigid designator.

Compare (28)a and (28)b. In (28)a under this analysis there is both a D-Op on DP1 and a locally defined DP2<sub>*l*</sub> and the QDs reading is unambiguous, whatever the determiner on DP2<sub>*l*</sub> might be. In (28)b there is the same locality, but the interpretation of the anaphoric pronoun, reflecting the interpretation of the plural DP1, is crucial in the determination of QDs. Given a locally bound DP2<sub>*l*</sub>, a totally partitioned DP1 results in a functional interpretation of the predicate and QDs, the same effect as obtained with a D-Op. With the same DP2<sub>*l*</sub> but a collective interpretation of DP1 the result is a relational interpretation of the predicate and a cumulative reading.

It is fundamental to an understanding of QDs to note that although in (28)b a functional predicate due to a partitioned DP1, i.e. distributivity, is associated with QDs, there is no direct link between the two. Once the functional predicate is ensured then locality becomes the key issue. Another way of saying the same thing is that if locality is adhered to, given a functional predicate, QDs necessarily obtain. This point is driven home in (64), an example with a) a D-Op on DP1 which necessarily results in a functional predicate and b) a text-level definition of DP2, forced by means of a definite determiner with its anaphoric binding. Then two distinct constraints are equally crucial to QDs: a totally partitioned BP which imposes a functional predicate and a locally defined multiple DP<sub>*i*</sub>; both of the arguments come into play in the determination of QDs. If in fact Given Information has a text-level definition and if New Information has a local definition as proposed here, then (28)a/(64) challenge the indefinite = Novelty and definite = Familiarity dichotomy proposed by Kamp (1981)/Heim (1982), as well as a Given = anaphoric analysis. The characteristics of (in)definiteness and (non)specificity play an instrumental role in effecting QDs only in that they determine the form of binding that is relevant in establishing whether a DP is defined at text-level or locally.

Is the constraint on QDs in fact in terms of locality or in terms of discourse structure, and how can this question be approached? The (un)availability of Inverse QDs with a multiple DP1 in English and Turkish is used to pursue this issue in Art #4 with the argument summarized in the next section of the introduction. Note that the QDs discussed here are distinct from the sorting of Given Information in a dialogue such as *There were 12 apples on the table this morning. Oh yes, the 3 boys each took 4 of them.*

Farkas' (1997) analysis of QDs as dependencies of functions that assign values to variables contained in DPs is adopted in Art. #5. This analysis is grounded in Discourse Representation Theory (DRT) (Kamp and Reyle 1993), useful to visualize the relations between the input from the discourse to the immediate assertion, and the input from the assertion itself. There are consequently two flavors of Given Information relevant to an assertion, that in the previous discourse, but not present in the assertion, and that Given Information that is part of the assertion. DPs that have a dependency on Given Information within the assertion are evaluated as New Information while those with a dependency relation on Given Information external to the assertion are themselves evaluated as Given. Since these dependencies in the form of binding relations determine the definition of a DP, and therefore its interpretation in terms of quantification, ambiguity arises when more than one binder is available for any given DP. It is not until the assertion is complete that one can disambiguate the potential binding relations, and therefore interpret the assertion. As the assertion unfolds, provisional binding relations are established to be confirmed or dismissed at

the completion of the assertion, proposed by van der Sandt (1992). Consequently a dynamic interpretation of an assertion, as the information is introduced into the context, is not possible. Only the completed proposition can be considered as the input to the discourse, consistent with Stalnaker's (1978) analysis of the Common Ground as a set of propositions with a truth value.

The next section considers the importance of Inverse QDs in the investigation of the interface between discourse structure and quantification.

## 6.2 Discourse Structure and Inverse QDs

In spite of the name, Inverse QDs are not an inverse function but rather the functional interpretation of the predicate, but from DP2 to DP1, where there is the multiplication of DP1<sub>*l*</sub> while DP2 is the BP. In English, generally speaking, all 2 place predicates with a locally defined DP1<sub>*l*</sub> and a D-Op on DP2 permit Inverse QDs, however marked that reading may be, seen in (65). However, *eat* is asymmetrical in that without a D-Op on either DP, linearity, perhaps the equivalent of c-command, seems to regulate QDs since they obtain with a multiple DP2 but not the inverse, seen in (65)b.

### ± Inverse QDs

- (65) a. A boy ate every pizza. (Steedman 1999)  
 (multiple boys = the highly marked reading)
- b. 2 boys ate 3 pizzas.  
 (QDs reading:  $\sqrt{6}$  pizzas, \*6 boys)

Cross-linguistically, garden variety predicates such as *eat* pattern with English and Inverse QDs do not obtain in sentences like (65)b.

In sharp contrast with the English in (65)a, however, in Turkish no Inverse QDs reading is available for these predicates, even with a D-Op on DP2, seen in (66).

### \* Inverse QDs in Turkish

- (66) Genç bir çocuk her pizza-yı yer.  
 young a child/boy-Nom every pizza-Acc eat  
 'A young boy eats every pizza.'  
 (one boy)

At first blush it seems that linearity, perhaps the equivalent of c-command, determines QDs in Turkish, as proposed by Göksel (1998). Yet linearity does not always rule; there are predicates such as *eşlik et-* 'accompany' that allow Inverse QDs on the condition that:

- a. There is a D-Op such as *her* 'each/every' on DP2;  
 b. DP1 is contrastively Focussed, i.e. New Information.

Under the analysis proposed here then DP1 would carry a *l* index; it is DP1<sub>*l*</sub> and (covertly) locally bound. Contrastive Focus is indicated by capital letters.

### √ Inverse QDs in Turkish

- (67) Genç bir DOKTOR<sub>i</sub> her hasta-ya eşlik etti.  
young a doctor-Nom every patient-Dat accompanied  
'A young doctor accompanied every patient.'  
(ambiguous: multiple doctors or one doctor)

However these same conditions applied to (66) do not result in Inverse QDs. Clearly the predicate has an effect in determining whether Inverse QDs may obtain or not.

It is suggested in Art. #4 that predicates have default discourse roles built into their argument structure. Recall that in Turkish the discourse structure of the sentence is explicit in its linear organization. The organization of discourse structure (Erkü 1982) exactly follows the default SOV word order.<sup>20</sup>

### Discourse Structure in Turkish (Erkü 1982)

- (68) Topic = Given Information > Focus = New Information > Predicate  
S O V

Generalizing from Turkish, for predicates such as *eat* the default Given would be the subject and the default New Information would be the object. However for *accompany* type predicates it seems that this intrinsic association of subject-Given and object-New is reversed and that the subject is the default New Information. These predicates are the only that allow Inverse QDs in Turkish.

Not only do *accompany* type predicates greatly facilitate an Inverse QDs reading in English, but the analysis presented here predicts that, for these predicates, Inverse QDs should obtain in English without a D-Op on DP2. That is they should operate in exactly the reverse direction of *eat* in (65)b. And that is the empirical fact, seen in (69).

### √ Inverse QDs

- (69) 3 students accompanied 4 professors.<sup>21</sup>  
(QDs readings: possible 12 students or, highly marked, 12 professors)

What is not expected, however, is that in the absence of a D-Op on either DP, *accompany* type predicates in English allow QDs in both directions. Then either a linearity or c-command effect is also operating, interacting with discourse structure to get the double reading in (69). The fact that there is a reading with 12 professors discredits an analysis of *accompany* type predicates as having a distinct syntactic structure from *eat* type predicates.

Let us say for a moment that this assessment of *accompany* type predicates holds cross-linguistically. There is still an inordinate distinction between English and Turkish in that the former has so much greater availability of Inverse QDs than the latter, seen in the contrast between (65)a and (66). (This discussion is taken from Art. #4, Sec. V.1.) Turkish is a discourse configurational language where the discourse roles of the arguments are fixed, linearly, modified within those linear parameters by prosody (İşsever 2003). Grammatical function is expressed by Case clitics suffixed to nominals.

<sup>20</sup> Recently updated in the work of İşsever (2003), but Erkü's analysis is sufficient here.

<sup>21</sup> As a native speaker of English I must confess that I cannot get the 12 professor reading, but some native speakers can, so I assume the reading is there, but is highly marked.

In English, word order determines grammatical function, while discourse roles are generally free, determined mainly by prosody. Then, if locality were the crucial factor in determining QDs, given a functional predicate, the two languages should have the same availability of Inverse QDs. However, empirically, that is not what obtains. English, with greater flexibility in discourse structure, has more availability of Inverse QDs. Turkish, with a stricter definition of discourse structure, has less availability of QDs. I argue that since the sentence initial DP is the default Topic or Given Information in Turkish it cannot multiply. Only when both the lexical predicate and the context overrule this default structure can Inverse QDs obtain. This points to discourse structure as the underlying primitive in determining QDs rather than locality of itself, together with the functional interpretation of the predicate.

## 7. QDS AND THE ‘ANYWHERE PRINCIPLE’ NECESSITATE POLYADIC QUANTIFICATION

Based on a traditional application of GQ theory, complete with a consolidated VP unit, the fundamental opposition in quantification has been perceived as that between *collectivity* and *distributivity* (Verkuyl 1993/4) and the hot debate has been to ascertain the location of the covert D-Op that induces QDs. Is this Operator internal to the semantics of the determiner of the BP or is it on the VP? The first step in proposing a multi-factor analysis of QDs is to demonstrate that QDs may be induced from diversely placed ‘Operators’. The evidence presented is in the form of an overt Operator in Turkish, as well as contrast, which may effect QDs from any element in either DP, with contrast affecting either quantity or quality.

### 7.0 Turkish *-Er* Morpheme

In Turkish QDs inducing morphological marking may appear on either argument, or on both of the DPs. These data are evidence that an ‘Anywhere Principle’ reigns with respect to a QDs inducing overt ‘Operator’ (from Art. #5).

#### (70) a. *-Er* Operator on Determiner of Multiple DP2

3 kız 4er sepet kaldırmış.  
 3 girl-Nom 4.in.one basket-@ lifted  
 ‘3 girls lifted 4 baskets each.’  
 (12 baskets)

#### b. Operator on BP DP1

3 kız-ın her bir-i 4 sepet kaldırmış.  
 3 girl-Gen every one-AgrN 4 basket-@ lifted  
 ‘Each of 3 girls lifted 4 baskets.’  
 (12 baskets)

The morpheme *-Er* is used in (70)a to induce a QDs reading, with DP1 as the Base Plural; *-Er* induces a functional interpretation of the predicate from the range argument rather than from the domain. In (70)b QDs and a functional predicate are induced from the domain argument. Then an overt QDs inducing Operator may occur anywhere, on either of the arguments. This is conclusive evidence that a traditional application of GQ theory, with a consolidated VP unit and the QDs inducing element in the BP or in an operator on the VP, cannot be maintained. The *-Er* morpheme in Turkish demonstrates that a higher level of abstraction is needed for a system of

quantification, that abstracts away from an asymmetrical representation of QDs. *-Er* is analyzed here as an operator that induces a symmetrical Dyadic Quantifier, built from two Monadic Quantifiers (Art. #3) that interpret GQs in terms of arity reduction, i.e. both DPs in QDs merit equal consideration.

### 7.1 Contrast

Art.#5 is a study of QDs without a D-Op on the Given Information argument to assure a functional predicate relation. In this case, QDs are identified as a non-assertive DP defining relation, drawing on propositions of the type seen in (13), that map Given Information – the BP - onto New Information – the multiple argument. The relevant features of discourse structure discussed here are  $\pm$ locality of definition which determine whether a DP is Given or New Information, and  $\pm$ contrast. **Contrast** is the stronger form of New Information (Rullman 1995).

- (71) a. Kim opened **two** boxes and Lee opened **five** boxes.  
b. Kim opened two **boxes** and Lee opened two **letters**.

In (71)a both *two boxes* and *five boxes* are [+contrast], as well as *Kim* and *Lee*. *Two/five boxes* are [+contrast] in quantity, but not in quality, while in (71)b *two boxes/letters* exemplify contrast in quality but not in quantity.

Contrast is associated with an *Only Effect* (Rullman 1995 based on Rooth (1985; 1992)) and may crucially induce QDs. In Turkish, the overt Focus Operator *sadece* ‘only’ is shown to pattern with modified numerals on the potential BP. They form a uniform class in inducing QDs. Once locality is adhered to for the potential multiple DP, the work a D-Op performs on the potential BP and that of the overt *Only* Operator are identical. Art.#5 continues in considering contrast, where the *Only Effect* is identified as an *Only* Operator. Contrast on any element in either DP may induce QDs, a repeat of the Anywhere Principle. Given that GQ theory is one of the standard frameworks used to represent QDs, how does it analyze *only*? Applied to *only* it makes very different assessments for contrast of quality and quantity, as well as for contrast of DP1 and of DP2. Under GQ theory *only* on the subject DP1, as a contrast of quality, defines a subset relation between the set that represents the denotation of the VP and that of DP1. However under contrast of quantity the relation between the two sets is intersective. But then so is it for, let's say, a cardinal on the subject DP without *only*.

What does *only* add? Wherever *only* is inserted it adds the implication of exhaustivity, since all relevant alternatives are discounted. Empirically, given the environment of an assertion without a D-Op on a quantified DP1 to assure a functional predicate relation and with a nonspecific object DP2, constrained in Turkish to the immediately preverbal position, data in Art. #5 show that contrast of any element, quality or quantity of either quantified DP in a 2 place predicate ambiguously results in a functional predicate and QDs. This would render the traditional GQ approach the equivalent of a blind alley. Once again there is an Anywhere Principle prevailing, ever a problem for a traditional application of the GQ framework to QDs. However when taken one level higher in abstraction to a Dyadic Quantifier, the GQ framework handles the data eloquently, seen in Art. #3. In Art. #5 I propose that:

- a. The *Only Effect*, distinct from other implicatures, alters the predication structure of the assertion to that of exhaustivity, a negative assertion of the predication of the relevant alternatives.
- b. Having lost its assertive force, the lexical predicate takes on an attributive role, which translates into a functional predicate. If it is a 2 place predicate and if the requirements for QDs are available, then QDs obtain.

Due to the fact that Turkish is a discourse configurational language with the nonspecific object DP2 constrained to the immediately preverbal position while DP1 is then the Given Information, QDs due to contrast are asymmetrical. The Turkish data repeatedly support an Anywhere Principle, which in turn supports a multi-factor approach to QDs that considers interacting factors rather than a single operator approach. Once one abandons the consolidated VP unit analysis, then the opposition in natural language is taken as cumulativity vs. QDs, reflecting Verkuyl's Law.

## 7.2 Polyadic Quantification

Several distinct arguments are used against a consolidated VP under QDs. In Art. #2, there is also an investigation and rejection of the hypothesis that QDs are manifestations of predicate-noun incorporation, at either a syntactic or semantic level of representation. In Art. #3, 3 place predicates that combine cumulative and QDs relations are used to demonstrate irrefutably that the computation of the DPs and of the predicate must be processed independently; if not the QDs relation overgenerates. Furthermore, if both the BP and the multiple DP are VP internal, as in (58) for example, and if the VP is a consolidated unit, then the result would be an infinite 'loop' of multiplication. The immediate solution to the problem posed by (58)b would be some kind of covert movement of the BP out of the VP under 'scopal shift', as in May's Quantifier Raising (QR) at LF (1985). A crucial argument used to support the scopal shift approach is that the BP needs to take scope over the multiple DP; that is that asymmetry is essential in the representation of QDs. However scopal shift must be rejected since it makes inaccurate predictions for sentences with two plural quantified DPs, shown in Section 5, as well as leaving unexplained the so called 'wide-scope' interpretation of a non quantified DP2, as in (58)a. The rejection of scopal shift leaves the problem posed by (58)b for the consolidated VP analysis without a solution. These data not only pose a serious threat to the consolidated VP analysis, and therefore to the traditional application of GQ theory, together with the collective/distributive dichotomy, but also to any representation of QDs in terms of asymmetry. As a counter to the scopal shift approach Verkuyl (1988; 1993/4)<sup>22</sup> and de Mey (1990) propose a functional predicate approach to QDs. However the problem of asymmetry that is the heart and soul of the scopal shift approach is not addressed by the functional predicate analysis.

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<sup>22</sup> Verkuyl's article *Distributivity and Collectivity: A Couple at Odds* first appeared as an OTS publication in 1993 (pages 1-33) and later in a CSLI publication in 1994 (pages 49-80). The two versions have their differences. The article *The Semantics of Plural Noun Phrases*, written together with J. van der Does, appears in a CSLI publication that has the date '1995' on the first page of the article and '1996' on the flyleaf of the book (pages 337-374). The information in these 3 articles is both overlapping and complementary, however the page numbers are not, so when I cite a particular page it is clear which article is being referred to.

There is a non traditional means of applying GQ theory, elaborated in Art. #3, that can accommodate the data. Keenan & Westerståhl (1997) developed the idea of Monadic Quantifiers, within the framework of polyadic quantification (Scha 1981) which is grounded in GQ theory. Abstracting away from symmetric vs. asymmetric representations Reniers & Kennelly (1999) and Kennelly & Reniers (1999) developed two Dyadic Quantifiers, each built from two Monadic Quantifiers, that can handle either 'scope-independent' cumulativity (Scha 1981; van der Does 1992; Verkuyl 1993/4) or QDs. These two Dyadic Quantifiers exactly reflect clauses (a) and (b) in Verkuyl's Law of Quantification in Natural Language. The higher level of representation in Dyadic Quantifiers allows us to maintain the theory of GQs yet at the same time allows access to information from each of the participating elements: the BP, the multiple DP and the predicate, obviating the need for a consolidated VP unit. This representation then allows an analysis of QDs in terms of interacting factors rather than with a unique Operator.

That is, a GQ takes as input a one place predicate relation which is then reduced to a truth value, a zero place predicate relation. This is the base case of a Monadic Quantifier that takes a relation of any arity and reduces it by one. Two Monadic Quantifiers are the input to a Dyadic Quantifier that reduces the arity of a relation by two. When QDs are represented in this fashion, the element that induces that arity reduction may come from either of the arguments without problem.

Under Generalized Quantifier theory a quantified DP takes a one place predicate, i.e. a one place relation, and reduces it to a truth value, a zero place relation; it reduces the arity of the predicate relation by one. In 1981 Scha proposed a system of 'polyadic quantification', which generalizes GQ theory such that quantification is treated as arity reduction. Subsequently, Keenan & Westerståhl (1997) developed Monadic Quantifiers, which use GQs as their base case, and which reduce a predicate relation by one, say a 3 place relation to a 2 place relation, etc. Consequently Monadic Quantifiers are not restricted to any one type. Kennelly & Reniers (1999) then use Monadic Quantifiers to build one Dyadic Quantifier as the representation of QDs and another as the representation of cumulativity. Dyadic Quantifiers abstract away from an asymmetrical analysis of QDs, allowing an *in situ* interpretation of quantified DPs. If QDs are understood in terms of this representation then they may be induced from either argument, accounting for the problematic Turkish data which operates under an Anywhere Principle. Consequently the evaluation of a consolidated VP, which results in an infinite loop of multiplication for data parallel to those in (58)b, together with the traditional opposition between collectivity and distributivity, can be abandoned without abandoning GQ theory. The analysis of QDs in terms of a symmetric Dyadic Quantifier paves the way for the multi-factor approach articulated in Arts. #4/#5.

## 8. CONCLUSION TO INTRODUCTION

Within the setting of a natural law which determines the calculation of quantities of the DPs for a 2 place predicate, these articles sustain that Dyadic Quantifiers are a necessary representation of natural language, reflecting exactly (my extension of) Verkuyl's Law. Five basic issues are addressed:

- 1 The semantics of DPs in terms of a) binding based on D-Linking, i.e. specificity – investigated in the first two articles - which reduces to an issue of

- 2     **Locality**; b) distributivity which reduces to the issue of a functional predicate and the resulting **Locality**.
- 2     Inverse QDs together with the D-Linking/specificity binding that determines **Discourse Structure**
- 3     The dissolution of the evaluation of the consolidated VP with the necessity for a symmetrical representation of QDs
- 4     The Anywhere Principle necessitates a symmetrical representation of QDs.
- 5     **Contrast**, associated with an *Only Effect*, which has exactly the effect of a D-Op plus Locality. It applies under the Anywhere Principle.

The first two articles lay the groundwork for the latter three in that the binding structures that determine discourse roles are D-Linking, which is the specificity discussed in Arts. #1/#2. This volume addresses the issues above and a multi-factor approach to QDs within the framework of Generalized Quantification (GQ) theory. 'Scope' is shown to be a misleading factor in the analysis of QDs. Distributivity is simply a characteristic of a class of determiners that induces a functional role of the predicate, crucial to QDs but which may also occur within a cumulative reading. The cumulative reading with a D-Op on a potential BP obtains when locality of definition of the potential multiple DP is violated with a text level D-Linking (specificity) relation, seen in (64). The distinction is made between multiple predicate application to accommodate the individuals or subcollections within a plural subject, which does not entail a functional predicate, and the total partitioning of the BP which, in an atemporal framework and given locality, results in QDs.

If Verkuyl's analysis based on argument structure is modified from 'external argument' to Given Information and from 'internal argument' to New Information, defined in Art. #4 in terms of binding, our two analyses are in many respects the same cup of tea in that we both visualize QDs in terms of a functional predicate. Verkuyl envisions all instantiations of his internal argument DP2, multiple or not, the result of a functional predicate applied to the external argument DP1. I opt for a stronger distinction between multiplication of one DP under clause (b) and non-multiplication under clause (a). While I adopt Verkuyl's analysis of a functional predicate for QDs, together with his criticism of scopal shift as an approach to QDs, I argue that under clause (a) cumulativity the predicate relation is underspecified and therefore may or may not be functional. At the same time I propose a representation of both clause (a) and (b) as two distinct symmetrical Dyadic Quantifiers, elaborated in Section 7.2 and in Art. #3. This provides an elegant way of disassociating QDs from structure such that each element: the BP, the predicate and the multiple DP, all have their respective input, paving the way for a multi-factor approach to QDs.

Once a single Operator analysis of QDs is abandoned, it is for sure that many other factors will come to light, and that the factors discussed in these articles will be further investigated with a more fine-grained analysis. Nevertheless I propose these articles as a first step in this direction.

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## **\*NONSPECIFIC EXTERNAL ARGUMENTS IN TURKISH**

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### **I. INTRODUCTION**

The proposal that nonspecific arguments obligatorily remain within VP has long been a topic of discussion (Enç 1991; Diesing 1992 among others). In Turkish I propose that the constraint is even stronger: nonspecific arguments are contained in VP (Kennelly to appear) as an internal argument<sup>1</sup>, never as an external argument in a Specifier position. Hence they are never subjects. By means of a study of Turkish Relative Clauses (RCs) it will be shown that nonspecific logical subjects of Unaccusatives (including Existentials and Passives) remain as internal arguments with Weak Case. This analysis then predicts that Transitive and Unergative verbs in Turkish will never have a nonspecific subject because they are base generated as external arguments in Spec,VP. In Section II the problematic data are introduced and the analysis proposed. The asymmetry of RCs is presented in Section III, which is then applied to the data in Section IV. When the internal argument of an Unaccusative verb is nonspecific, it must remain contained within VP and verb adjacent. Therefore, to satisfy the Extended Projection Principle (Chomsky 1991) which states that all sentences must have a subject, the Locative occurs as the external argument under Locative Inversion. Section V discusses presuppositional subjects and Section VI summarizes the issues.

Some DPs presuppose the existence of a set of individuals while others assert the existence of a set of individuals, and the two are incompatible (Enç 1991:14). In her

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<sup>1</sup> Data using the distinctions in truth conditions between sentences that have the Turkish equivalents of 'fish-catching' balık tutmak and 'catching a fish' bir balık tutmak show that the nonspecific object is not an incorporated argument when it is a DP. (see Kennelly to appear)

study of specificity Enç (1991:7) popularized that term, equating it with Pesetsky's (1987) Discourse-linking (D-linking), while Diesing (1992:80) has equated specificity with presuppositionality. In this paper I refer to specificity or presupposition of a DP with the meaning that the set denoted by NP (previously referred to as N') is not empty. Thus a specific or presuppositional DP implies the partitive, e.g. one/two/some/all/each of the NP.<sup>2</sup> In contrast, a nonspecific or existential DP (Keenan 1987) asserts the existence of the individuals denoted by the NP.<sup>3</sup>

## II. THE PROBLEM

In Turkish all arguments are morphologically marked for Case except the Nominative, a zero morpheme 'Ø', and the nonspecific object (NODP), which has Weak Case (de Hoop, 1992); the specific object has an Accusative marker. There is no morphological difference for a  $\pm$ presuppositional subject as there is for the object. Turkish is a scrambling language (Kural 1992) whereby the Nominative argument may occur in any position in the sentence.

- (1) a. Doktor-Ø genç bir hastayı tedavi etti.  
 doctor-Nom young a patient-Acc cared.for  
 'The doctor cared for a (+Specific) young patient.'
- b. Genç bir hastayı doktor-Ø tedavi etti.

There is a one-to-one mapping between the discourse function interface and the linear position in Turkish, with the immediately preverbal position reserved for Focus (Erkü 1982) or 'new information', i.e. nonpresuppositional arguments. Thus the NODP, in sharp contrast with the Nominative, only appears immediately preverbally in the written language due to its discourse function<sup>4</sup>, i.e. it is dependent on the linear position for its interpretation.

- (2) a. Doktor-Ø genç bir hasta tedavi etti.  
 doctor-Nom young a patient-Weak cared.for  
 'The doctor cared for a (-Specific) young patient.'
- b. \*Genç bir hasta doktor-Ø tedavi etti.

In (1) the Nominative subject may occur in either argument position while in (2) the NODP is constrained to the preverbal position. However the morphology and word

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<sup>2</sup> This directly contradicts Belletti's (1988) and Lasnik's (1992:398) use of the term partitive as nonspecific. De Hoop (1992: 62-65) demonstrates that the partitive is independent of [ $\pm$  def], confirming that Belletti's use of partitive in terms of  $\pm$ definite cannot be maintained.

<sup>3</sup> Keenan (1987) defines an existential determiner as a function  $f$  from properties to sets of properties such that for all properties  $p, q$ :  $p \in f(q)$  iff  $1 \in f(q \wedge p)$ .

<sup>4</sup> In conversational Turkish, the NODP may occur postverbally (Göksel, 1995) iff it is a DP (see Kennelly to appear for a discussion). This is evidence to rule out Case licensing as the motivation for the constraint on the position of the NODP.

order of the Nominative in (1b) is identical to that of the NODP in (2a). That is, there is no discernible difference between a Nominative DP in Spec,VP/Spec,AgrP<sup>5</sup> and a NODP when they occur in the immediately preverbal position in a matrix clause.<sup>6</sup>

Embedded clauses take the form of nominalized propositions and the embedded subject takes the Genitive marker. Strangely, the Genitive is absent from the nonspecific subject of embedded Unaccusatives, Existentials, and Passives, as long as the subject remains in the immediately preverbal Focus position.

**Embedded Unaccusative:**

- (3) Deniz [bostana danalar girdiğın]i söyledi.  
garden-Dat calves having.entered-Acc said  
'Deniz said that there were calves entering the garden.'  
\* 'Deniz said that the calves had entered/were entering the garden.'<sup>7</sup>

**Embedded Existential:**

- (4) Deniz [bostanda danalar olduğın]u söyledi.  
garden-Loc calves having.been-Acc said  
'Deniz said that there are/were calves in the garden.'  
\* 'Deniz said that the calves were in the garden.'

**Embedded Passive:**

- (5) Deniz [hastanede kan verildiğın]i söyledi.  
hospital-Loc blood having.been.given-Acc said  
'Deniz said that there was blood given at the hospital.'  
\* 'Deniz said that the blood was given at the hospital.'

If the subject occurs elsewhere, the Genitive marker is obligatory and the DP has a specific interpretation.

**Unaccusative:**

- (6) Deniz [danalar\*(-ın) bostana girdiğın]i söyledi.<sup>8</sup>  
calves-Gen garden-Dat having.entered-Acc said  
'Deniz said that (\*there were) the calves had entered/were entering the garden.'

<sup>5</sup> Pollock's (1989) proposal of a blown up INFL is adopted here, as is Belletti's (1990) proposal of an AspP. Distinct scope construals for a  $\pm$ quantified subject with respect to a NODP indicate that the subject in Turkish may occur in either Spec,VP (nonquantificational) or Spec,AgrP (quantificational). See Kennelly (to appear) for the data.

<sup>6</sup> In Dutch the existential object may not undergo scrambling but remains in its pre-verbal 'D-structure' position, though a PP may occur between the argument and the verb (Reuland 1988; de Hoop 1992:80).

<sup>7</sup> This is contrary to what occurs in Dutch where an existential DP may not occur in the subject position of an unaccusative verb (Reuland 1988:375).

<sup>8</sup> Even when the subject is 3 p. plural, the agreement on the verb is normally 3 p. singular.

**Existential:**

- (7) Deniz [danalar\*(-ın) bostanda olduğun]u söyledi.  
 calves-Gen garden-Loc having.been-Acc said  
 'Deniz said that (\*there were) the calves are/were in the garden.'

**Passive:**

- (8) Deniz [kan\*(-ın) hastanede verildiğin]i söyledi.  
 blood-Gen hospital-Loc having.been.given-Acc said  
 said  
 'Deniz said that (\*there was) the blood was given at the hospital.'

The Genitive marker is also grammatical on the subject in (3)/(4)/(5) when it occurs immediately preverbally; however then the subject loses its nonspecific interpretation that is available only in the Focus position.

**Unaccusative:**

- (9) Deniz [aostana danalar-ın girdiğin]i söyledi.  
 garden-Dat calves-Gen having.entered-Acc said  
 'Deniz said that (\*there were) the calves had entered/were entering the garden.'

**Existential:**

- (10) Deniz [bostanda danalar-ın olduğun]u söyledi.  
 garden-Loc calves-Gen having.been-Acc said  
 'Deniz said that (\*there were) the calves are/were in the garden.'

**Passive:**

- (11) Deniz [hastanede kanlar-ın verildiğin]i söyledi.  
 hospital-Loc blood-Gen having.been.given-Acc said  
 'Deniz said that (\*there was) the blood was given at the hospital.'

In order to retain the nonspecific interpretation the embedded subject must morphologically resemble and position-wise behave exactly as a NODP. Furthermore, the subjects of embedded Transitive and Unergative verbs obligatorily take the Genitive marker, whatever their position.

**Embedded Transitives:**

- (12) Deniz [kitabevinde kitabı bir adam\*(-ın) seçtiğin]i söyledi.  
 bookshop-Loc book-Acc a man-Gen having.chosen-Acc said  
 'Deniz said that a man [+Spec] chose the book at the bookshop.'

**Embedded Unergatives:**

- (13) Deniz [bahçede bir çocuğ\*(-un) gülümsediğin]i söyledi.<sup>9</sup>  
 garden-Loc a child-Gen having.smiled-Acc said  
 'Deniz said that a child [+Spec] was smiling/smiled in the garden.'

<sup>9</sup> Among my informants I found a variation in the verbs that require the genitive marker on the embedded subject, but there was always a group of classical Unergative verbs that maintained the







following the analysis put forth by Bresnan and Kanerva (1989; 1994).<sup>12</sup> This hypothesis can be examined by applying the RC strategies considered above. If the Locative DP is in fact the structural subject we would expect the SP strategy to be used when the Locative DP is relativized. If the Locative is an oblique argument we would expect the OP strategy.

Consider the existential sentence (18) and the relativization of the Locative DP:

**Existentials:**

(18) Bostanda danalar var.  
 garden-Loc calves there.are  
 'There are calves in the garden.'

(19) **SP Strategy:**  
 a. Op<sub>i</sub> e<sub>j</sub> danalar olan bostan<sub>j</sub> ...  
     calves be-SP garden  
 'the garden where there are calves'

**OP Strategy:**  
 b. Op<sub>i</sub> danalar\*(-ın) e<sub>j</sub> olduđu bostan<sub>j</sub> ...  
     calves-Gen be-OP-AgrN3 garden  
 'the garden where the calves are/were'

In (19a) we see that the Locative DP is relativized using the SP strategy, indicating that it is the structural subject; the existential argument remains unmarked for Case. It cannot be the Nominative since the subject has been extracted. The only other possibility is that it has Weak Case. However, if *danalar* is base generated as the external argument in Spec,VP it has a Genitive marker (to be checked in Spec,DP), forcing the presuppositional interpretation, and the Locative DP is relativized as an oblique argument using the OP strategy in (19b).

Let us attempt at this point to be more precise about what occurs in the process of what is known as 'Locative Inversion'. I propose that the Locative DP is base generated in Spec,VP with Locative (or locational Dative) Case iff an Unaccusative verb has a nonspecific internal argument which, because its discourse function is encoded in its linear position, cannot undergo movement to a Specifier position and become the external argument. Following the claim of de Hoop (1992:128) that in similar structures in Dutch the proposition is about the Location rather than about the existential argument, the Locative argument in (18)/(20)/(22) then raises to Spec,AgrP to have its Case checked as well as to contribute its  $\phi$  features for agreement. Consequently we see that the checking system for subjects includes not only the Nominative and Genitive Cases, but also the Locative and locational Dative. When the Locative argument is *pro*, we can

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<sup>12</sup> D.Pestesky proposed Locative Inversion to account for the data, confirming my previous thinking. This proposal was then passed on to G.Poole in an e-mail discussion of the draft of his work cited here.

say that the existential sentence is a predication of the domain of discourse.<sup>13</sup> The data are exactly the same for Unaccusatives and Passives (20) - (23)<sup>14</sup>:

**Unaccusatives:**

- (20) Bostana danalar giriyor.  
garden-Loc calves are.entering  
'There are calves entering the garden.'

**SP Strategy:**

- (21) a. Op<sub>i</sub> e<sub>j</sub> danalar giren bostan<sub>i</sub> ...  
calves enter-SP garden  
'the garden calves enter'

**OP Strategy:**

- b. Op<sub>i</sub> danalar\*(-m) e<sub>j</sub> girdiği bostan<sub>i</sub> ...  
calves-Gen enter-OP-AgrN3 garden  
'the garden that the calves are entering/entered'

**Passives:**

- (22) Hastanede kan verildi.  
hospital-Loc blood was.given  
'There was blood given at the hospital.'

**SP Strategy:**

- (23) a. Op<sub>i</sub> e<sub>j</sub> kan verilen hastane<sub>i</sub> ...  
blood be.given-SP hospital  
'the hospital where there is blood given'

**OP Strategy:**

- b. Op<sub>i</sub> kan\*(-m) e<sub>j</sub> verildiği hastane<sub>i</sub> ...  
blood-Gen be.given-OP-AgrN3 hospital  
'the hospital where the blood is/was given'

To ascertain if the appearance of the Locative argument in subject position is in reality a phenomenon that permits nonspecific DPs to remain contained within VP and thus maintain their existential interpretation, let us compare the above data with the

<sup>13</sup> Time expressions do not function as a 'Locative' argument in terms of relativization using the SP strategy. \*Adam-Ø gelen gün. 'The day when a man came.'

<sup>14</sup> It isn't only existential arguments that permit Locative subjects. It is clear that a subcategorized oblique object does not become the subject of the passive form of the verb since the Locative argument is relativized using the SP strategy: *garsonlara kızılan otel* 'the hotel where waiters are gotten angry at'; *adamlardan korkulan sokak* 'the street where men are feared'. Impersonal passives of intransitives always use the SP strategy when the Locative is relativized: *Denizde yüzülmez* 'In.the.sea one.doesn't.swim.' *Yüzülmeyen deniz* 'the sea where one doesn't swim'. The same is true of a few transitive verbs which appear to have undergone noun incorporation: e.g. bee sting, dog bite.

relativization strategies used for Transitives and Unergatives, which do not accept an existential argument as a logical subject, seen in (12) & (13).

### Transitives

- (24) Adam-Ø kitabevinde kitabı seçti.  
 man-Nom bookshop-Loc book-Acc chose  
 'The man chose the book at the bookshop.'  
 \* 'There was a man who chose the book at the bookshop'

#### SP Strategy:

- (25) a. \* Op<sub>i</sub> e<sub>j</sub> adam-Ø kitabı seçen kitabevi<sub>i</sub> ...  
 man-Nom book-Acc choose-SP bookshop  
 'the bookshop that chooses the book the man'

#### OP Strategy:

- b. Op<sub>i</sub> adam\*(-**im**) e<sub>j</sub> kitabı seçtiği kitabevi<sub>i</sub> ...  
 man-Gen book-Acc choose-OP-Agr3 bookshop  
 'the bookshop where the man is choosing/chose the book'

The Locative argument may not be relativized 'from' (or with) a transitive verb using the SP strategy in (25a), indicating that it does not occur as the external argument. The conclusion is then it is not generated in Spec,VP in (24) which would permit the logical subject to remain contained in VP and have an existential interpretation. The Locative may only be relativized as an oblique argument using the OP strategy (25b), whereby the subject has the Genitive marker and a presuppositional interpretation. The data are parallel for Unergatives:

### Unergatives:

- (26) Bahçede çocuklar-Ø gülümser.  
 garden-Loc children-Nom smile  
 'Children smile in the garden.'

#### SP Strategy:

- (27) a. \* Op<sub>i</sub> e<sub>j</sub> Çocuklar-Ø gülümsen bahçe<sub>i</sub> ...  
 children smile-SP garden  
 'the garden where there are children who smile'

#### OP Strategy:

- b. Op<sub>i</sub> Çocuklar\*(-**im**) e<sub>j</sub> gülümsediği bahçe<sub>i</sub> ...  
 children-Gen3 smile-OP-Agr3 garden  
 'the garden where the children smile(d)'

The Locative DP may only be relativized 'from' (or with) a sentence with an Unergative verb using the OP strategy.

Previously unexplained RC strategies can then be seen to line up precisely in terms of subject-object asymmetry. The Locative DP is the external argument in the event that an existential argument appears as the internal argument of an Unaccusative verb. It does not occur with Transitive or Unergative verbs. So to test for Unaccusativity in Turkish, it is enough to understand if relativization of the Locative DP

using the SP strategy is possible with that particular verb or not. If a sentence with an existential DP has no Locative argument, then presumably a *pro* occurs in Spec,AgrP following Sezer (1991), however rather than an expletive *pro* I propose that it is a Locative *pro* following the proposal of Comorovski (1991:92) and Freeze (1992:564).

The Turkish data on existential DPs pose a challenge for the analysis of Unaccusatives which says that the internal object must move into the subject position. An existential argument in Turkish is generated in a VP internal position without morphological Case. If it is the logical subject of an Unaccusative verb it does not undergo movement to Spec,AgrP to check off Nominative Case in a Spec-head relation. If it is the object of a transitive verb it does not undergo movement to a possible Spec,Agr-oP to check off Accusative Case in a Spec-head relation. It remains contained within VP where it is licensed by Weak structural default Case (de Hoop 1992). For Unaccusatives, the Locative (or locational Dative) DP is the structural subject which is generated in the external argument position in Spec,VP with Locative or Dative Case. In a matrix sentence it then undergoes movement to Spec,AgrP so that its Case may be checked and it may enter an agreement relation with the verb.

So we see the realization of the Extended Projection Principle (Chomsky 1981) which says that every sentence must have a subject, here an external argument. In the absence of an external argument with Unaccusative verbs, and since the existential argument must remain contained within VP to maintain its nonspecific interpretation, the Locative, possibly *pro*, takes on that role by filling the Specifier position.

## V. PRESUPPOSITIONAL SUBJECTS

The discussion of presupposition of the subject dates from Strawson's observation (1952:VI.III.7) that Aristotle's famous examples of contradiction, similar to (28), and tautology, similar to (29), do not necessarily hold up as such under scrutiny.

- (28) Every student did well and no student did well.
- (29) Somebody in this room smokes or somebody in this room doesn't smoke.

(28) is not a contradiction if there are no students and (29) is not a tautology if there is nobody in the room. Thus he concluded that a sentence of the form Q NP VP presupposes a non-empty set of individuals named by the NP.

However (30), (31), & (32) constitute counterexamples to Strawson's proposal:

- (30) 2 UFOs landed in my backyard.
- (31) At most 20 local calls from this number were recorded.
- (32) No phonologists with psych degrees applied for a job at our office.

Since sentences of the type indicated by these examples do not necessarily presuppose a non-empty set of individuals named by the NP, Strawson's analysis must be incorrect.

Milsark (1974; 1977) noted that some quantifiers can be ambiguous. He classified quantifiers into two groups: *strong* quantifiers such as 'every, all, each, most' which force a presuppositional interpretation and *weak* quantifiers such as 'no, two,

some, a, at most, at least' which may have two different interpretations, presuppositional or existential.<sup>15</sup> (30), (31), & (32) are examples of weak quantifiers that permit a non-presuppositional reading. When they occur with a DP in subject position their existential interpretation constitutes a counterexample to Strawson's proposal.

The ambiguity of weak quantifiers becomes even more transparent when different predicates are considered with the same DP; some predicates permit an existential interpretation while others do not. Note:

- (33) No phonologists with psych degrees are empiricists/available.

A subject DP with a weak quantifier and an individual-level predicate in (33) maintains the Strawsonian presupposition while the same DP with a stage-level predicate (32) does not. This paper considers the structures within which the stage-level vs. individual-level distinction may apply in Turkish. In a revision of Strawson's analysis Diesing (1992) draws on German and English data to analyze existential DPs as being located within VP, either at Spell-out or at LF. The Turkish data supply striking evidence in support of both Diesing's analysis and of Strawson's original proposal that a subject DP is always presuppositional.

Let's return to the counterexamples to Strawson's (1952) proposal that Q NP VP is always presuppositional. Under the analysis presented here, to obtain the existential interpretation the 'subject' DP in each of these counterexamples should be contained in VP in Turkish while the Locative argument should be in Spec,AgrP and hence a candidate for relativization with the SP strategy. And that is precisely what occurs. In (30) we can use the relativization of the Locative DP as a test for the Unaccusativity of the verb *in-* 'to land/descend'. In (30'b) we see that relativization of the Locative may use the SP strategy, indicating that the existential DP is **not** the subject, but the internal argument of an Unaccusative verb.

- (30) 2 UFOs landed in my backyard.

- (30') a. Bahçeme [iki UFO] inmiş.  
 my.garden-Dat two landed  
 '2 UFOs landed in my backyard.'

**Relativization of Locative with SP:**

- (30') b. Op<sub>i</sub> e<sub>j</sub> [İki UFO] inen bahçe<sub>j</sub> ...  
 two land-SP garden  
 'the garden where 2 UFOs landed'

The second counterexample to Strawson's proposal is a passive sentence (31). In terms of the Turkish data, it is no surprise that it too permits the Locative DP to occur as the external argument. This is demonstrated by the use of the SP strategy when the Locative

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<sup>15</sup> 'There is DP' in English may take a strong quantifier if it takes on a 'presentational' or list reading rather than an existential interpretation.

DP is relativized in (31'b), indicating the presence of an existential argument in a VP contained position.

(31) At most 20 local calls from this number were recorded.

(31') a. Bu numaradan [en fazla yirmi tane şehirçi görüşme] kaydoldu.  
 from.this.number at.most twenty local calls were recorded  
 'At most 20 local calls from this number were recorded.'

**Relativization of Locative with SP:**

(31') b. Op<sub>i</sub> e<sub>i</sub> [En fazla yirmi tane şehirçi görüşme] kaydolan numara<sub>i</sub>...  
 at.most twenty local calls were recorded-SP number  
 'the number from which at most 20 local calls were recorded'

The other counterexample, (32), is an Unergative verb, so we would expect that in Turkish the subject DP would be presuppositional rather than existential and that the Locative DP could not be relativized with the SP strategy. The data maintain these predictions.

(32) No phonologists with psych degrees applied for a job at our office.

(32) a. İş için ofisimize [psikolojiden mezun olan hiç bir fonolog] baş vurmadı.  
 work for to.our.office psychology-Abl degree.holding no one phonologist applied-Neg  
 'Not one of the phonologists with a psych degree applied for a job at our office.'  
 \* 'There are no phonologists with psych degrees who applied for a job at our office.'

**Relativization of Locative with SP:**

b. \* Op<sub>i</sub> İş için e<sub>i</sub> [psikolojiden mezun olan hiç bir fonolog] baş vurmayan ofis<sub>i</sub>...  
 work for psychology-Abl degree.holding no one phonologist apply-Neg-SP office  
 'The office where no phonologists with psych degrees applied for a job'

Thus the proposed counterexamples (30) & (31) to Strawson's hypothesis are not Ss of the form Q NP VP in Turkish but rather of the form Loc [VP [V' [Q NP] V]] and therefore do not constitute counterexamples to his proposal. The Turkish translation of (32) does not have the existential interpretation that the English sentence has. Thus the Turkish data overwhelmingly support Strawson's proposal that subjects are in fact presuppositional as well as Diesing's (1992) proposal that existential arguments are VP internal.

**VI. CONCLUSIONS**

But why can't a VP contained existential argument function as the subject in Turkish? Why must there be an external argument in Spec,VP/Spec,AgrP? The following tentative explanation could be proposed. If all Case marking is specific in Turkish, and we know that all subordinate sentences are Case marked then they are [+Spec]. If one assumes that the specificity of a sentence depends on the specificity of the subject (Csuri, p.c.), then it follows that the subject of all subordinate clauses must also be [+Spec]. Erguvanlı-Taylan (p.c.) has proposed that Turkish is an aspectual

language in the matrix as well as in the subordinate clause.<sup>16</sup> If this assessment of Turkish is correct, then the matrix clause also lacks the temporal element that Enç (1987) considers the point of reference or anchor for a proposition. The matrix clause has no clausal determiner AgrN, nor Case marking to give it its referentiality. I propose that in a language without tense some other strategy must be employed to anchor the proposition. In Turkish this anchor is supplied by the specificity of the matrix subject which is thus a requirement for the sentence to be interpreted. Since specificity renders an expression referential, then the fact that an argument in Spec,VP/Spec,AgrP is obligatorily presuppositional is only natural for a language lacking tense. Thus, in aspectual languages of the same type as Turkish, only structures which permit a logical subject DP contained in VP may have an existential 'subject' together with a Locative DP (possibly *pro*) which has moved into Spec,AgrP.

The analysis presented here which seeks to demonstrate the importance of presuppositionality (D-linking) in an aspectual language is in keeping with Tsai's (1992) statement that Chinese, another aspectual language, is a "D-linked oriented language". He bases this conclusion on the fact that *wh*-Operators in Chinese, a *wh* 'in situ' language, may be licensed by D-linking. How far this parallel can be drawn to Turkish awaits further research. However Turkish also seems to rely on D-linking or presuppositionality as a licensing factor in a way that English and Romance do not.

So what then is the striking difference between English and Turkish? As was seen in (32), the strategies for altering the set of presupposed beliefs shared by the speaker and the listener are different in the two languages. In English it is possible to state: *I believe a Republican will win the election*, thereby asserting the existence of a Republican by that statement. In other words the English sentence may have either the interpretation *I believe one of the Republicans will win the election* or *I believe there is a Republican who will win the election*, thus asserting the existence of a Republican. However this assertive capacity does not exist in the parallel Turkish sentence. Using the normal subordination strategy, a Turkish speaker may not make the same assertion and thus may not affect the set of presupposed beliefs as an English speaker may. S/he may only discuss as the subject of a sentence the pre-established sets of individuals in the world of discourse when using a Transitive or Unergative verb as seen in (34).

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<sup>16</sup> The analysis of tense on the matrix S is based on the interpretation of the past tense morpheme, *-dl*. However this morpheme can also appear immediately affixed to a DP *Kadın-ıdl* lit. 'Woman-was'. Since \*[tense+nominal] (Higgenbotham 1992) *-(I)dl* cannot be tense. It has been argued that a proposition without a tense morpheme can still demonstrate tense effects in some Creole languages. However this is not the case for Turkish since all propositions, including RCs, are transparent, supporting the proposal that there is no tense argument.

- (34) a. [Bir cumhuriyetci\*(**nin**) seçimi kazanacağını]ı sanıyorum.  
 one/a Republican-Gen election-Acc will.win-Acc I.believe  
 'I believe a Republican (i.e. one of the Republicans) will win the election.'  
 \* 'I believe there is a Republican who will win the election.'
- b. [Seçimi bir cumhuriyetci\*(**nin**) kazanacağını]ı sanıyorum.  
 election-Acc one/a Republican-Gen will.win-Acc I.believe  
 'I believe a Republican (i.e. one of the Republicans) will win the election.'  
 \* 'I believe there is a Republican who will win the election.'

The immediately preverbal position is where new information is presented, i.e. the Focus position. It makes sense then that it is a VP contained position that is used to introduce a new element into the world of discourse.

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## THE SYNTAX OF THE P-FOCUS POSITION IN TURKISH

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### Abstract

In Turkish (a SOV language) the discourse function of an element is mapped onto a linear representation; hence we see the emergence of a discourse function interface. Focused elements are analyzed here as derived predicates (drawing on Herburger 1995) which require contiguity with the verb, motivating their immediately preverbal position. A subclass of Focused elements, call it P-Focus, only have a cumulative reading with respect to the subject, that is no scope distinction whatsoever. This natural class minimally includes nonspecific object DPs, defined here as the existential quantification of a free-choice partial function, and interrogative Wh-exps, a nonspecific plus a Q feature. P-Focus elements are then existential quantifiers and therefore undergo movement to an adjoined position, in Turkish in the overt structure. Call that position 'F'. It is shown in this paper that in Turkish the verb is in I° and that the subject remains in Spec,VP such that 'F' can be analyzed as rightmost adjoined to VP, maintaining an m-command relation with the subject, resulting in no scope effects. Thus the discourse interface (here Focus) and principles of interpretation (quantification) interact with the

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derivational economy principles in mapping sentential elements onto the syntactic structure.

## INTRODUCTION

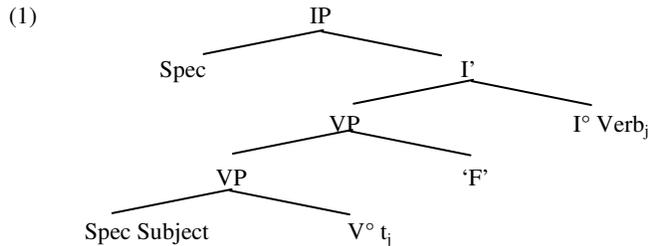
Turkish is a discourse configurational language where the discourse function of an element is mapped onto a linear representation; thus we see the emergence of a discourse function interface. This paper will show that the discourse interface (here Focus) and principles of interpretation (interrogative and quantification) interact with the derivational economy principles in mapping elements onto the syntactic structure. Turkish is a SOV head final language where a Focused element, roughly 'new information', appears immediately preverbally (Erkü 1982).<sup>1</sup> Drawing on Herburger (1995), Focused elements are analyzed here as derived predicates, which require contiguity with the verb. Though the subject normally takes wide scope over arguments to its right, a sub-class of Focused elements, call it P-Focus, show an absence of scope construals with respect to the subject. This class minimally includes nonspecific object DPs (NODP),<sup>2</sup> defined here as the existential quantification of a free-choice partial function whose domain is the set described by the NP, and interrogative *Wh*-exps (*Wh*-Q),<sup>3</sup> a nonspecific plus a Q feature. The NODP is morphologically explicit in Turkish in the absence of the usual Accusative Case marker, indicated by <@>. P-Focus elements are then existential quantifiers and hence undergo movement to an adjoined position, in Turkish in the overt structure. In order to derive their predicate role P-Focus elements must also be contiguous with the verb, while the verb is in I°. Call the position(s) that host(s) these elements 'F'. The standard form of adjunction under current linguistic theory is Quantifier Raising (QR) at the level of Logical Form (LF). Under QR, quantified NPs raise to adjoin to IP or VP (May 1985) to be interpreted. Thus movement to adjunction is an alternative in Universal Grammar to the feature-checking system of Chomsky (1995:377). Since the subject remains in Spec,VP then 'F' can be analyzed as rightmost adjoined to VP, sketched in (1). Assuming May's (1985) analysis of segments, 'F' and the subject mutually m-command (Chomsky 1986:8) each other, accounting for the absence of scope.

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<sup>1</sup> The head of a RC is to the right and there are postpositions rather than prepositions.

<sup>2</sup> It has been proposed there are no nonspecific subjects in Turkish (Kennelly 1997). Turkish speakers vary in their judgments wrt obliques so that discussion will have to wait for further research.

<sup>3</sup> Drawing on Baker (1970), Cheng (1991:19) draws a correlation between the presence of a Q particle in a language and the absence of *Wh*-movement. However Turkish has a yes-no Q particle, *mi* and *Wh*-movement is to the Focus position, first noticed by Güliz Kuruoğlu (p.c.). Turkish is then a counterexample to Cheng's analysis.



Section I considers the scope construals and distribution of *Wh*-Qs and NODPs, motivating 'F' and P-Focus. Then the linear component in terms of verb contiguity is considered in Section II. 'F' as adjunction to VP is supported in Section III while the VP internal subject is motivated in Section IV. Section V examines the adjunction analysis in the iteration of 'F', the scope construals of quantified VP adverbs, and the inability to extract from 'F'. Section VI addresses the problematic order of P-Focus elements, discounting Case Licensing and Incorporation for the adjacency constraint on NODPs. Section VII summarizes the issues.

## 1. MOTIVATION FOR POSITION 'F' AND P-FOCUS

In Turkish there is no covert QR such that the overt structure is the LF for quantification.<sup>4</sup>

- (2) Genç bir doktor her hastayı tedavi etti.<sup>5</sup>  
 young a doctor every patient-Acc treated  
 'A young doctor treated everyone.' [adapted from Göksel 1995]  
 [there is one young doctor such that s/he treated each of the individuals]  
 \* [for each of the individuals, there is a young doctor such that s/he treated that individual]

In (2) there is unambiguously only one doctor and the immediately preverbal argument has no scope with respect to the subject. That is the universal quantifier does not have a quantificational interpretation with a distributed reading of the preceding argument. A discussion of (2) in terms of its role as a Focus structure lies beyond the scope of this paper.

In sharp contrast, *Wh*-Qs and NODPs obligatorily appear left-verb adjacent and

<sup>4</sup> The problem of linearity vs. hierarchy was first brought to my attention by Aslı Göksel of SOAS, London and Boğazici Üniv, Istanbul. The analysis that there is no covert QR in Turkish predicts that any ambiguity is due to other factors. This is supported by the work of Göksel (1995) and by the analysis of ambiguity due to Incorporation in (34).

<sup>5</sup> Like the German *ein*, the unstressed form of *bir* is the indefinite determiner while the stressed form is the number 'one'; only the unstressed form is considered here. The determiner interpretation is forced when an adjective appears before *bir* while the cardinal interpretation is forced if an adjective appears after *bir*.

demonstrate no scope construals wrt the subject, indicating that they reside in a mutual m-command relation, which I propose results from their position in 'F'.

- (3) a. (Bu) Üç çocuk kimleri gördü? <sup>6</sup>  
 this 3 child who-pl-Acc saw  
 'Who did the(se) 3 children see?'  
 [who are the individuals such that 3 children saw them]  
 [for each of 3 children who did they see]
- b. Deniz'i ve Ufuk'u. [answer to (3a)]  
 Deniz-Acc and Ufuk-Acc
- c. Deniz Ufuk'u, Uğur Ümit'i ve Remzi'de Ahmet'i gördü.  
 Ufuk-Acc Ümit-Acc and Remzi-also Ahmet-Acc saw  
 Deniz saw Ufuk Uğur saw Ümit and Remzi saw Ahmet.' [answer to (3a)]

Scope construals of interrogatives are disambiguated in their possible answers. In response to (3a) either (3b) or the pair-list response in (3c) is a felicitous response, indicating an absence of scope between the subject and the *Wh*-Q in Focus position.

The preverbal *Wh*-exp that is not in the Focus position is translated as a cleft construction in (4a) and is strongly marked in Turkish, even ungrammatical for some speakers.

- (4) a. ?\*Kimi üç çocuk gördü? [a simple request for information]  
 who-Acc 3 child saw  
 'Who is it that the 3 children saw?'
- b. \* Üç çocuk gördü kimi? [totally unacceptable]

The immediately preverbal *Wh*-Q may take prosodic prominence or marked contrastive stress, whereas in other positions it obligatorily takes marked contrastive stress. Cheng (1991:19,58) discusses cross-linguistic data that support an analysis of base-generated sentence initial *Wh*-exps which result in a *Wh*-cleft construction as well as the scrambling or 'Topicalization' of *Wh*-exps to an initial position. These are distinct from *Wh*-fronting to obtain an interrogative interpretation. Cheng's analysis is in keeping with Horvath's (1986:118) proposal for UG that an interrogative interpretation can be derived only if the *Wh*-Q Op bears the feature Focus, which in Turkish is obtained in the left-verb adjacent position. The *Wh*-exp in the postverbal position in (4b), reserved for backgrounded information which remains unchanged as long as the context is constant, is infelicitous.<sup>7</sup>

<sup>6</sup> When numerals are used the noun occurs in the singular and the verbal agreement is 3 singular. When the subject has the 3 plural form, as in (7), it is normal to omit the plural marker on the verb. The nominal and verbal plural morphemes are homophonous so the repetition is usually considered redundant.

<sup>7</sup> The infelicity of sentences like (4b) is attributed by Göksel (1995) to the fact that postverbal constituents in Turkish are de-stressed, while *Wh*-Qs may not be; i.e. that the motivation for the absence of postverbal *Wh*-Qs is found in the prosody. I would rather suggest that there is some

Thus it is clear that in Turkish the linear position of an element plays an integral role in its interpretation and that there is a left-verb adjacency constraint on straightforward *Wh*-Qs.

Turkish is also a 'scrambling' language (Kural 1992) in that the arguments may appear in any order, though any order other than SOV is marked.<sup>8</sup> Consider the hypothesis that the *Wh*-Q in (3) is in its base generated position. Then we wouldn't expect to find adverbials base generated in the same position. In contrast with argument *Wh*-Qs in English, adverbial *Wh*-Qs are ungrammatical *in situ*.

- (5) a. \* Who arrived why?  
 b. Why did who arrive?

The conclusion is that they obligatorily undergo overt *Wh*-mvt. to a position that takes scope over the sentence. In Turkish they obligatorily appear in the immediately preverbal position.

- (6) a. Murat nereye gitti?  
           to.where went  
       'Where did Murat go?'  
 b. \* Nereye Murat gitti?  
       to.where went  
       'Where did Murat go?'

[Erguvanlı 1984:35 eg.92]

Horvath's proposal together with (3) and (6) support the hypothesis that a *Wh*-Q in 'F' a) undergoes movement and b) is in a mutual m-command relation with the subject.

NODPs, like *Wh*-Qs, occur left-verb adjacent where they may show wide scope effects wrt the subject:

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kind of semantic type mismatch: backgrounded information is never affected by the proposition while a *Wh*-Q is, and consequently it is this mismatch that is reflected in the prosody.

<sup>8</sup> Specific indefinite objects are generally infelicitous in the Focus position. This constraint can be overridden if there is a clear relation between the specific indefinite and a previously introduced DP. This is seen in (i) in that the subject introduces a profession to which the specific indefinite has a relation. An unrelated specific indefinite, as in (ii) is ungrammatical.

- (i) Şu tamirci bir arabayı tamir etti.  
       that mechanic a car-Acc repaired  
       'That mechanic repaired a (specific) car.'  
 (ii) \*/?Şu tamirci bir elmayı yedi.  
       that mechanic an apple-Acc ate  
       'That mechanic ate a (specific) apple.'

This fact clearly indicates a functional interpretation for Focused specific indefinites which entails a relation with an element in the discourse.

- (7) a. Üç çocuk/Çocuklardan üçü yeni bir araba-@ almış.<sup>9</sup>  
 3 child/of.the.children 3 new a car-@ bought  
 'Three (of the) children bought a new car.'  
 (a new car is such that 3 (of the) children bought it)  
 \* (each of 3 (of the) children bought a new car)
- b. \* Yeni bir araba-@ üç çocuk/çocuklardan üçü almış.
- c. # Üç çocuk/Çocuklardan üçü taze bir çekirdek-@ yemiş.  
 3 child/of.the.children 3 fresh a sunflower.seed-@ ate  
 'Three (of the) children ate a fresh sunflower seed.'  
 (a fresh sunflower seed is such that 3 (of the) children ate it)  
 \* (each of 3 (of the) children ate a fresh sunflower seed)

Unlike its English counterpart, (7a) is unambiguous: there is only one car, indicating a wide scope construal of the NODP. (3c) has demonstrated that the subject '3 NP' does not have an intrinsically collective interpretation. However if the subject cannot be treated collectively, as in (7c) where it is impossible for 3 (of the) kids to eat a unique sunflower seed, the sentence is anomalous. (7b) indicates that NODPs are obligatorily left-verb adjacent in the written language, patterning with *Wh-Qs*. Furthermore, the absence of ambiguity in (7) supports the proposal that there is no covert QR at LF in Turkish.

The wide scope construal in (7) is in fact a cumulative interpretation (Scha 1984) of both arguments, resulting from an absence of scope between the subject and the NODP, clarified in (8):

- (8) Üç kız üç sepet-@ kaldırmış.  
 3 girl 3 basket-@ lifted  
 '3 girls lifted 3 (nonspecific) baskets.'  
 Cumulative reading: <girl x, basket y>: x lifts y, |x| = 3, |y| = 3

The only available reading in (8) is cumulative whereby it is not at all clear how many of the girls lifted which of the baskets. Informants offered that one possible interpretation is that there is a one-to-one relation between the three girls and the three baskets, positing that cumulativity subsumes a constrained form of distribution, i.e. that 'det NP' cannot be regarded as a lattice sum of individuals under cardinality. The scope facts are not ambiguous: the distributed reading which would result in either 9 baskets or 9 girls does not obtain.

In conversation NODPs may occur postverbally, where verb adjacency isn't required but a determiner is.

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<sup>9</sup> Though the partitive acts like a strong determiner on the object in that it requires the specificity marker in the form of Accusative Case marking, in the subject position it patterns with the weak determiners in that it is nonquantificational, thereby supporting de Hoop's (1992) analysis that partitivity is independent of definiteness.

- (9) Bu adamlardan kaç *görmüş* dün \*(bir) film-@? [only discourse]  
 these men.of how.many saw yesterday a film-@  
 'Of these men how many saw a film yesterday?' [Göksel 1995:21 #27a]

The backgrounded NODP<sup>10</sup> is highly marked in Turkish, while the left-verb adjacent Focus position is unmarked, as in (7)/(8). (9) clearly demonstrates that Case Licensing is irrelevant to the left-verb adjacency constraint for NODPs, thereby supporting de Hoop's (1992) analysis of Weak Case for NODPs in Turkish.

The data in (2)-(9) have prompted the proposal of a position 'F' which is rightmost adjoined to VP, as shown in (1), and which minimally hosts *Wh*-Qs and NODPs. 'F' hosts the Accusative *Wh*-Q-exp (3a), the Dative *Wh*-Q-exp (6a) and the 'Weak' Case for NODPs (7)/(8). Surely all these elements are not base generated in the same position; thus there must be movement to 'F'. The absence of scope of the Focused *Wh*-Q and NODP wrt the subject stems from the interaction of linearity and hierarchical structure in relation to quantificational interpretation.

## 2. THE LINEAR COMPONENT

In Turkish there is evidence that the LF for quantification is the overt structure. Since it is a head final language, the verb moves to the right under head movement to check the strong inflectional morphology. If one issue for 'F' is contiguity with the verb, then in order to move to an adjoined position, the Focused element would also have to move to the right. So it is crucial to ascertain if verb adjacency is at stake. Cross-linguistically the *wh*/Focus position is consistently verb adjacent: Hungarian (Szabolcsi 1981:143; Horvath 1986; Brody 1990), Aghem (Rochemont 1986:19), Georgian (Nash 1995) and Basque (Rebuschi 1983; Ortiz de Urbina this vol).

According to Chomsky (1971:199) "...the Focus is the predicate of the dominant proposition of the deep structure". In the following discussion it is assumed that the verb (predicate adjective/noun/PP<sup>11</sup>) is the natural predicate of an assertion, and hence, in Chomsky's terms, that it is the natural or 'neutral' Focus. When an element other than the verb is Focused, Chomsky doesn't mention how it becomes the predicate; what mechanism is at work. Nor does he elaborate on what the status of the verb is when an argument is Focused, i.e. is the verb then a 'secondary' predicate, is it relieved of its status as the predicate, or is there a verb-Focus predicate complex? I propose that the

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<sup>10</sup> According to de Hoop's (1992) analysis, an argument with Weak Case, the NODP in Turkish, may move into any A-bar position. I will modify her analysis by claiming that it may move into an A-bar position as long as occurrence in that position is consonant with its interpretation. As brought out in Chierchia & McConnell-Ginet (1991:282) a nonpresupposed element, that is new information, may also be backgrounded, seen in English in a nonrestrictive relative.

Non-specific arguments are taken to be new information and hence nonpresupposed. So they may occur either in the 'new information' Focus slot, left verb adjacent in Turkish, or backgrounded postverbally.

<sup>11</sup> The discussion may be generalized to other lexical elements (Williams 1980:208) that may function as the predicate.

motivation for i) the verb adjacency constraint and ii) the adjoined position 'F' are distinct: i) the Focused element needs to derive the role of predicate from the verb to be interpreted as 'Focus'; call it 'predicate derivation'. That is, given that the natural predicate of a sentence is the verb, if another element is to become the predicate it must derive that role from the verb; in Turkish the crucial factor is contiguity. ii) P-Focus elements are existential quantifiers which require movement to an adjoined position for interpretation.

Consider the adjacency constraint. A sentence can be taken as a description of an event such that the verb is not a direct predicate of the individuals denoted by the subject but rather it is a predicate of an event while the subject is a participant in that event (Davidson 1967; Parsons 1990). Then the arguments have a relation to the event through their theta-roles, as exemplified in (10).

- (10)  $\exists(e)[\text{Lee}(e,\text{agent}) \ \& \ \text{hugged}(e) \ \& \ \text{Kim}(e,\text{theme})]$   
 'There was a hugging by Lee of Kim.'

Herburger (1995) notes that this representation of the structure of a sentence may include the restriction of the existential quantification over events, and consequently the Restrictor of the Event Operator is distinguished from the Matrix. I am assuming that in a 'neutral' sentence the Matrix of the Event Operator is the verb, the natural predicate.

- (11)  $\exists(e)[ \text{Restrictor}[\text{Lee}(e,\text{agent}) \ \& \ \text{Kim}(e,\text{theme})] \ \text{Matrix}[\text{hugged}(e)]]$

Herburger then proposes that Focus structures the quantification over events such that the Focused element is the Matrix of the Event Operator. If we link her proposal with Chomsky's then we have (12).

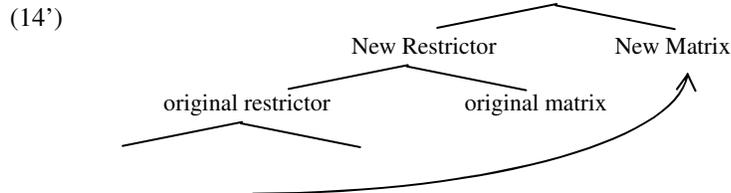
- (12) Predication:  
 The predicate of a sentence is the Matrix of the Event Operator.

If the theme is a NODP, which is P-Focused unless marked as backgrounded, we get a representation of the structure of the sentence where the Matrix of the Event Operator is now the theme and the verb constitutes part of the restrictor:

- (13)  $\exists(e)[ \text{R} [\text{Lee}(e,\text{agent}) \ \& \ \text{hugged}(e)] \ \text{M} [\text{a child}(e,\text{theme})]]$  [first attempt]

Perhaps a more precise way of analyzing the step from (11) to (13) (D. Lebeaux p.c.) is to identify it as a form of raising of the Focus element, leaving the original Matrix as the matrix of the Restrictor, shown in (14) and (14'). This is what occurs in the syntax under adjunction to obtain interpretation by the P-Focus element(s). Note that this is not a one-to-one mapping onto the syntactic structure since the adjunction site there remains verb internal.

(14)  $\exists(e)[R[R[Lee(e,agent)]M[hugged(e)]]M[a\ child(e,theme)]]$ [final form]



It is the re-organization of the structure of the sentence that occurs under predicate derivation. That is, assuming that the natural Matrix of the Event Operator is the verb, the restructuring of the sentence to a Focus structure where the Focused element is the Matrix requires a process which I have termed 'Predicate Derivation'.

(15) Predicate Derivation:  
 Predicate Derivation restructures the sentence such that the role of Matrix of the Event Operator is shifted from the original predicate to another element.

Focus is then a constraint on predicate derivation whereby the Focus element is the derived predicate while the verb, in the restrictor, is the event variable in the sentence, in Parson's terms the predicate of the event. In Turkish, as in many languages, there is a syntactic constraint on predicate derivation that requires contiguity at Spell-Out.

(16) Condition on Predicate Derivation in Turkish  
 Predicate Derivation occurs from a predicate head H to an element in position P iff  
 a) H c-commands the element in P;  
 b) the relevant branches are both either left or right-branching; and  
 c) there are no intervening elements.

Notice that the stricter form of government, c-command, is used here rather than the m-command relation that is relevant for the subject/P-Focus element. The Focus elements that of themselves occupy 'F' are labeled P-Focus, a natural class.

(17) P-Focus - a Natural Class [following Cheng (1991)]:  
 P-Focus is the set of elements that minimally contains *Wh*-Qs and Nonspecific Object DPs.

Drawing on the work of Hamblin (1973), Karttunen (1977), Cheng (1991), Rebuschi (1994), Kratzer (1995), and Reinhart (1995) I propose that the *Wh*-Q is the existential quantification of a free-choice partial function where the range is a subset of the domain. The domain is defined by the *Wh*-Q itself (*who* operates on the domain of people) and by

the context, while the range argument remains undefined due to the Q feature. Cross-linguistically, the nonspecific is frequently either homophonous with the *Wh*-Q or has one additional morpheme (Cheng 1991:80). This has led Cheng to propose that the *Wh*-Q is itself without quantificational force (p.84). Another way to capture that idea is my proposal that the additional morpheme found on the nonspecific is the representation of the range argument of the free-choice function while the Q feature of the *Wh*-Q precludes the realization of that argument. That is, there is a choice function and there is a domain but the mapping onto a range argument is not operative.

The analysis of *Wh*-Qs as predicates patterns with Pearson's (1996) analysis of Malagasy. Furthermore, in Japanese there is an optional scope taking particle that occurs in the presence of the *in situ Wh*-Q. Watanabe (1992:19) has proposed that the particle is right adjoined to VP, which is consistent with this analysis of 'F'.

### 3. THE POSITION 'F'

Since 'F' is left-verb adjacent, it is crucial to establish the position of the verb. Following Chomsky (1986:6) I assume that all adjunction is to XP rather than X', and that all adjuncts are base generated in an adjoined position and remain in that position (Pollock 1989). Hence they are crucial in disambiguating verb movement and the position of arguments. Sentential adverbs adjoin to IP while VP adverbs adjoin to VP (Jackendoff 1972:106). In Turkish, sentential adverbs seen in (18) occur postverbally without a pause. A pause would lead to an analysis in which the postverbal elements were extraposed. Its absence indicates the reverse. (18) then supports right-adjunction.

- (18) Deniz filmi çevirdi galiba/bile/zaten.  
           film-Acc turned probably/even/anyway  
           'Deniz probably/even made the film.'  
           'Deniz made the film anyway.'

In contrast, VP adverbs may not occur postverbally without a pause, indicating that the verb is higher than VP.

- (19) \*Deniz filmi çevirdi hızla/aceleyle.  
           film-Acc turned quickly/urgently  
           'Deniz made the film quickly/urgently.'

Distinct morphology for number and person as well as aspect/tense, termed 'strong' morphology, has been cited in cross-linguistic studies (Pollock 1989; Vikner 1991:134) as the driving element for verb movement to I°. Turkish strong inflection then provides the motivation for the head movement of the verb to I°.

There is no evidence of a CP category in Turkish since there is no lexical complementizer in the language, subordination is in terms of DP (Kennelly 1990) and

there is no *Wh*-fronting in the usual sense, as seen in (4)/(6).<sup>12</sup> Consequently it is assumed that at Spell-Out the verb resides in I° rather than higher up. This analysis is in the spirit of Chomsky (1995) whereby a derivation is structure building such that the only structure that exists for a given sentence is that necessary for its derivation, and also in the spirit of Grimshaw's (1997) claim that there are no useless projections.

The preverbal position for the NODP is an A-bar position, which cannot act as an A-binder in a binding relation but is interpreted *in situ* for A-binding purposes, as seen in (20).

- (20) \* Kendi bir hasta-@ öldürmüş.  
       self a patient-@ killed  
       'Self killed a patient.'

When it occurs preverbally the NODP occupies an A-bar position that is left-adjacent to the verb in I°, providing further support for the adjunction analysis for 'F'. It is claimed here that movement occurs for interpretation. In addition, contiguity with the verb of Focused elements is imposed to obtain predicate derivation, forcing rightward movement of the P-Focused elements in a head final language. The condition on interpretation and the overtness of the logical structure feed the discourse interface in the mapping of P-Focus elements onto the syntactic structure.

#### 4. THE SUBJECT IN SPEC,VP

The distinction between final sentential adverbs and ungrammatical VP adverbs in (18)/(19) indicates that the verb has undergone head movement to the category above VP, I°, where it governs the arguments internal to VP. It is assumed that all arguments, including the subject, are base-generated internal to VP. This analysis also claims that the subject remains in its base generated position in Spec,VP where it is governed by the verb. The proposal that all arguments may remain within VP has been made by Jackendoff (1977) for English, as well as by Brody (1990) and Kiss (1994) for Hungarian; Haider (1985) and Diesing (1992) for German; de Hoop (1992) for Dutch; Costa (1996) for Portuguese and Pinto (1994) (among others) for Italian. Traditionally Nominative Case is checked in Spec,IP by Tense within a Spec-Head checking relation. Koopman and Sportiche (1988:17) propose that while Tensed INFL assigns (checks) Nominative Case in English by agreement in a Spec-Head configuration, forcing the external argument DP to raise to Spec,IP, Tensed INFL in Arabic, Irish and Welsh can assign Case structurally, under government, permitting lexical DPs to surface in Spec,VP iff the verb is in I°.

Since the Turkish verb is in I°, under the Koopman/Sportiche analysis, government licensing of the Nominative in Spec,VP is then possible. From I° the verb governs Spec,VP. It is then predicted that a sentential subject should be transparent to

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<sup>12</sup> There is the Persian loan word *ki* 'that' which triggers SVO word order but it is unintegrated into the language. Native speakers tell me that it is primarily used by Türks who grew up in a bilingual environment, such as the Türks who were born in Germany.

extraction by relativization and this is attested. It is shown that if a quantificational determiner appears on the subject DP it then takes wide scope over the NODP, indicating a distinction between subjects in Spec,IP and those in Spec,VP. This is clearly an overt form of Quantifier Raising which follows Woolford's (1994) Principle of Exclusion in that quantified subject DPs are excluded from a VP internal position. The position of subject DPs can best be explained in terms of quantification, as proposed by Diesing (1992:4), with nonquantificational determiners in Spec,VP where they are governed by the verb.

#### 4.1 Turkish Subjects Behave Like Complements Rather Than Adjuncts

In English sentential subjects behave like adjuncts in that they are islands to extraction, here relativization, while complements are not:

- (21) \* The patient<sub>i</sub> who<sub>i</sub> [[ t<sub>i</sub> would eventually recover] is extremely doubtful] walked out of the hospital.
- (22) The patient<sub>i</sub> who<sub>i</sub> [John thought [ t<sub>i</sub> would eventually recover]] walked out of the hospital.

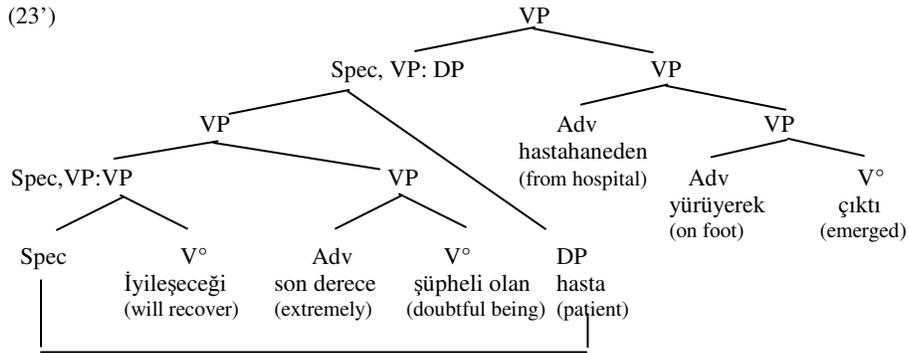
The distinction in (21)/(22) can be attributed to the ECP which roughly states that a trace must be properly governed. *Proper* government is either a) theta-government, government by a theta-marking element, or b) antecedent government. The latter has the effect of imposing a locality condition (Chomsky 1986). Thus objects are transparent to long distance extraction while subjects are not and theta-government is the crucial difference.

A subject in Spec,VP is also theta-governed and hence it behaves as an object rather than as an adjunct. The mechanism that is used to describe government of a Specifier position is grounded in the idea of *L-marking* (Chomsky 1986). The effect of *L-marking* is transparency to extraction. *a* *L*-marks *b* iff *a* is a lexical category that theta-governs *b* and they are in a sisterhood configuration. Chomsky continues (p.24) that if *a* *L*-marks *b*, then it also *L*-marks the Specifier of *b*. Although I° cannot *L*-mark VP because INFL is not lexical, once the verb has moved to I° the V+I complex can. The result is that Spec,VP is *L*-marked while Spec,IP is not. Koopman and Sportiche (1988) make use of this analysis to propose that a sentential subject that is not an island to long distance extraction must then be in Spec,VP. In English the subject obligatorily moves to Spec,IP where it is an island; i.e. it behaves like an adjunct, as in (21).

Sentential subjects are not islands in Turkish, as seen below. Under the above analysis the sentential subject must then be located in Spec,VP where it is *L*-marked by the verb in I°.

**Relativization out of a sentential subject:** [Ex. from Sezer 1982:2]

- (23) [[ t<sub>i</sub> İyileşeceği] son derece şüpheli olan] hasta; hastaneden yürüyerek çıktı.  
 will.recover extremely doubtful being patient from.hospital on.foot emerged  
 'The patient, whose (will be) recovering is extremely doubtful, walked out of the hospital.'



(23) is the Turkish equivalent of (21) and it is grammatical. It has been argued that Turkish relativization does not involve movement. If that were the case then there should also be relativization out of an adjunct clause. This is not attested, as seen in (24).

- (24) \* [[Ayşe t<sub>i</sub> kırdığı] için] Ahmet'in bağırdığı] bardak;...  
 broken for Ahmet's yelled glass  
 'the glass that Ahmet yelled because Ayşe broke (it)...' [Kural 1994: 5 eg.6]

Thus the relativization out of the sentential subject indicates that the subject is governed by the verb and hence that it is in Spec,VP. A similar proposal has been put forth by Haider (1985) for German where extraction is possible out of sentential subjects. He concludes that the subject in German remains within VP unless it is scrambled.

**4.2 Contrast with Quantified Subjects in Spec,IP**

When a necessarily quantificational determiner appears on the subject DP of the matrix clause the result is a wide scope construal with respect to the NODP.

- (25) Herkes yeni bir araba-@ almış.<sup>13</sup>  
 everyone new a car-@ bought  
 'Everyone bought a new car'  
 \* (a new car is such that everyone bought it)  
 (each one bought a new car)

In English existential sentences are distinguished by the fact that the logical subject remains internal to VP due to the fact that *there* occupies Spec,IP. Thus the determiners that cannot appear on the logical subject of existential sentences in English are those that cannot remain internal to VP. It is only *her* 'each' that is necessarily quantificational in subject position in Turkish where it takes a wide scope construal over the NODP, as seen in (25). It then adheres to Woolford's (1994) Principle of Exclusion from VP, based on quantification as suggested by Diesing (1992:4), and undergoes an overt form of Quantifier Raising in subject position. In this case it does not adjoin to IP, as in classical QR. I propose that it undergoes Spec-to-Spec movement from Spec,VP to Spec,IP under a quantificational interpretation. The distinction between the scope construals in (7)/(8) and (25) provides striking evidence that the subjects in (7)/(8) remain in Spec,VP where they are in a mutual m-command relation with the NODP, as predicted by the proposal. The analysis presented here is that raising to adjunction occurs to obtain the interpretation of the P-Focus existential quantifiers. At the same time QR is analyzed here as overt Spec-to-Spec movement. Clearly the use of the adjunction strategy for rightward Focus movement does not preclude overt QR to a Spec position. (25) is also further evidence that the NODP may be distributed.

To recap what has been brought to light so far: The LF and the discourse function are read off the overt structure. The requirement that Focused elements be verb adjacent is motivated by predicate derivation. The verb is in I°. P-Focus, that is the minimal set of *wh*-Qs and NODPs, are left-verb adjacent and have no scope relation wrt the subject in Spec,VP. They require an adjoined position to obtain the interpretation of existential quantification as well as contiguity with the verb.

## 5. ARGUMENTS FOR ADJUNCTION

There are four arguments in favor of the analysis that 'F' is right-most adjoined to VP and one against it. In favor are: i) Multiple occupants of 'F' have ambiguous scope; ii) VP adverbs have ambiguous scope readings wrt elements in 'F'; iii) Extraction out of 'F' is ungrammatical; iv) Movement to adjunction obviates the need for feature checking. The argument against adjunction is that it is difficult to explain the strict order of *Wh*-Qs wrt NODPs in 'F' in terms of adjunction.

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<sup>13</sup> It has been proposed here that *Wh*-Qs and NODPs both occupy the P-Focus position, right-adjoined to VP. We would then expect them to interact with the distributive *her* 'each' in subject position similarly, which is not attested. The *Wh*-Q retains a wide scope construal over the subject. However the impossibility of quantifying into an interrogative has been widely attested cross-linguistically, with the striking exception of English, so it is not a problem specific to this analysis.

### 5.1 Iteration of 'F'

The first argument in favor of the adjunction analysis is grounded in the theory of segments. Chomsky (1986:7) adopted May's (1985:34) analysis for adjunction structures: two adjoined elements mutually c-command each other and hence govern each other iff there is no maximal projection boundary between the two, where a  $X^{\max}$  boundary crucially dominates all segments of XP. Consequently, adjoined elements to XP are free to take any type of relative scope relation.

In Turkish, multiple *Wh*-Qs line up adjacent to one another with the rightmost left-verb adjacent. Their order is reversible and they have ambiguous scope construals with respect to each other - that is, whatever the order of *Wh*-Qs, the same question is being asked. This is taken to indicate that they are all in 'F'.

- (26) a. Bu şehirde kim kimi arıyordu?  
in.this.city who-Nom who-Acc was.seeking  
'Who was looking for who in this city?'
- b. Bu şehirde kimi kim arıyordu?  
in.this.city who-Acc who-Nom was.seeking  
'Who was looking for who in this city?'
- (27) a. Can Deniz'i arıyordu; Ufuk Ümit'i arıyordu. [answer to (26a/b)]  
Deniz-Acc was.seeking Ümit-Acc was.seeking  
'Can was looking for Deniz; Ufuk was looking for Ümit....'
- b. Deniz'i Can arıyordu; Ümit'i Ufuk arıyordu. [answer to (26a/b)]
- c. Can ve Ufuk Deniz'i arıyordu. [answer to (26a/b)]  
and Deniz-Acc was.seeking  
'Can and Ufuk were looking for Deniz.'

(27) (a) (b) and (c) are all felicitous answers to both (26a/b), indicating that the scope construals of the *Wh*-Qs are ambiguous and that the order of the *Wh*-Qs may be changed with no effect on the possible readings since both (26a) and (26b) ask the same question. The only difference lies in which reading is more salient; in (26b) it is more probable that only one person is sought. 'F' is then a term used to indicate a series of adjoined positions.

Parallel to multiple *Wh*-Qs, a *Wh*-Q and NODP may co-occur in 'F' with ambiguous scope construals. The prosody of the *Wh*-Q in (28) patterns with the *Wh*-Qs that are immediately preverbal, taking either prosodic prominence or strong, contrastive stress.

- (28) a. Ufuk kimlere güzel bir hediye-@ vermiş?  
to.whom-pl. beautiful a present-@ gave  
'Who-all did Ufuk give a beautiful present to?'  
[a beautiful present x [who-pl [Ufuk gave x to who]]]  
[who-pl [a beautiful present x [Ufuk gave x to who]]]

- b. [Can ve Deniz]'e güzel bir hediye-@ vermiş. [answer to (28a)]  
 and Deniz-Dat beautiful a present-@ gave  
 'S/he gave a beautiful present to Can and Deniz (together).'
- c. Can'a ve Deniz'e güzel bir hediye-@ vermiş. [answer to (28a)]  
 Can-Dat and Deniz-Dat beautiful a present-@ gave  
 'S/he gave a beautiful present to Can and Deniz (together or separately).'
- d. Can'a ve Deniz'e birer hediye-@ vermiş. [answer to (28a)]  
 Can-Dat and Deniz-Dat one.each present-@ gave  
 'S/he gave a present to Can and s/he gave a present to Deniz.'

In answer to the *Wh*-Question in (28a), which includes both a *Wh*-Q and a NODP, the response may be either (28b) or the ambiguous (28c), as well as with the explicitly distributed (28d). That is, there may be a unique present given to all concerned collectively in (28b) or (28c), or there may be a distinct present given to each person in (28c) or (28d), indicating that a *Wh*-Q and NODP have ambiguous scope. The ambiguity in (28), as with (25), also indicates that the NODP with *bir* may have a distributed interpretation; that is it is not a necessary characteristic of *bir* to invoke a unique interpretation. Furthermore if there were two distinct projections for the *Wh*-Q and the NODP ambiguity would not occur. The fact that there is ambiguity supports an analysis in terms of multiple adjunction.

In support of the proposal that the *Wh*-Q and the NODP are both in 'F' while the other (unscrambled) arguments are not, under co-occurrence neither is distributive wrt the subject. Taken together with the previous data this is further support for a position 'F', whose every segment is in a mutual m-command relation with the subject, resulting in a cumulative reading for all the arguments.

- (29) a. Üç çocuk kime güzel bir hediye-@ vermiş?  
 3 child who-Dat beautiful a present-@ gave  
 'Who did the three children give a beautiful present to?'  
 [for a beautiful present x who is the individual that 3 children gave x to]  
 [who is the ind. such that for a beautiful present x, 3 children gave x to them]  
 \* [3 children are such that who gave a beautiful present to each of them]  
 \* [who is the single person such that for 3 children they gave a beautiful present to each of them]  
 \* [for one beautiful present for each of 3 children who is the individual who gave it to each of them]
- b. Denize vermişler. [Turkish is an object drop lang.]  
 Deniz-Dat they.gave  
 'They gave (it) to Deniz.' [answer to (29a)]
- c. # Can Deniz'e, Uğur Ayşe'ye, ve Ufuk Ümit'e birer hediye-@ vermiş.  
 Deniz-Dat Ayşe-Dat Ümit-Dat each.one present-@ gave  
 'Can gave a present to Deniz, Uğur to Ayşe, and Ufuk to Ümit.' [answer to(29a)]
- d. # Can Deniz'e, Uğur Ayşe'ye, ve Ufuk Ümit'e bir hediye-@ vermiş.  
 Deniz-Dat Ayşe-Dat Ümit-Dat a present-@ gave

'There was one present such that Can gave it to Deniz, Uğur to Ayşe, and Ufuk to Ümit.'  
 [answer to (29a)]  
 'Can gave one present to Deniz, Uğur gave one to Ayşe, and Ufuk one to Ümit.'

- e. # Deniz'e 3 hediye-@ vermişler. [answer to (29a)]  
 Deniz-Dat 3 present-@ they.gave  
 'They gave 3 presents to Deniz.'

The only appropriate answer to (29a) is seen in (29b) with a unique recipient of a unique present.

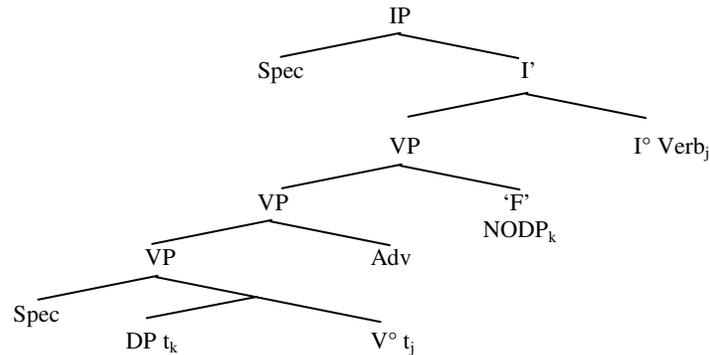
Adjunction to VP doesn't interfere with head movement of the verb due to Relativized Minimality (Rizzi 1990): movement of  $X^\circ$  is blind to adjunction since that is not a potential landing site for  $X^\circ$ . This is also the case with VP adverbs in French which presumably left adjoin to VP, yet the verb moves into  $I^\circ$ . The segment analysis of adjunction readily accounts for the iterative property of 'F' with multiple occupants.

## 5.2 VP Adverbs - Ambiguous Scope

The second argument for the proposal is the fact that VP adverbs take ambiguous scope with respect to the elements in 'F', and not with other arguments. Suppose there were an 'FP'. Though the Specifier positions are to the left in Turkish, there is nothing in X-Bar theory that requires a consistent directionality. However the Head Parameter does. If there were a righthand Spec position to host *Wh*-Qs and NODPs, say Spec,FP, then multiple occupants due to movement would not govern their respective traces, resulting in an illegitimate structure. The Focus Particles, discussed in Sec. VI might be proposed as 'F $^\circ$ ', but under a righthand Spec analysis they should occur to the left of the elements in Spec,'F'. Instead they occur to the right of an element in 'F'. Worse still they are not associated with one position; they may occur as a clitic on any element in the sentence (e.g. the Q particle), hence it will be proposed that they are incorporated. The only possible 'F $^\circ$ ' would then be an abstract head. If there were an 'FP', one would expect occupants of the 'FP' projection to take scope over VP adverbs.

- (30) a. ?Bu çocuk iki kere üç kitap-@ okumuş.  
 this child twice three book-@ read  
 'This child read three books twice.'  
 [this child 2 times read 3 books] - so 6 books - which entails:  
 [there were 3 books such that this child read each one twice] - 3 books
- b. ? Üç çocuk iki kere yeni bir kitap-@ okumuş.  
 3 child twice new a book-@ read  
 'Three children read a new book twice.'  
 \* [twice three children read a new book] - so 6 books  
 \* [three children twice read a new book] - so 6 books  
 \* [three children read a new book twice] - so 3 books since the same book is read twice  
 [twice a new book such that three children read it] - so 2 books  
 [a new book such that twice three children read it] - so 1 book

(30')



The sentences in (30) were judged odd by some informants, fine for others. However all were clear that the salient interpretation of the number of books in (30a) was six, with a less salient reading of three. And for (30b) there were either two or one. Then the wide scope construal of the NODP predicted by a 'F'P projection is not attested in (30), where the NODP takes ambiguous scope with respect to a VP adverb.

The VP adverb in (30a) is to the left of the object, yet has ambiguous scope with respect to that object. The object in turn is in a mutual m-command relation with the subject, seen in (7)/(8) and (30b). If the adverb were left adjoined to VP, with the subject in Spec,IP, it would be impossible for the object to demonstrate an absence of scope wrt the subject while remaining left of the verb. The fact that the subject does not take wide scope over the adverb in (30b) can be accounted for if the adverb is right adjoined to VP, where it c-commands the subject in Spec,VP. There is a distinction between elements *dominated* by all segments of XP and those dominated by some segments, *contained* in XP. Thus an element in Spec,XP, here the subject in Spec,VP, *dominated* by VP, would be differentiated from adjoined elements which are simply *contained* by VP. In addition, the fact that a VP adverb has ambiguous scope with elements in 'F' is further support for the proposal that the right-adjacent verb is in I°. The analysis of the NODP in 'F' seen in (1) is shown in (30'), with a parallel analysis for *Wh*-Qs.

At this point we have seen c-command as crucial in predicate derivation, XP segment analysis, and adverbial scope. Why then should m-command hold for P-Focus? This is an issue that will have to remain an open question for the moment.

### 5.3 \* Extraction from 'F'

Since adjunction creates an island to extraction the prediction is that extraction out of a NODP should be ungrammatical. Though extraction out of a specific object is fine, extraction out of a NODP is infelicitous, providing the third piece of evidence in favor of the adjunction analysis. Since Focus movement is clause-bound in Turkish extraction in the form of relativization is used. In Turkish there is relativization out of a Relative Clause (RC). If the nonspecific object is in fact in an adjoined position as

proposed here then the prediction is that relativization out of a RC with a nonspecific head noun should pattern with relativization out of adjuncts seen in (24). That is it should be ungrammatical. Consider RCs with a  $\pm$  specific head noun in object position.

- (31) a. [ t<sub>j</sub> Arabayı tamir eden] kadını<sub>j</sub> şimdi gördüm.  
           car-Acc repairing woman-Acc now I.saw  
           'I just saw the woman who repaired the car.'
- b. [ t<sub>j</sub> Arabayı tamir eden] bir kadını<sub>j</sub>-@ gördüm.  
           car-Acc repairing a woman-@ I.saw  
           'I saw a woman who repaired the car.'

Extraction out of the RC with a definite, and therefore specific head noun in object position in (31a) is grammatical, seen in (32a). If the nonspecific object is adjoined, then extraction out of the same RC with a nonspecific head noun in (32b) should be ungrammatical. And it is:

- (32) a. [[ t<sub>j</sub> t<sub>i</sub> tamir eden] kadını<sub>j</sub> şimdi gördüğüm] araba<sub>i</sub>...  
           repairing woman-Acc now my.having.seen car  
           'the car that I just saw the woman who repaired (it) ...'
- b. \* [[ t<sub>j</sub> t<sub>i</sub> tamir eden] bir kadını<sub>j</sub>-@ gördüğüm] araba<sub>i</sub>...  
           repairing a woman-@ my.having.seen car  
           'the car that I saw a woman who repaired (it) ...'

In (32) the head of the RC is the original subject of the RC and the object of the matrix clause, such that the final extraction is the original object of the RC. While relativization is felicitous out of a RC with a specific head noun, relativization out of a RC with a nonspecific head noun is not. A RC with a head noun that is the nonspecific object of a matrix clause patterns with the adjunct seen in (24), regardless of whether or not relativization in Turkish involves movement. Furthermore, (31b) is a counterexample to the proposal put forth by Heim (1982) and Enç (1991) that a nonspecific head of a RC is disallowed. In addition, the 'Specificity Effects' (Enç 1991), whereby extraction is not possible out of specific DPs while it is fine out of nonspecifics, do not hold in Turkish, indicating that the issue is syntactic rather than semantic, and that no universals are involved.

#### 5.4 Motivation in the Interpretation

Fourth, under the Minimalist Program, movement to adjunction for interpretation is allowed, which obviates the need for feature checking (Chomsky 1995: 388). The points in favor of adjunction are iteration, scope ambiguity with a VP adverb, extraction, and the need for interpretation. Since *Wh-Q/NODPs* have no scope construals wrt the subject, and since they are immediately preverbal, which we know from the distribution of adverbs in (18)/(19) resides in I<sup>o</sup>, then I propose that 'F' is the rightmost adjunction(s) to VP and that the left edge of the leftmost of the P-Focus elements constitutes the left edge of 'F'.

## 6. PROBLEM: THE ORDER OF THE P-FOCUS ELEMENTS

In contrast with the reversibility of *Wh*-Qs in (26)/(27), the order of a *Wh*-Q and a NODP in 'F' is fixed with the NODP strictly left-verb adjacent, as in (29a), all the while maintaining ambiguous scope construals seen in (28). This is difficult to explain in terms of multiple adjunction.

- (33) a. Üç çocuk kime güzel bir hediye-@ vermiş? = (29a)  
3 child who-Dat beautiful a present-@ gave  
'Who did the three children give a beautiful present to?'
- b. \*Üç çocuk güzel bir hediye-@ kime vermiş?

No other element may appear between the NODP and the verb, seen in (7b), including the *Wh*-Q (33b). It might be suggested that the adjacency of the NODP is due either to Case Licensing by the verb, or to incorporation of the noun-verb complex. However the facts indicate that neither of these explanations holds.

### 6.1 Adjacency of the NODP is not determined by Case licensing

As seen in (9) the NODP may occur anywhere post-verbally in a marked construction. Adjacency is a requirement on the preverbal position, with an exception in the form of Focus clitics, but not on the postverbal. So Case Licensing of the Weak Case object cannot be a factor in the preverbal adjacency constraint.

### 6.2 Adjacency of the NODP is not determined by Incorporation

Certainly incorporation exists in Turkish, but of the nonspecific object NP and not of the NODP. The fact that NODPs may occur postverbally in (9), while the object NP may not, is the first piece of evidence for this analysis. There is also a contrast in scope construals between that of the unmarked object NP in (34), which results in ambiguity, and the NODP in (7), which results in a cumulative reading.

- (34) a. Üç çocuk araba-@ almış.  
3 child car-@ bought  
'Three children bought a car.'  
[a car is such that 3 children bought it]  
[each of 3 children bought a car]
- b. \*Araba-@ üç çocuk almış.

Under Dayal's (1992:49) analysis, a nonspecific bare NP in object position in Hindi has no restriction on number due to the fact that it is an incorporated noun-verb complex, that is it may be perceived either as singular or plural. If we apply her analysis to sentences of the type seen in (34a) we have a straightforward explanation for the ambiguity, without resorting to structure. In addition, the ambiguity in (34a) provides further evidence that the subject in (7) does not have an intrinsically collective interpretation, indicating that the explanation for the absence of distributivity of the NODP lies in the syntax rather than in the semantics.

In support of the proposal that it is incorporated, the bare NP has a strict adjacency constraint in that it may only occur immediately preverbally, as seen in (34), with the possible intervention of a Focus Clitic.

A Case marked noun without a determiner has a definite interpretation in Turkish, as seen in (18) and (31). Parallel to Dayal's analysis of Hindi (p.43), the Case clitic encodes an Iota Operator that results in a unique interpretation of the noun. It is the equivalent of a null definite determiner. If there is a lexical determiner the uniqueness feature of the Iota Operator is overridden. Consequently all Case marked nouns are DPs in Turkish. The unmarked object NP is then the only bare NP that surfaces in the language. This fact in itself is strong evidence in favor of the proposal that, like the Hindi equivalent, the bare NP is incorporated.

### 6.2.a Distinct Truth Conditions

There are distinct truth conditions for a sentence with a nonspecific argument and for one with an incorporated noun-verb complex which can be used to test whether the unmarked DP and/or the bare NP are incorporated or not. The progressive is used to indicate an action that continues over a period of time, plus a time adverbial is added to reinforce the idea of a drawn out time span. Such a sentence is grammatical with an incorporated noun, indicating that the incorporated noun is an integral part of the activity, such as fish-catching, but anomalous with a NODP - one cannot catch an individual fish all day, not even a nonspecific fish.

- (35) a. Deniz bütün gün balık-@ tutuyordu.  
          all day fish-@ was.catching  
          'Deniz was fishing all day.'
- b. # Deniz bütün gün bir balık-@ tutuyordu.  
          all day a fish-@ was.catching  
          # 'Deniz was catching a fish all day.'

The truth conditions for (35) require that it is true iff one is occupied with the activity of fish-catching all day. This makes sense in Turkish if the object is a bare NP as in (35a) but it is anomalous if the object is a DP in (35b). These facts are consistent with the proposal that the bare NP is incorporated while the DP is not. Thus in the same fashion as Hindi the ambiguity of the bare NP is due to a  $\pm$ plurality interpretation rather than to structure.

### 6.2.b Focus Clitics

It is unclear if the bare NP is a classic case of syntactic noun incorporation (Baker 1988) at the level of word in which the  $N^{\circ}$  incorporates with  $V^{\circ}$ , or whether it is an example of semantic incorporation. There is a closed set of Focus particles, including the Q particle *mi*, that may occur between the bare NP and the verb.

- (36) O çocuk gazete-@ de/bile/mi okudu.  
 that child newspaper-@ also/even/interrog. read  
 'That child also/even read a newspaper.'  
 'Was it a newspaper that child read?'

Under a syntactic incorporation analysis the Focus clitic is adjoined to N° before incorporation with V°.

### 6.2.c Adjectives

Although an adjective may modify the incorporated noun, seen in (37), multiple adjectives are excluded with the bare NP, as is a modified adjective, while these are both fine with a NODP.

- (37) Deniz yeni araba-@ almış.  
 new car-@ bought  
 'Deniz bought (a) new car.'
- (38) a. \*Güzel ve eski araba-@ almış.  
 beautiful and old car s/he.bought  
 'S/he bought (a) beautiful and old car.'
- b. Güzel ve eski bir araba-@ almış.  
 beautiful and old a car s/he.bought  
 'S/he bought a beautiful and old car.'

Under the proposed analysis, a bare NP and a single adjective function as a compound, which is then incorporated into the verb. Support for this can be seen in the prosody. A compound noun has prosodic prominence at the right edge of the first element of the compound.

- (39) BAŞ-bakan  
 head-minister  
 'prime minister'

An unmodified bare NP has prosodic prominence (40a). However if the bare NP is preceded by an adjective, the adjective+bare NP complex patterns with compounds (40b), with prominence at the right edge of the first element. This contrasts with the NODP which may retain the immediately preverbal prominence when modified (40c).

- (40) a. Deniz PİYANO-@ almış.  
 piano-@ bought  
 'Deniz bought (a) piano.'
- b. Deniz ESKİ piyano-@ almış.  
 Old piano-@ bought  
 'Deniz bought (an) old piano.'
- c. Deniz eski bir PİYANO-@ almış.  
 old a piano-@ bought  
 'Deniz bought an old piano.'

It is my claim that the bare NP object in Turkish is incorporated and hence the ambiguity in sentences of the type seen in (34) is due to an ambiguity in  $\pm$ plurality rather than due to structure. This leaves the absence of distributivity in (7)/(8) to be explained by a structural analysis.

### 6.3 The Proposal:

Multiple *Wh*-Qs obligatorily line up adjacent to one another with the rightmost left-verb adjacent and with ambiguous scope construals, taken to indicate that they are all in 'F', which must then be made up of a series of adjoined positions. A *Wh*-Q and NODP may both occur in 'F', maintaining ambiguous scope construals with respect to each other, but the NODP must be left-verb adjacent. Inasmuch as it can be shown that neither Case nor Incorporation determine this adjacency, and since an analysis of two distinct projections can be ruled out by the ambiguity of scope construals in (28), I propose that *Wh*-Qs and NODPs have distinct mechanisms responsible for their respective movement to 'F' which apply at distinct levels of the derivation, resulting in the word order constraint. Although *Wh*-Qs and NODPs are analyzed as members of the same natural class and in the unmarked form they are P-Focused, class membership is clearly not a primitive since their distinct characters surface in the constraint on the order of their occurrence. P-Focus elements are existential quantifiers of choice functions. NODPs are analyzed as the existential quantification of a free choice partial function which operates on the set of individuals defined by the NP while *Wh*-Qs are analyzed as a nonspecific with a Q feature which blocks the realization of the range argument. From the order constraint visible in (33) it can be concluded that it is the Q feature, i.e. the property of having an undefined range argument, which prompts immediate P-Focus raising of *Wh*-Qs to right-adjunction in the bottom-up derivation. The NODP, instead, undergoes a last-resort style of overt quantifier raising, reminiscent of Heim's (1982) Existential Closure, that occurs at the closure of the VP shell, resulting in the higher position for the NODP, left-verb adjacent. The discourse interface and principles of interpretation interact with the derivational economy principles in mapping sentential elements onto the syntactic structure.

## 7. SUMMARY OF THE ISSUES

All Focused elements are analyzed as derived predicates which, in Turkish, require contiguity with the verb. P-Focus elements necessarily seek an adjoined position, 'F', parallel to the VP adjoined Focus position proposed by Brody (1990) for Hungarian and Neeleman (1994) for Dutch. The analysis of an adjoined position as an integral part in the interpretation of its occupants provides an alternative to the feature checking system as motivation for movement, along the same lines that adjunction to IP/VP applies in English for QR.

One of the most striking issues that has emerged from this study of Turkish is support for the proposal that *Wh*-Qs and nonspecifics constitute a natural class; it is proposed that they are existential quantifiers of a free choice partial function. Consequently they require movement to an adjoined position to be interpreted, similar to

QR. When they are P-Focused, which is always the case for *Wh*-Qs, they adjoin to VP. In Turkish this raising is further constrained in terms of the discourse interface. Since the verb undergoes rightward head movement to I°, to maintain contiguity with the verb in order to obtain their role as a derived predicate, P-Focus elements are compelled to righthand adjunction to VP. *Wh*-movement is then movement to form a predication structure and is clause-bound. That is, once the *Wh*-Q has obtained the interrogative interpretation in 'F', there is no motivation for further movement. Predictions based on the adjunction analysis for 'F' are upheld by binding data, iteration with ambiguous scope construals, VP adverbs, and extraction. The only consistent island to extraction in terms of relativization in Turkish is an adjunct. A RC with a specific head is not an island to further relativization, while an identical RC with a nonspecific is; nonspecifics then pattern with adjuncts. Similarly, sentential subjects pattern with complements rather than adjuncts. It is then concluded that the subject is in Spec,VP and that *in situ* arguments are VP internal, supporting the analysis of (3)/(7)/(8) with the position 'F' adjoined to VP. One conclusion that can be drawn from the data is that existential quantification forces raising.

The overt structure is the LF in Turkish, at least with regard to quantification. Consequently the properties of NODPs are transparent. It is clear from the data that the common assumption (Milsark 1977:27; Enç 1991; Reinhart 1995) that nonspecificity can be defined in terms of narrow scope is simply false. If in language X the other arguments remain internal to VP, then the NODP will have a cumulative interpretation. The proposal that a nonspecific DP cannot be the head noun of a RC (Heim 1982; Enç 1991) is also found to be in contradiction with the empirical facts. Potentially crucial issues such as Case and Incorporation are shown to be irrelevant to the verb adjacency constraint of NODPs. Furthermore, the 'Specificity Effects' pointed out by Enç (1991) for English, whereby extraction is not possible out of specific DPs while it is fine out of nonspecifics, do not hold in Turkish, indicating that the issue is syntactic rather than semantic, and that no universals are involved.

The study of the syntax of 'F', the P-Focus position in Turkish, has revealed new insights not only into Focus, but also into the potentially diverse nature of *Wh*-movement. Derivational economy principles participate with the need for Full Interpretation in feeding the mapping of the discourse interface onto syntactic structure. This study of Turkish P-Focus not only brings to light some of the primitives (here interrogatives and quantification) underlying discourse structure, but it begins to tease apart the complicated interaction between hierarchical structure and linearity, while providing counterexamples for some of the general assumptions about nonspecifics.

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## CUMULATIVITY & DISTRIBUTIVITY INTERACTION OF POLYADIC QUANTIFIERS

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### Abstract

We show how to relate tri-adic quantifiers that express mixed readings of distributivity and cumulativity within a single 3-place predicate to the dyadic quantifiers that express distributivity (function composition of monadic quantifiers) and cumulativity (Scha 1981). We discuss problems with the standard approaches and propose that cumulativity necessarily takes precedence over distributivity. Consequently, for mixed readings cumulativity is reanalyzed as a relation between a type  $\langle 1 \rangle$  and a type  $\langle 2 \rangle$  quantifier. This new account of cumulativity generalizes conveniently to cumulative quantifiers of arbitrary type.

### 1 INTRODUCTION

This article discusses the systematic correspondences that exist between dyadic quantifiers that express distributivity and cumulativity and tri-adic quantifiers that express mixed readings of distributivity and cumulativity. Schein (1993) has also investigated these readings in terms of event-semantics, however the present analysis attempts to circumvent an event-based approach. As a working example we consider the ‘mixed’ reading of (1):

- (1) 20 linguists sent 5 articles to 40 reviewers

In (1) distributivity and cumulativity may be expressed simultaneously, under a reading whereby 20 linguists each sent 5 articles to a total of 40 reviewers. On this reading the NP *5 articles* is scope-dependent on the NP *20 linguists*, while *40 reviewers* is scope-independent. Another form of dependency relation does seem to hold, however, in that the number of reviewers totalizes with respect to the 20 linguists.

It is an easy task to articulate the intended interpretation of (1) in terms of a tri-adic quantifier:  $MIX(20, Linguist, 5, Article, 40, Reviewer)$ . 'MIX' can be applied to the relevant relation (Send) if the information from the three NPs is supplied as parameters, as in (2).

$$(2) \quad \begin{aligned} &MIX(20, Linguist, 5, Article, 40, Reviewer)(Send) \text{ iff} \\ &20(Linguist)(\lambda x. 5(Article)(\lambda z. \exists y Reviewer(y) \wedge Send(x, y, z))) \wedge \\ &40(Reviewer)(\lambda y. \exists x Linguist(x) \wedge 5(Article) \\ &(\lambda a. \exists r Reviewer(r) \wedge Send(x, r, a)) \wedge \exists z Article(z) \wedge Send(x, y, z)) \end{aligned}$$

In this representation it is assumed that the numerals represent traditional determiners (i.e. '5' abbreviates  $\lambda P. \lambda Q. [ |P \cap Q| = 5 ]$ ). Informally, (2) says that 20 linguists each sent 5 articles to reviewers and that 40 reviewers got articles from linguists who sent 5 articles to reviewers. This is termed the 'subject-oriented' reading. There also exists an indirect-object oriented reading whereby the articles vary with respect to the reviewers and the linguists are scope-independent.

The problems posed by this type of reading are twofold. First, how can this interpretation (and therefore this tri-adic quantifier) be derived from current definitions of cumulativity and distributivity? Although cumulativity has already been defined in terms of polyadic quantifiers (Scha 1981), as has distributivity - at least in that distributivity always entails a scopal relation between the distributor and the distributee, and therefore can be represented in terms of function composition of monadic quantifiers - the composite of the two quantifiers poses interesting problems. Second, as the informal paraphrase of (2) suggests, the second reference to linguists needs to identify the same group previously mentioned, but this is not made explicit in the formal representation. In this sense the formal representation only serves as an indication of the empirically attested interpretation.

The structure of this article is as follows. Section 2 discusses the derivation of the tri-adic quantifier. Section 3 addresses the problem of how to account for the crucial dependency relation. Finally, Section 4 summarizes the issues.

## 2 DERIVATION OF THE TRI-ADIC QUANTIFIER

### 2.1 Cumulativity and distributivity in a polyadic setting

How can (2) be related to Scha's cumulative quantifier  $[n, m](A, B)$  and distributivity expressed in terms of the function composition of two monadic quantifiers? Scha's cumulative quantifier  $[n, m](A, B)$  is defined in (3):

$$(3) \quad \begin{aligned} &[n, m](A, B)(R^2) \text{ iff} \\ &|Dom(R \cap A \times B)| = n \wedge |Rng(R \cap A \times B)| = m \end{aligned}$$

(3) is a dyadic quantifier that takes a two-place relation into a truth-value, given four parameters, viz. two numbers (n,m) and two noun sets (A,B). For example, consider the representation of *100 Aliens contacted 50 ETs*' in (4), which amounts to saying that the number of ET-contacting aliens was 100 and the number of ETs contacted by aliens was 50.

$$(4) \quad [100,50](\text{Alien,ET})(\text{Contact})$$

We propose to follow Keenan & Westerstahl (1997) in extending the definition of a generalized quantifier to apply to predicates of any arity. Using their terminology we call them monadic or type <1> quantifiers. They reduce the arity of a predicate by one. A GQ is thus used as the base case in the definition of the corresponding monadic quantifier  $M$ , mapping a n+1-ary relation ( $R^{n+1}$ ) into a n-ary relation ( $R^n$ ).

$$(5) \quad M(R^{n+1}) =_{\text{def}} \{ \langle x_1, \dots, x_n \rangle | GQ(\lambda y. R(x_1, \dots, x_n, y)) \}$$

The definition in (5) is simplified to the extent that it is always the final argument of the relation which is reduced. The strategy in this definition is to fix all  $n$  arguments except the one to be reduced by the generalized quantifier, here  $y$ , and to retract them external to the scope of the generalized quantifier. Thus, a *polymorphic* monadic quantifier  $M$  is obtained<sup>1</sup> which makes it possible to use function composition in the construction of a dyadic quantifier ( $M_1 \circ M_2$ ) (i.e. type <2>). The function composition of two monadic quantifiers  $M_1$  and  $M_2$  results in a scope-dependency, and therefore a distributive reading. This can be verified easily since function composition is an associative operation;  $(M_1 \circ M_2)(R)$  is equivalent to the iterative  $M_1(M_2(R))$ .

## 2.2 Obvious intepretation strategies fail

To integrate cumulativity and distributivity an obvious strategy to pursue is to apply the distributee *5 articles* in (1) to the Send-relation, obtaining the incorporation of the NP with the predicate, and then apply cumulation to the remaining arguments, as in (6).

$$(6) \quad [20,40](\text{Linguist,Reviewer})(\{ \langle x,y \rangle | 5(\text{Article})(\lambda z. \text{Send}(x,y,z)) \})$$

However, this strategy predicts that the number of articles varies with the number of linguist-reviewer pairs. Empirically the articles should distribute only with respect to the linguists.

Another way to go would be to quantify-in as in (7).

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<sup>1</sup> It is polymorphic.  $M$  reduces one-place relations to zero-place relations (truth values), two-place relations to one-place relations, etc. In other words,  $M$  is not restricted to an one type, so it is polymorphic. However, it is not (strictly) polyadic, since monadic quantifiers reduce relations only one place.

$$(7) \quad 5(\text{Article}) (\lambda z. [20,40](\text{Linguist,Reviewer})(\{ \langle x,y \rangle | \text{Send}(x,y,z) \}))$$

Of course this not an appropriate strategy, since the quantified-in element takes scope over the cumulative frame and in fact it must be scoped over in order to be distributed.

### 2.3 Proposal

We pursue the option that the distributive-cumulative interplay must be taken together in a tri-adic quantifier where function composition obtains within the cumulative relation. Schematically:

$$(8) \quad \begin{array}{l} \text{a.} \quad (40R \bullet (20L \circ 5A)) (\{ \langle y,x,z \rangle | \text{Send}(x,y,z) \}) \\ \text{b.} \quad (20L \bullet (40R \circ 5A)) (\text{Send}) \end{array}$$

In (8) 20L,40R and 5A abbreviate the monadic quantifiers corresponding to the 20 linguists, 40 reviewers and 5 articles respectively. Apart from the function composition operator ( $\circ$ ), we introduce a new cumulative operator ( $\bullet$ ) that builds a tri-adic quantifier out of a monadic and a dyadic quantifier. (8a) represents the subject-oriented reading of (1) and (8b) represents the indirect-object-oriented reading.

Distributivity has already been defined in terms of the function composition of monadic quantifiers. Then the first step in the definition of the  $\bullet$ -operator is to also define cumulativity in terms of monadic quantifiers. It will then only be a small step to extend this operator in order to build a tri-adic quantifier from a monadic quantifier and a dyadic quantifier, as needed in (8). Following Van der Does (1992), Scha's cardinality constraint in terms of numbers ( $n,m$ ) (cf.(3)) may be generalized to determiners:

$$(9) \quad [D_1, D_2](N_1, N_2)(R^2) \text{ iff} \\ \exists S^2 S = R \cap N_1 \times N_2 \wedge D_1(N_1)(\text{dom}(S)) \wedge D_2(N_2)(\text{rng}(S))$$

From (9) there is a straightforward translation to the  $\bullet$ -operator.

$$(10) \quad (M_1 \bullet M_2)(R^2) \text{ iff} \\ \exists S^2 S = R \cap \downarrow(M_1) \times \downarrow(M_2) \wedge (M_1)(\text{dom}(S)) \wedge (M_2)(\text{rng}(S))$$

Where:  $\downarrow(M)$  is the minimal live on set of  $M$ .

The use of minimal live on sets permits us to abstract away from the reference to noun sets as used in (3).<sup>2</sup> This is advantageous when considering mixed readings and fully cumulative quantifiers of arbitrary type.

The second step in the definition of the  $\bullet$ -operator is to extend (10) to allow for dyadic input. Our final proposal is given in (11).

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<sup>2</sup> We assume quantifiers to be conservative.

$$(11) \quad (M \bullet D)(R^3) \text{ iff} \\ \exists S^3 S = R \cap \downarrow(M) \times \downarrow(D) \wedge (M)(Arg_1(S)) \wedge (D)(Arg_{2,3}(S))$$

Where:

$$Arg_1(R^3) =_{\text{def}} \{x | \exists y \exists z R(x,y,z)\}, \text{ and} \\ Arg_{2,3}(R^3) =_{\text{def}} \{ \langle y,z \rangle | \exists x R(x,y,z) \}$$

Note that the  $\downarrow$ -operator applied to dyadic quantifiers has not been defined. We will define  $\downarrow(A \circ B)$  as  $\downarrow(A) \times \downarrow(B)$ . Under a natural extension of the minimal live on set operation to minimal live on relations<sup>3</sup>, this follows as a theorem<sup>4</sup> (E. Keenan p.c.).

Applying our final formulation of the  $\bullet$ -operator in (11) to our working example in (1) we arrive at the following semantics.

$$(12) \quad (40R \bullet (20L \circ 5A)) (\{ \langle y,x,z \rangle | \text{Send}(x,y,z) \}) \text{ iff} \\ 40R(\{y | \exists x \exists z \text{Linguist}(x) \wedge \text{Article}(z) \wedge \text{Send}(x,y,z)\}) \wedge \\ 20L(5A(\{ \langle x,z \rangle | \exists y \text{Reviewer}(y) \wedge \text{Send}(x,y,z) \}))$$

Informally (12) says that a) 40 reviewers were sent articles by linguists and b) 20 linguists each sent 5 articles to reviewers. Clearly, the (b)-part is adequate as it gives the desired distributivity and, moreover, the existential closure over reviewers in the scope of the 5 articles is empirically attested (e.g. a particular linguist may send two of his articles to one reviewer and the remaining three to another reviewer). However, the (a)-part is too weak in one minor but crucial feature; it says that 40 reviewers were sent articles by linguists, which problematically may or may not be linguists from the original 20. This problem will be addressed in Section 3.

Finally, the strategy used to define the  $\bullet$ -operator can be used to systematically build fully cumulative quantifiers of arbitrary type. For example, the CUM3 quantifier below can be derived in terms of the  $\bullet$ -operators defined in (10) and (11):  $\text{CUM3}(M_1, M_2, M_3)(R^3)$  is equivalent to  $(M_1 \bullet (M_2 \bullet M_3))(R^3)$ . Crucially,  $\downarrow(M_2 \bullet M_3)$  is equivalent to  $\downarrow(M_2) \times \downarrow(M_3)$  if the  $\downarrow$ -operator applied to dyadic quantifiers is interpreted as the minimal live on relation.

$$(13) \quad \text{CUM3}(M_1, M_2, M_3)(R^3) \text{ iff} \\ \exists S^3 S = R \cap \downarrow(M_1) \times \downarrow(M_2) \times \downarrow(M_3) \wedge \\ M_1(Arg_1(S)) \wedge M_2(Arg_2(S)) \wedge M_3(Arg_3(S))$$

<sup>3</sup>  $D$  lives on  $R^2$  iff for all  $S^2$ :  $D(S) \equiv D(S \cap R)$ , where  $D$  is a dyadic quantifier.

<sup>4</sup> Let  $M_1$  live on  $A$  and  $M_2$  live on  $B$ , then  $(M_1 \circ M_2)$  lives on  $A \times B$  (given finite domains).

### 3 DEPENDENCY RELATIONS

This article has worked exclusively with the definition of cumulativity as proposed by Scha (1981) and elaborated by Van der Does (1992). Under this definition cumulativity is symmetrical. Yet, the informal paraphrase of (2) suggests an asymmetry in the semantics of mixed readings (and presumably in the semantics of cumulative readings): 20 linguists each sent 5 articles to reviewers and 40 reviewers were sent articles by *those* linguists. The problem is that the tri-adic quantifier ( $40R \bullet (20L \circ 5A)$ ) does not accommodate the dependency indicated by *those*.

We leave a formal translation of this missing dependency within the cumulative semantics for further research. At the same time we observe that the desired strengthening is obtained if one assumes that the linguists in (1) are fixed in reference and treated as a plurality that is already present in the discourse<sup>5</sup>, formalized in (14):

$$(14) \quad \exists X X \subseteq \text{Linguist} \wedge |X|=20 \wedge (40R \bullet (D(X) \circ 5A))(\{ \langle y, x, z \rangle | \text{Send}(x, y, z) \})$$

Where:  $D(X)(R^{n+1}) := \{ \langle x_1, \dots, x_n \rangle | \forall y \in X R(x_1, \dots, x_n, y) \}$

(14) says that there is a collection of 20 linguists in the discourse such that these linguists each sent 5 articles to a total of 40 reviewers. The strengthening thus obtained shows that the problem encountered in (12) is independent of the interplay of cumulativity and distributivity and inherent to the definition of cumulativity as developed by Scha.

### 4 CONCLUSION

In this article we attempted to set out a systematic correspondence between two systems of quantification. We encountered unexpected problems when the quantifying-in or predicate integration strategies were applied to mixed readings. In our final solution we propose that function composition is nested within the cumulative semantics, attributing a dependency constraint within the cumulative reading.

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<sup>5</sup> Under this account the treatment of the NP *20 linguists* is not truly quantificational in that we use existential quantification over collections of linguists. For downward entailing NPs this could be problematic.

## THE IMPLICATIONS OF QUANTIFICATION FOR THE ROLE OF FOCUS IN DISCOURSE STRUCTURE

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### Abstract

This paper shows that first order logic does not translate one-to-one into distinct readings with respect to quantificational interpretation, nor does the semantic interpretation of a DP uniquely determine its role in quantification. Turkish data demonstrate that it is discourse structuring that is crucial to quantificational dependencies (QDs), also countering proposals of the importance of linearity, operators or (c)overt movement. Only New/Focus Information DPs that are locally bound can multiply while Given Information DPs with text-level binding have a fixed quantity for the duration of the Speech Act. This is in opposition to the claim that the semantics of the DP determines if it is Novel/New/Focus or Given/Familiar Information (Heim, 1992). The binding that shapes discourse structure is not only anaphoric but also indirect, i.e. D(iscourse)-Linking (Pesetsky, 1987). Both the functional predicate relation under QDs and the definition of New Information exert a locality constraint on QDs, where 'local' is the predicate domain. Then quantificational interpretation directly reflects discourse structuring.

### I THE PROBLEM

Quantificational Dependencies (QDs) are defined as a 2-place predicate relation with covariation of the two arguments whereby the variation of one is dependent on that within the other, exemplified in the salient reading of (1) with multiple doctors.<sup>1</sup>

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\* An earlier version of this paper was presented at the ICTL held at Boğaziçi University in Istanbul in August of 2000 and a brief form with a very different analysis appears in those proceedings. This paper owes a lot to the work of Farkas (1994; 1997) and to crucial discussion with C. Bozşahin, S. İşsever, K. Oflazer, E. Ruys, B. Say, S. Şener, M. Steedman, Ü. Turan, E. Uzun and D. Zeyrek. It draws on my dissertation *Quantificational Dependencies* (in progress).

- (1) a. Her hasta-yı bir doktor tedavi etti.<sup>2</sup> (adapted from Göksel, 1998)  
 every patient-Acc a/one doctor-Nom has.treated  
 ‘A doctor has treated every patient.’  
 (ambiguous: one or multiple doctors)
- b. Her hasta-ya bir doktor eşlik etti.  
 every patient-Dat a/one doctor-Nom has.accompanied  
 ‘A doctor has accompanied every patient.’  
 (ambiguous: one or multiple doctors)

Under the QDs interpretation of (1) call the dependent DP *bir doktor* ‘a doctor’ the *multiple* DP and *her hasta* ‘every patient’ the *Base Plural* (BP).<sup>3</sup> DP1 and DP2 are used to indicate the left-to-right linear order of the arguments. For the salient reading in (1) the variation or *multiplication* of DP2 depends on the variation within the plural DP1 and that dependency is defined by the treat/accompany relations. Then (1) is held to be true iff for every patient there is a doctor who treats/accompanies that patient.<sup>4</sup> In the less salient reading without QDs (1) is held to be true iff there is one doctor who treats/accompanies all the patients. These distinct truth conditions can be translated into first order logic:

- (2) a.  $\forall x (\text{patient}(x) \rightarrow \exists y [\text{doctor}(y) \wedge \text{treat/accompany}(y,x)])$   
 b.  $\exists y (\text{doctor}(y) \wedge \forall x [\text{patient}(x) \rightarrow \text{treat/accompany}(y,x)])$

(2)b entails (2)a, the salient reading, although (2)a does not entail (2)b. This entailment is sketched in (3):

- (3) a.  $\exists \forall \rightarrow \forall \exists$   
 b.  $\neg (\forall \exists \rightarrow \exists \forall)$

Linearity has been attributed with a crucial role in determining the ‘scope’ of QDs (Göksel, 1998; Kempson & Meyer-Viol, 1999), predicting that DP1 would never multiply, and that seems to hold for Turkish. In (4) where the order of the arguments is the inverse of that in (1), with the universal quantifier *her* ‘each/every’ on DP2, DP1 does not have a multiple interpretation. The multiplication of DP1 is termed here *inverse QDs*.

<sup>1</sup> Given that there is no distinction in truth conditions between wide scope and scope independence for singulars, the term *scope* for QDs is avoided as much as possible.

<sup>2</sup> Turkish is a SOV head final ‘scrambling’ language where the arguments may appear in any order (Kural, 1992). Case marking takes the form of a suffix on the lexical stem. Nominative Case is a  $\emptyset$  morpheme. Generalizing from the fact that the Accusative suffix (Erkü, 1982; Enç, 1991) and the Nominative (Kennelly, 1997) are specific, all Case marking is taken to indicate +specific. Turkish has a system of vowel/consonant harmony which explains the morphophonemic variations in the suffixes.

<sup>3</sup> The term ‘Quantificational Dependencies’ originated from a discussion with J. Hoeksema, ‘multiplication’ is from Szabolcsi (1997) and I coined ‘Base Plural’.

<sup>4</sup> There is a distinction between QDs discussed here and a ‘sorting’ of information with a (c)overtpartitive as in *There were 12 apples on the table this morning. Where are they? Oh yes, four kids each took 3.*

- (4) a. (Genç) bir doctor her hasta-yı tedavi etti.<sup>5</sup> (adapted from Göksel, 1998)  
 (young) a doctor-Nom every patient-Acc has.treated.  
 ‘A (young) doctor has treated every patient.’  
 (one doctor)
- b.  $\exists y (\text{doctor}(y) \wedge \forall x [\text{patient}(x) \rightarrow \text{treat}(y,x)])$  = (2)b

Any variation in the neutral stress pattern in Turkish, where the pitch accent lies on the immediately preverbal element, does not alter the judgements. (4) is held to be true iff there is only one doctor who has treated all the patients. (4) certainly entails that for each patient there is a doctor who has treated her/him, in keeping with (3)a. At the same time that logical entailment implies that there should be a second reading with distinct truth conditions, but there is not. This supports the proposal that linearity is in fact the crucial issue in QDs in Turkish and that there is no covert movement at Logical Form (LF), or else that the 1<sup>st</sup> order representations in (2) are not the appropriate translations of natural language quantificational structures, argued for in Kennelly (in progress).<sup>6</sup>

There is also a one-to-one mapping between discourse structure and linearity in Turkish (Erk, 1982; 1983).<sup>7</sup>

- (5) Topic = Given Information > Focus = New Information > Predicate

In light of (5), it is problematic to determine if discourse structure or linearity is the crucial issue in (4) such that data that can distinguish between the two are needed. If there are examples of inverse QDs with multiple DP1 in Turkish, they might be able to clarify the issues.

Since discourse structure is crucial to the discussion, working definitions of the relevant discourse roles are useful until more fine-grained definitions are developed in Sections IV and V. Pragmatics was first associated with anaphora and therefore with binding structures by van der Sandt (1992). While he uses binding structures for presupposition, which he posits as [+anaphoric], I propose to make use of binding structures to provide a tangible means of assessing the discourse roles of quantified DPs. Given Information, associated here with the Topic, must have appeared previously in the discourse so it must be [+anaphoric]. Assume that all quantified DPs

<sup>5</sup> *Bir* is both the cardinal ‘one’ and the indefinite article. When it appears between an adjective and a noun the indefinite article interpretation is forced, as in (4). For some reason the ambiguity is sharper in (1), however, without an adjective.

<sup>6</sup> According to one reviewer the fact that  $\forall\exists$  does not entail  $\exists\forall$ , yet in a proposition represented by  $\forall\exists$ ,  $\exists\forall$  also obtains, as in (1), indicates that logical entailments are not involved in generating readings in natural language. However true that may be, it does not alter the validity of the following argumentation. The entailment in (3)a is valid and IF (4)b is the logical representation for (4)a then (3)a must (and does) hold also. That entailment implies that a second reading should obtain for (4)a, again IF the logical representations in (2) are the logical representations of natural language quantificational structures for the readings in (1). If the entailment does not translate into a reading for the natural language proposition, then there must be either a blocking factor, or else the representations in (2) are not appropriate.

<sup>7</sup> See İşsever (2001) for a modification of this schema to include (back)ground information as well as distinct positions for Contrastive and Presentational Focus.

contain a variable that needs to be bound. Then (the variable contained in) a quantified Given DP must be bound under an identity relation with a DP that has occurred previously in the discourse. Under a binary analysis, opportune in an investigation of quantificational structures, the DP that is not Given is New Information, therefore [-anaphoric], associated here with Focus. Its variable does not have a binder in the previous discourse.

This article argues against linearity as the crucial factor in QDs, claiming instead that (4)a does not conform to the appropriate organization of discourse structure for QDs to obtain. Because the quantified DP1 in (4) is Topic/Given Information and consequently [+anaphoric] it necessarily has a fixed quantity for the duration of the Speech Act, here the set of utterances that constitute the discourse.

Section II substantiates my claim that discourse structure rather than linearity determines the infelicity of inverse QDs in (4). Data are furnished where DP1 does multiply under inverse QDs in Turkish only if it is supported as Focus/New Information both by the context **and** by the lexical choice of the predicate. In sharp contrast, when the potential multiple DP is [+anaphoric] Given Information it cannot multiply. In Section III a proposition is pictured as a mapping from Given to New Information. This mapping is subsequently integrated with a) the observation from Section II that the multiple DP must be New Information, and with b) a functional interpretation of the predicate under QDs. The proposal that emerges is that QDs are a mapping from Given to New Information where the BP is Given (Kempson & Cormack, 1980; Erteshik-Shir, 1999) and the multiple DP is New Information. Independently, the definition of QDs in terms of a functional predicate results in an ironclad locality constraint on the multiple DP. (6) and (7) clarify the use of the terms  $\pm$ local.

**Locality = Predicate Domain**

- (6) The *predicate domain* is defined as the predicate  $Pred_i$ , its argument, and adverbs, i.e. the clause. All elements within a single predicate domain are said to be 'local' one to the others.

**Non-locality = Text-level**

- (7) DPs external to the domain of any given predicate  $Pred_i$  are said to be at 'text-level' with respect to all elements within the domain of  $Pred_i$ .

'Text-level' is the equivalent of van der Sandt's 'global' or DRT's 'top-level'. Intermediate readings (Farkas, 1981; Ruys, 1992; Abusch, 1994; Farkas, 1994; Reinhart, 1997; Kratzer, 1998; Verkuyl, 1999; Kennelly, 2000), which challenge the locality constraint on QDs, are addressed briefly in Section III.<sup>8</sup>

Section IV opens with a continuation of the discussion of locality, with data demonstrating that it is relevant to QDs not only for the position where a DP resides in the syntax but also where the binder of its variable resides. Drawing on the thinking of Kaplan (1978) and of Farkas (1997), the syntactic position of its binder is termed here where a DP is *defined*.

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<sup>8</sup> Long distance 'Inverse Scope' (Farkas, 1997; Steedman, 1999) are addressed in Farkas & Giannakidou (1996) and Steedman (1999) in terms of a functional analysis, supporting the locality constraint for QDs.

**Proposal: Definition of a DP**

- (8) A quantified DP is *defined* at the position in the syntactic structure where the binder of its variable resides.

From (6), (7) and (8) if the binder of (the variable of) a (quantified) DP resides within the same predicate domain, that DP is said to have a *local definition*. I assume that a nonspecific DP is subject to IP internal existential closure which is then an example of *local definition*.<sup>9</sup> If the binder of a (quantified) DP resides external to the predicate domain that hosts the DP then that DP is said to have a *text-level definition*, exemplified in a definite DP, by definition [+anaphoric]. In the determination of the definition of a DP, not all binding dependencies are under identity. There is also indirect binding, exemplified in the subset relation. If the indirect binder, such as the superset, is part of the previous discourse, i.e. if it is presupposed, indirect binding is called D(-iscourse) Linking (Pesetsky, 1987:107). D-Linking was originally posited to address the behavior of the *wh*-expression *which NP* that presupposes a superset of NPs. Under a subset relation the dependent D-Linked DP is also presupposed, but this is not necessarily the case for all forms of D-Linking.

Section IV continues with an examination of the interaction between D-Linking,  $\pm$ locality of definition of a DP, QDs and discourse structure with respect to several current theories. Turkish data show that the local definition of a DP is crucial not only for QDs but also in the shaping of discourse roles. An analysis of discourse roles for quantified DPs emerges in terms of the  $\pm$ locality of its definition, rather than in terms of the semantics of the DPs. This article then argues against Heim's (1982) Novelty Condition, i.e. New Information status of all indefinites. It also argues against her Familiarity Condition, i.e. Given Information status of all definite descriptions. Section V individuates three types of binding structures that determine the  $\pm$ locality of the definition of a quantified DP. The analysis that is defended is that the definition of a DP determines its discourse role and that determines the way the DP may participate in QDs. A formal analysis of binding structures translates into a system of indices used to formulate an analysis of discourse structure and consequently the constraints on QDs. But then is it discourse structure or perhaps locality itself, as first proposed, that is the fundamental issue for QDs? These two are finally confronted resulting in the analysis that it is discourse structure that can account for the distinction between QDs in English and Turkish, while locality, also a primitive, is not a discriminating factor. Returning to the Turkish data from Section II where inverse QDs do obtain, predicates that appear to have a reversal of discourse roles built into their argument structure are examined in Section VI, suggesting an explanation for the lexical variation in Turkish for inverse QDs. The issues are summarized and conclusions drawn in Section VII.

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<sup>9</sup> It is assumed that determiners and their respective DPs are  $\pm$ definite and that indefinite DPs are  $\pm$ specific; also that determiners are divided into strong, specific (*every, all, each, most, both, many*) and weak (*a, some, few, cardinals*) (Milsark, 1974;1977; Partee et al., 1993:385), with weak determiners ambiguous between  $\pm$ specific.

## II THE SOLUTION: DISCOURSE STRUCTURE

The Turkish data in this section show that it is discourse structure rather than linearity that determines QDs in Turkish. While inverse QDs are not available for (4), a significant percentage of Turkish speakers asked, including Göksel, do accept an inverse QDs reading for (9) with a multiple DP1.

- (9) Genç bir doktor her hasta-ya eşlik etti.  
young a doctor-Nom every patient-Dat has.accompanied  
'A young doctor has accompanied every patient.'  
(ambiguous: highly marked: multiple doctors; salient reading: one doctor)

How can the distinction between (4) and (9) be explained? Can the distinction clarify whether it is linearity or discourse structure that is crucial to QDs?

Consider the context in which (9) occurs. In the following exchange the context forces the interpretation of *bir doktor* as New Information to the discourse, reflected in the pitch accent which is translated by capital letters. Redundant information, normally omitted in natural dialogue, is included in brackets, as well as is the gloss for *hayır* 'no':

- (10) a. Genç bir HEMŞİRE her hasta-ya eşlik etti.<sup>10</sup>  
young a nurse-Nom every patient-Dat has.accompanied  
'A young nurse has accompanied every patient.'
- b. Hayır ('no'), (genç) bir DOKTOR her hastaya eşlik etti. = (9)  
(ambiguous: one or multiple doctors)

Then discourse structure rather than linearity is crucial to the multiple DP1 reading in (10)b, and context, reflected in the prosody, seems to override the default linear organization of discourse roles in (5).

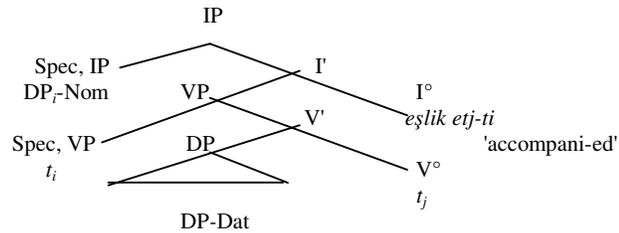
Rullman (1995) notes that there are two distinct forms of Focus/New Information: a relatively straightforward form and a stronger form that obtains under contrast, elaborated in Rooth (1985). Call the simpler form P(resentational)-Focus and the stronger form C(ontrastive)-Focus. İşsever (2001) has shown that P-Focus and C-Focus utilize two distinct strategies in Turkish, although both are confined to the preverbal area. (5) is operative exclusively for P-Focus, i.e. in terms of syntax, while a C-Focussed DP may appear anywhere (in the preverbal area) and surfaces in the prosody; it carries the pitch accent. The two forms do not co-occur and it is C-Focus that is relevant in (10). Note that the reading in (10)b = (9) is not available for (4), whatever the context or prosody. So the lexical choice of the predicate feeds an application of discourse structure that renders inverse QDs available, allowing the realization of the (implication of the) logical entailment in (3)a. A discussion of *accompany* type predicates is found in Section VI, indicating that they have an intrinsic reversal of discourse roles built into their argument structure, rendering inverse QDs possible in Turkish and facilitating them in English. The distinction between the two languages is addressed in Section V.1 where that distinction is seen as crucial in appreciating that the discriminating primitive in QDs is discourse structuring.

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<sup>10</sup> Thanks to Selçuk İşsever of Ankara Univ. Linguistics Dept. for providing this environment.

Perhaps the distinction between (4) and (9) could be attributed to distinct syntactic structures of the arguments inherent in the two predicates. Assume the following syntactic structure for Turkish:

(11) Sketch of Turkish Structure for 2-place Predicate



It could be argued that *her hasta-ya* 'every patient-Dat' in (9) is in a c-commanding position, under movement to the right, to a position adjoined to the VP while the verb has undergone verb (head) movement to I<sup>0</sup> and the Nominative argument remains in Spec,VP (Kennelly, 1999). But if that were the case the anaphor in (12)a, adapted from Kural (1992), would have to c-command its antecedent.

- (12) a. Havalimanına kadar öğretmenler<sub>i</sub> birbirlerin<sub>i</sub>-e eşlik etti.  
to.the.airport teachers-Nom each.other-Dat has.accompanied  
'The teachers have accompanied each other to the airport.'
- b. \*Havalimanına kadar birbirlerin<sub>i</sub>-e öğretmenler<sub>i</sub> eşlik etti.  
to.the.airport each.other-Dat teachers-Nom has.accompanied  
'The teachers have accompanied each other to the airport.'

The linear organization of the reciprocal *birbirleri* 'each other' and its antecedent *öğretmenler* 'teachers' in (12) indicates that (a Nom marked) DP1 c-commands (a Dat marked) DP2, at least for *eşlik et-* 'accompany'. (4) shows that there is no covert movement at LF. It is not possible that DP1 c-commands DP2 for the anaphoric relation in (12)a **and** DP2 c-commands DP1 in (9). This is taken as evidence that c-command is relevant for anaphoric binding, maintaining the left-to-right c-command structure in Turkish as sketched in (11), but then it is crucially not relevant for QDs, at least not in sentences that pattern with (9).

Consider other examples of inverse QDs with multiple DP1 in Turkish:

- (13) Kızgın bir polis her kapı-yı çalıyordu.  
angry a policeman-Nom every door-Acc was.knocking  
'An angry policeman was knocking at every door.'  
(ambiguous - highly marked: multiple policemen; salient reading: one policeman)
- (14) Dürüst bir çiftçi her toplantı-ya gitti.  
honest a farmer-Nom every meeting-Dat has.gone  
'An honest farmer has gone to every meeting.'  
(ambiguous - highly marked: multiple farmers; salient reading: one farmer)

- (15) Hoş bir kız her masa-da konuklar-ı ağırladı.  
 charming a girl-Nom every table-at guests-Acc has.entertained  
 ‘A charming girl has entertained the guests at every table.’  
 (ambiguous - highly marked: multiple girls; salient reading: one girl)

Now put (13)-(15) into the following dialogues where the QDs reading is brought out:

- (16) a. Kızgın bir POSTACI her kapı-yı çalıyordu.  
 angry a postman-Nom every door-Acc was.knocking  
 ‘An angry postman was knocking at every door.’  
 b. Hayır (‘no’), (kızgın) bir POLİS her kapıyı çalıyordu. = (13)  
 (ambiguous: one or multiple policemen)
- (17) a. Dürüst bir ÖĞRETMEN her toplantı-ya gitti.  
 honest a teacher-Nom every meeting-Dat has.gone  
 ‘An honest teacher has gone to every meeting.’  
 b. Hayır (‘no’), (dürüst) bir ÇİFTÇİ her toplantıya gitti. = (14)  
 (ambiguous: one or multiple farmers)
- (18) a. Hoş bir ADAM her masa-da konuklar-ı ağırladı.  
 charming a man-Nom every table-at guests-Acc has.entertained  
 ‘A charming man has entertained the guests at every table’  
 b. Hayır (‘no’), (hoş) bir KIZ her masada konukları ağırladı. = (15)  
 (ambiguous: one or multiple girls)

Parallel to (10) in (16)-(18) the multiple reading for DP1 is readily available.<sup>11</sup> (13)-(15) also show that the distinction between (4) and (9) has nothing to do with Case marking.

In the following discourse, where DP1 is [+anaphoric] Given Information, the multiple reading is crucially not available at all. As noted by S. Şener (p.c.) these would be echo type questions. What is relevant here is not, however, what is being asked but what is not being asked, i.e. the Given Information in the question-answer pairs.

- (19) a. Kızgın bir polis ne yapıyordu?  
 angry a policeman-Nom what was.doing  
 ‘What was an angry policeman doing?’  
 b. (Kızgın bir polis) HER KAPIYI çalıyordu. = (13)  
 (one policeman)
- (20) a. Dürüst bir çiftçi nere-ye gitti?  
 honest a farmer-Nom where-Dat has.gone  
 ‘Where has an honest farmer gone?’  
 b. (Dürüst bir çiftçi) HER TOPLANTIYA gitti. = (14)  
 (one farmer)

<sup>11</sup> Göksel & Özsoy (1998) propose a Focus domain between the element with pitch accent and the predicate, occupied entirely by Focused elements. Clearly that domain contains Given Information in (10), (16)- (18). This poses a problem for their analysis but is in keeping with İşsever (2001).

- (21) a. Hoş bir kız ne yaptı?  
 charming a girl-Nom what.has.done  
 ‘What has a charming girl done?’
- b. (Hoş bir kız) her masada KONUKLARI ağırladı. = (15)  
 (one girl)

In [(10),(16)-(18)] vs. [(19)-(21)] C-Focus New Information DP1 multiplies in inverse QDs while [+anaphoric] Given Information DP1 does not. I propose a working hypothesis:

- Discourse Structure Constraint on QDs - Formula 1** - to be updated in Section III  
 (22) Under Quantificational Dependencies the multiple DP is Focus/New Information.

This proposal is updated and formalized in Section III below. Once discourse structure is analyzed in terms of locality, (22) translates into a locality constraint on the multiple DP in Section V, that a multiple DP must not only reside within the predicate domain of the BP but that it must also be bound from, i.e. defined within that same predicate domain. In Section V.1 the analysis returns from locality back to discourse structure as the final definition of QDs since it is discourse structure that can account for the difference between Turkish and English, while locality cannot discriminate between them. At the same time, discourse structure is analyzed in terms of binding structure, which is organized in terms of locality. Section II has then provided the data which support the crucial role of discourse structuring in QDs.

### III DISCOURSE STRUCTURE, FUNCTIONS AND QDs

Discourse structuring combined with a functional predicate can be used to update (22). Drawing on Jackendoff (1972) and Krifka (1991) among others, Rullman (1995) assumes a ‘structured meaning’ approach to discourse such that Focus applied to a constituent in a sentence induces a binary partitioning of the meaning of the sentence into Background and Focus.<sup>12</sup> The terms *Given* and *New Information*, respectively, are used here. To anticipate the discussion in Sections IV and V, this binary partitioning breaks ground for the analysis of discourse structuring of quantified DPs in terms of  $\pm$ locality, where New Information is locally defined and Given is defined at text-level. The binary partitioning of a sentence is captured formally by interpreting that sentence as ‘structured meaning’, i.e. an ordered pair  $\langle G, N \rangle$ , (originally  $\langle B, F \rangle$ ) where G is the Given Information and N is the New. In Rullman’s example the predicate is included in the Given but that is not crucial to his analysis. The standard interpretation of the

<sup>12</sup> Rullman’s term *background* for non-Focus Information is also used in many tripartite assessments of discourse structure with a Topic = Given, Focus = New, and Background, information that is unaffected by the assertion, which may contain Given and/or New Information. This ‘background’ is also termed the *Tail* by Vallduví (1992), who terms the Topic the *Link*. It seems that the clearest terminology available for a binary partition of discourse structure is simply Given and New Information so I will stick to them, usually adding or substituting Topic and Focus, and the examples are generally constructed without Background Information. While discourse structure in Turkish is certainly more complex than this (see İşsever, 2001), it is only the binary organization that is relevant for QDs.

sentence is obtained by applying G to N. For example (23)a is associated with the structured meaning (b), while its standard interpretation is (c).

**Rullman's (1995: 222) Focus/New Information Structure**

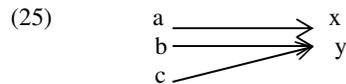
- (23) a. Sue took JOHN to the movies.<sup>13</sup>  
 b.  $\langle \lambda x[\text{took\_to\_the\_movies}(s,x)],j \rangle$  (=  $\langle G,N \rangle$ ; where 'G' includes the predicate)  
 c.  $\lambda x[\text{took\_to\_the\_movies}(s,x)](j) = \text{took\_to\_the\_movies}(s,j)$

The analysis of QDs adopted here is that they obtain under a functional interpretation of the predicate relation, in the mathematical sense (Verkuyl, 1988; de Mey, 1990:30).<sup>14</sup> That is the functional definition of QDs is a primitive, and the term 'functional predicate' is used here. What is a functional predicate as opposed to a straightforward relational predicate, since relations include functions? A binary relation can be defined in terms of the Cartesian product of 2 sets A and B such that a binary relation from the domain A into the co-domain B is a subset of A X B, including 2 place predicate relations. Relations may also have sets as input rather than individual elements, such that A and B would represent sets of sets and  $\alpha, \beta$  sets rather than individuals. A function is a binary relation, with a uniquely determined mapping into B for each  $\alpha \in A$ .

**Function** from A into B is a relation  $R_f$  such that

- (24) a.  $\text{dom } R_f = A$   
 b.  $\forall \alpha \in A \exists ! \beta \in B: \langle \alpha, \beta \rangle \in R_f$

(24) reads: For all  $\alpha$  in A there is a unique  $\beta$  (possibly a set but treated as a plural individual since it is a closed set) in B such that  $\langle \alpha, \beta \rangle$  is a member of the function  $R_f$  from A into B.



Say that A is the set of kids in a room and  $R_f$  is the 'mother' relation, while B is the set of the mothers of the kids. The mother of Alejandro is Xena, the mother of Bert is Yolande, and the mother of Constance is also Yolande, so Bert and Constance are siblings. But there are 3 distinct mother relations for the 3 elements in A even though

<sup>13</sup> Thanks both to E. Ruys and to an anonymous reviewer for pointing out the problem of proper names. Proper names are intrinsically presuppositional, or the listener, upon hearing "Lee", would immediately ask "Who's Lee?" Under van der Sandt's (1992) analysis they are then anaphoric, which renders them Given Information, yet in (23) a proper name is the New Information. Proper names can be the New Information only under the stronger form of New Information, C-Focus, which takes a set of possibilities from the discourse and discounts all but one, rendering that one the New Information with respect to the assertion. For further discussion see Kennelly (to appear).

<sup>14</sup> de Mey considers the relation between the BP *all boys* and the multiple DP *exactly one book*. I have generalized his proposal to account for all multiplication, assuming that a plural multiple DP is treated as a closed set, a plural individual, semantically the equivalent as *exactly one NP*.

they map onto only 2 elements. The range argument of a function within the co-domain can be expressed as in (26):

$$(26) \quad \forall \alpha \in A: R_f(A) := \{\beta: R_f(\alpha, \beta)\}$$

If the predicate relation under QDs has a functional interpretation, then the characteristic function of the resultant DP, which may be a multiple, can be expressed as  $\{x:R_f(\alpha, x)\}$ .

An Atomic Operator that partitions the elements of the domain down to the atomic individual is one way to represent the functional role of a 2-place predicate (van der Does, 1992; Verkuyl, 1993;1994). This is the work that a Distributivity-Operator (D-Op) such as *each/every* performs on a potential BP, feeding a functional interpretation of the predicate since there is a distinct mapping into the co-domain for each individual in the domain. In Kennelly (in progress) distributivity is analyzed as a characteristic of a class of determiners, termed D-Ops, that minimally partition the elements of a plurality down to the individual, usually atomic, trivially disallowing overlapping elements. This imposes an individual satisfaction of the predicate for each individual in the domain, which translates as a functional predicate.

However there is no one-to-one mapping between potential BPs with a D-Op and QDs, exemplified in propositions with reciprocals, distributivity without QDs (de Mey, 1990). Since a D-Op always induces a functional predicate, this is simply another way of saying that a functional predicate does not necessarily result in QDs. Empirically a 2-place predicate constrained to a functional interpretation may result in QDs **if** the arguments adhere to the appropriate discourse structure, defined in Section V by locality conditions, and if there is no totality constraint. Note that all the examples of QDs in this article have D-Ops to ensure the functional interpretation of the predicate. QDs without D-Ops are discussed in Kennelly (in progress). The opposition to QDs in natural language is the 'scope independent' or cumulative reading (Scha, 1981; van der Does, 1992), including collectivity (Verkuyl, 1993:28), which has a relational predicate.

I propose to integrate the functional predicate analysis of QDs and Rullman's analysis of the structure of a proposition by separating the predicate from the contents of Rullman's ordered pair and then naming the predicate relation a function. Kempson & Cormack (1980) as well as Ertshik-Shir (1999:119) have proposed a direct link between discourse and QDs and I adopt their analysis that the BP in QDs is the Topic/Given Information. Then Rullman's structured meaning analysis of an assertion can be modified for dependency relations to give a functional predicate relation.

**Discourse Structure Constraint on QDs - Formula 2** - updating (22)

(27) QDs are a functional predicate  $R_f$  from A into B such that

$$\forall \alpha \in A \exists! \beta \in B: \langle \alpha_{\text{Given Information}}, \beta_{\text{New Information}} \rangle \in R_f.$$

(27) is used as the working hypothesis for the integration of discourse structure and Verkuyl's/de Mey's functional analysis of QDs.

Under QDs, the functional predicate in (27) necessarily applies within the predicate domain, imposing a locality constraint on the multiple DP, independent of the analysis of discourse structure.

**Locality Constraint on QDs - Formula 1** - to be updated in Section IV.5

- (28) A multiple DP under QDs is confined to the same predicate domain as that of the BP.

Data in Section IV show that the Locality Constraint as formulated in (28) is not fine-grained enough. The update of (28) states that the multiple DP is not only confined to a local domain syntactically but must also be locally defined. Then in Section V the two constraints in (27) and (28) are integrated. Since QDs obtain within the predicate relation, a primitive, the Locality Constraint is inviolable.

Intermediate readings, exemplified in (29), pose a serious challenge to the Locality Constraint.

- (29) a. Every witness alleged [that every suspect had some connection to a well-known movie star]. (a distinct star for each witness) (Farkas, 1994: 7 ex. 9)
- b. Each student has to come up with three arguments [which show that some condition proposed by Chomsky is wrong]. (a distinct condition for each student) (Farkas, 1981: 64 ex.17a)

For Farkas the 'Intermediate' reading of (29)a has the syntactic structure in (30)a and the LF in (30)b.

- (30) a. Syntactic Structure: every every a  
b. Logical Form: every a every

I argue that a multiple DP cannot align wherever in the syntax but can only multiply with respect to its relation with the immediate predicate. Intermediate readings are analyzed in terms of a functional predicate in Verkuyl (1999) and in Kennelly (2000; in progress), supporting Fodor & Sag (1982) that there are no real 'Intermediate' readings as in (30)b. In (31), for a model with five professors, although the precise number of students is irrelevant it is not possible that there be a total of one student rewarded by each of the five professors, and that that one student then read five distinct recommended books.<sup>15</sup>

- (31) Every professor rewarded every student [who read *a recommended book*].  
\* 5 professors, 1 student, 5 books (Kennelly, 2000)

Under a five book 'Intermediate' reading if the LF in (30)b is correct for (31) then there should be a relation between professors and books without any regard for the students. Under a functional predicate approach, the number of books can only vary in terms of the *read* relation with the students. Therefore the fact that there is no five book reading without a variation in students is taken as support of the functional predicate analysis of quantification and consequently of the Locality Constraint in (28). In Section III the integration of discourse structure and a functional predicate under QDs takes the form of two constraints, one for discourse structuring in (27), motivated by the data in

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<sup>15</sup> It has been suggested that *every student* cannot be used in a context where there is only one student, but that is not correct: *Lee saw to it that every student had left the canteen before locking the doors* can readily be used even if there was only one student in a given situation.

Section II, and one for locality conditions in (28), motivated by the functional definition of the predicate.

#### IV ±LOCALITY AND INDIRECT BINDING IN THE FORM OF DISCOURSE-LINKING

In this section D-Linking is introduced, as well as several theories of discourse structure as related to the semantics of DPs. The importance of a local binder of D-Linking to New Information is demonstrated as well as the tie between the local resolution of D-Linking and QDs, supporting both the Discourse Structure Constraint in (27) and the Locality Constraint in (28). Definites are shown to pattern with specific indefinites where there is overt local D-Linking and a functional predicate, such that all types of specific DPs may multiply if locally defined, where the local definition of a DP is analyzed here and in Section V as New Information. From the data the analysis that emerges is that it is D-Linking that shapes discourse structure of specific quantified DPs, and consequently their capacity to participate in QDs.

Weak determiners are considered ambiguous between a quantificational (BP) interpretation and a cardinal or 'adjectival' interpretation. If this analysis is taken seriously, when strong determiners such as *each* are not BPs they must also have an 'adjectival' interpretation, as in (32).

- (32) a. Each child opened the/those/both box(es).  
(cumulative reading only, no QDs)
- b. Each child opened every/each/most/many/all (the) boxe(es).  
(cumulative reading only, no QDs)

However a strong DP is considered inherently quantificational. In sentences like (32) with a strong DP1 and a quantified DP2, DP2 is said to be in the 'scope' of DP1. If DP2 does not multiply it has 'escaped' the scope of DP1, motivating covert movement at LF, i.e. QR (May, 1985). This article argues that DPs do not vary in their interpretation with respect to quantification nor do they undergo covert movement at LF. Furthermore no determiner has an 'adjectival' interpretation, seen clearly in Turkish where a determiner blocks NP incorporation but an adjective does not (Kennelly, 1999). It is an empirical fact that any quantificational determiner may appear on either a BP or on a multiple DP, with crucial supporting data in Section IV.5. Only rigid designators cannot multiply since they do not contain an unbound variable, and there is no pair of determiners that disallows a cumulative interpretation (Kennelly, in progress). This paper proposes that QDs reflect binding structures, one form of dependencies, that can be classified for their interaction with QDs in the way that they determine discourse structure.

A presupposed DP is [+anaphoric] (van der Sandt, 1992) and therefore must be Given Information since it has already appeared in the discourse. The extension of such an analysis is that for quantified DPs a) all Given Information is [+anaphoric] and that b) New Information is [-anaphoric], rendering it a local phenomenon as proposed in the working definitions in Section I. In (32)a DP2 is a definite object, and therefore [+anaphoric] Given Information. It does not multiply in spite of the D-Op on DP1 and the resulting functional predicate. The fact that DP2 is Given and does not multiply concurs with the Turkish data in (19)-(21) in support of the Discourse Constraint in (27) that the multiple DP must be Focus/New Information. Since both arguments in (32)a

are Given Information the New Information must be the predicate relation. In (32)b the strong DP2s are not necessarily definite but are presupposed and so pattern with (32)a since they are [+anaphoric].

#### IV.1 Göksel (1998)

For the ambiguity in sentences of the type seen in (1) and in (33) below, Göksel (1998) was one of the first to proffer an analysis in terms of  $\pm$ local dependencies.

- (33) Her doktor bir hasta-yı tedavi etti. (adapted from Göksel, 1998)  
Every doctor-Nom a/one patient-Acc has.treated  
'Every doctor has treated a patient.'  
(ambiguous: one or multiple patients)

Due to the specificity indicating Accusative clitic (Enç, 1991) and to the indefinite article, DP2 in (33) is a specific indefinite. Göksel analyzes the ambiguity in (1)/(33) in terms of a skolem function, proposed as intrinsic to all indefinites. She states that a skolem function is by definition dependent, with an unspecified source of its dependency.<sup>16</sup> According to Göksel's analysis this applies to all indefinites. She also posits a covert sentence initial temporal specification (operator). She then analyzes both linearly preceding universal quantifiers and the sentence initial temporal specification (operator) as potential sources for the dependency of (skolem functions intrinsic to) indefinites. These two flavors of dependencies would then be responsible for the ambiguity in (1)/(33): the preceding universal quantifier dependency with the indefinite results in multiplication and QDs while a temporal dependency results in a fixed or text-level interpretation of the indefinite with a 'scope-independent' cumulative reading.

At the same time (34) is problematic for Göksel's analysis:

- (34) Her doktor bir hasta tedavi etti.<sup>17</sup>  
Every doctor-Nom a/one patient-@ has.treated  
'Every doctor has treated one/a (nonspecific) patient.'  
(multiple patients)

In (34) DP2 *bir hasta* 'a/one patient' is nonspecific and has only a multiple interpretation. Since the source of the fixed interpretation of the indefinite in (1)/(33) was the covert temporal specification at the beginning of the sentence, then the nonspecific object would be without this potential dependency for its 'inherent' skolem function. This may in fact be a characteristic of nonspecifics. So without calling into question whether Göksel's analysis is correct or not, I would like to investigate specificity as a form of dependency, i.e. of indirect binding or D-Linking as proposed by Enç (1991), which suggests a more discourse oriented explanation of the data. My

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<sup>16</sup> In reality skolem functions may also be independent, 'skolem constants', as noted by one reviewer.

<sup>17</sup> The nonspecific object is morphologically explicit in Turkish in the absence of the Accusative clitic (Erkū, 1982:30; Enç, 1991:4), glossed '@'. Incorporation of a nonspecific object in Turkish obtains when the immediately preverbal nonspecific noun is an NP rather than a DP (Kennelly, 1999). In this case it is interpreted as a 'type' rather than as a 'token'. Using 3-place predicates that have both QDs and cumulativity Kennelly & Reniers (1999) and Reniers & Kennelly (1999) have demonstrated that QDs cannot be a form of incorporation.

proposal also draws heavily on van der Sandt's (1992) forward-looking integration of binding structures and pragmatics.

#### IV.2 Enç (1991) and Discourse Linking

Enç's (1991) analysis of specificity, which she equates with D-Linking, is grounded in the work of Kamp (1981)/Heim (1982). According to them an indefinite, *a man*, and a definite, *the man*, are variables rather than quantified D/NPs. Heim adds that the distinction between the two lies in the Novelty Condition vs. the Familiarity Condition: an indefinite has no antecedent; a definite must have one. This can readily be translated into New and Given Information, and drawing on (the extension of) van der Sandt's analysis we have these as [-anaphoric] and [+anaphoric] respectively. So indefinites of the type *a NP*, all the examples in Section II, would be [-anaphoric] New Information and definites [+anaphoric] Given Information. Consequently discourse roles would be determined directly from the semantics of the DP.

Enç's (1991:7) definition of specificity extends the Kamp/Heim analysis so that a specific DP has a D-Linking dependency on a previous discourse referent. She creates a system of feature-bearing indices to articulate her analysis. A DP has two indices: one is the referential index, *i*, which corresponds to the discourse referent, and the other, *j*, relates the referent of the DP to other discourse referents. The indices themselves bear a definiteness feature. This feature on the referential index *i* reflects the definiteness of the DP. That on the second index, *j*, constrains the relation of the referent of the DP to other discourse referents; i.e. it expresses the familiarity or novelty of the discourse referent to which the referent of the DP stands in a subset (or some other D-Linking) relation. It reflects the specificity of the DP.

- |         |                                      |   |
|---------|--------------------------------------|---|
| (35) a. | the man <sub>i</sub> [+def], j[+def] | identity relation with a discourse referent <sup>18</sup> |
| b.      | a man <sub>i</sub> [-def], j[+def]   | specific indefinite - D-linked                            |
| c.      | a man <sub>i</sub> [-def], j[-def]   | nonspecific   |

Under Enç's analysis, a DP is specific if the *j* index is definite, whereby the Familiarity Condition requires that *the discourse referent to which the referent of the DP bears a subset (or other) relation be in the domain of discourse prior to the utterance of the DP*. A definite DP is always specific because its linking is the identity relation to a discourse referent, represented in the *j*[+def] index. However, it is shown in Section IV.5 that the anaphoric identity relation must be either attributed to a distinct index or to the '*i*' index, since definites can also have a distinct D-Linking relation in addition to the anaphoric relation and the '*j*' index is needed for that.

An indefinite DP is only specific if its referent is a subset of, or otherwise related to, a discourse referent. In other words it must be included in or related to an element in the Common Ground, i.e. the set of propositions that constitute shared knowledge by the speaker and listener (Stalnaker, 1978:281). Then a specific DP presupposes both a) a 2-place relation where the specific DP is one of the arguments **and** b) a second

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<sup>18</sup> Note the absence of: the man<sub>i</sub>[+def],j[-def]. Condoravdi (1992) fills it in her analysis of Greek definite plurals as 'Weak' Familiarity as well as the English *There's this man sitting on that bench over there*.

argument for that relation whereby that second argument is an element within the Common Ground, i.e. it is presupposed. If the relation under (a) is the subset relation, exemplified by *which NP*, then the dependent D-Linked DP must also be presupposed. However this is not necessarily the case for all flavors of D-Linking relations, exemplified in IV.3 below. To return to Enç, according to her analysis, the  $j[+def]$  index is morphologically overt in Turkish in the form of the Accusative clitic.<sup>19</sup> Then in (1)/(33) the  $\pm$ multiple specific indefinite DP2 in the immediately preverbal Focus position is [ $\pm$ anaphoric] [+D-Linked] New Information, where its anaphoric status depends on the nature of the D-Linking. However it is not the  $\pm$ anaphoricity that determines the ambiguity in multiplication. In order to clarify this issue in Section IV.6, first further discussion of the nature of D-Linking is necessary.

A consequence of Enç's analysis is that a nonspecific DP would be without a relation to a discourse referent so it is [-anaphoric] [-D-Linked] New Information.<sup>20</sup> To further clarify Enç's position consider the following sentences with nonspecific yet nevertheless presupposed DPs.

- (36) a. Temizlik yaparken bir vazoyu kırdım. (Erguvanlı-Taylan & Zimmer, 1994:3)  
 cleaning while.doing a vase-@ I.have.broken  
 'I broke a vase as I was cleaning.'<sup>21</sup>
- b. Komşumuz bir çocuk öldürdü. (Erguvanlı-Taylan & Zimmer, 1994:3)  
 our.neighbor-Nom a.child-@ has.killed  
 'Our neighbor has killed a child.'

In (36) the unmarked and therefore nonspecific object DP2 is labeled  $i[-def],j[-def]$ . Consonant with her analysis of specificity in terms of discourse is the fact that verbs of destruction, which presuppose the existence of their object, may take an unmarked nonspecific object DP. Here we have presupposed nonspecifics that are nonetheless [-anaphoric] [-D-Linked] New Information. They are New Information with respect to the discourse but they do not assert the existence of the NP; the predicate is clearly the source of the existential form of presupposition. These data support Enç's claim that specificity is defined in terms of presupposition of a relation to an element within the Common Ground rather than presupposition of existence, and the term 'presupposition' is used here in the sense of Enç and van der Sandt, i.e. [+anaphoric] in the discourse.

<sup>19</sup> Condoravdi (1992) also has a system in which there are two indices: 1) Novelty/Familiarity Condition and 2)  $\pm$  entailed descriptive content. She states that a specific indefinite (Weak Novelty) is only required to obey the Novelty Condition. That is its discourse referent *must be distinct* from previously established discourse referents. At the same time it entails the descriptive content of the DP. In contrast, the discourse referent of a nonspecific indefinite is further *required to be unrelated* to previously established referents. A nonspecific introduces a new discourse referent. Contra Condoravdi I claim that a specific indefinite may also be unrelated to previous discourse referents that reside external to the clause, rendering it Novel, i.e. New Information, or it may be related to a previous discourse referent external to the clause, rendering it Familiar, i.e. Given Information.

<sup>20</sup> Kennelly (1996) gives Turkish data to show that a nonspecific DP may have 'accidental coreference' with a previously occurring DP in the discourse.

<sup>21</sup> The perfective in Turkish is necessarily 'translated' by the simple past in English in this sentence.

### IV.3 Discourse Linking and Relational Nouns

Enç equates (p.21) the notion of specificity to that of D-linking and nonspecificity to the cardinal/nonquantificational interpretation of weak determiners, i.e. those determiners that may appear in existential sentences (Milsark, 1974; 1977). In contrast to nonspecifics, specific [+D-Linked] DPs (including all DPs with strong determiners which are presuppositional and therefore [+anaphoric]) are infelicitous in existential *there* sentences, seen in (37)a. Relational nouns have the same infelicity in existential *there* sentences, seen in (37)b.

- (37) a. \* There is every child in the garden.  
b. There is a brother in the garden.  
(\*somebody's brother; √ a religious 'brother')

(37)b can only be interpreted with the non-relational interpretation of brother as some kind of religious person. In the sense of a relational noun it is infelicitous in the same environment that rejects specific DPs. This can be taken as evidence that specific DPs and relational nouns are essentially the same; they are both [+D-Linked], even in the absence of an overt link or binder, providing further empirical support for Enç's analysis of specificity. So a relational noun is intrinsically specific.

Relational nouns are useful in demonstrating how D-Linking works. A relational noun such as *brother*, in the absence of a possessive to identify who the referent is a brother of, induces the 'accommodation' of information by the listener, the equivalent of presupposition accommodation (Lewis, 1979). Natural language provides different cues for that accommodation. If one hears 'three brothers', under a Least Effort Principle, one accommodates the least possible information: since the relation is given and there are three participants available one presupposes that the brother relation applies to those three and that they are brothers of each other. But if one hears 'three mothers' one has only the relation as given while the second argument of the kinship relation is missing so one accommodates at least one presupposed child for each woman. But that does not mean that the specific relational DP of itself is presupposed. In *Everyone here has a brother* the set of (relevant) brothers is not necessarily presupposed information. Consequently relational nouns, in contrast with specific DPs that constitute a subset of a presupposed set, are ambivalent as to whether they are presupposed or nonpresupposed specifics; they are [±anaphoric].

D-Linking plays a critical role in structuring discourse. Since it is clear from Section II that discourse structure plays a role in QDs, then the interaction of D-Linking and QDs will also shed some light on the interaction of D-Linking and discourse structure. In Hintikka's famous example of the multiplication of a specific indefinite in (38) the effect the relational noun has on QDs is explicit.

- (38) Every true Englishman<sub>i</sub> adores a certain woman – his<sub>i</sub> mother.  
(only multiple women) (adapted from Hintikka, 1986)

Here the D-Linking relation is the mother relation, and the specific indefinite DP<sub>2</sub>, clearly [-anaphoric] as well as [+D-Linked], unambiguously multiplies.<sup>22</sup> From the data

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<sup>22</sup> One reviewer questioned if there were a D-Linking relation in *Every true Englishman loves a certain woman - his Queen*. Ignoring the metaphorical use of *Queen* which would allow

in Section II the constraint emerged that only New Information DPs multiply, formulated in (27), and supported by (32) where Given Information DPs do not multiply. In (38), given a functional predicate, a specific indefinite unambiguously multiplies if locally bound, i.e. if locally defined. Then consonant with a) the Discourse Constraint in (27) proposed to account for the data in Section II, and with b) the Locality Constraint in (28), the analysis that emerges is that if the specific DP is locally defined as in (38), the [+D-Linked] DP behaves as New Information and it is due to that discourse role that it may multiply. In Section IV.4 there is more data to support the analysis that the local definition of a DP determines its status as New Information.

#### IV.4 Discourse Linking and the Presentational Focus Position

A specific indefinite is infelicitous in the immediately preverbal Focus/New Information position in Turkish, under the same constraint that applies in existential sentences in (37). In spite of the analysis of indefinites as [-anaphoric] New Information, the dependency that comes with the indirect binding of a [+D-linked] relation of a specific DP makes it paradoxical in the immediately preverbal P-Focus position in Turkish, seen in (39)a/(40)a.

- (39) a. \* Her tamirci            nefis bir elma-yı yedi.  
           every mechanic-Nom    delicious an apple-Acc has.eaten  
           'Every mechanic has eaten a delicious (specific) apple.'
- b. Her tamirci            eski bir araba-yı tamir etti.  
           every mechanic-Nom old a car-Acc            has.repaired  
           'Every mechanic has repaired an old (specific) car.'
- (40) a. \* Her doktor            eski bir araba-yı aldı.  
           every doctor-Nom    old a car-Acc            has.bought  
           'Every doctor has bought an old (specific) car.'
- b. Her doktor            ihtiyar bir hasta-yı tedavi etti.  
           every doctor-Nom    an elderly patient-Acc has.treated  
           'Every doctor has treated an elderly (specific) patient.'

However, if there is a local resolution of the D-Linking relation the proposition is felicitous, seen in (39)b/(40)b. An occupational noun such as *tamirci* 'mechanic' or *doktor* 'doctor' brings with it a particular body of world knowledge, which includes elements such as *eski bir araba* 'an old car' / *ihtiyar bir hasta* 'an elderly patient'. Given the lexical cue of these nouns it is an easy step for a listener to accommodate a relation between them. That is, the occupational noun DP1 in the felicitous (39)b/(40)b not only provides the second argument for the D-Linking specificity relation for DP2, but it also cues the listener to allow her/him to accommodate the nature of that D-Linking relation. Since the accommodated D-Linking relation in (39)b/(40)b is locally resolved then the specific indefinite may occur in the P-Focus position for New Information. If there is

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multiplication under a Fodor & Sag (1981) *have-in-mind* type of D-Linking relation with the subject, the term *Queen* behaves as an indexical or a context dependent expression such as *President* which has a fixed reference for any given time, world context (Kaplan, 1978) and is therefore used to indicate a defined individual with respect to that same time, world context. Consequently the link that exists is not with an element in the Common Ground.

no local dependency, a specific indefinite is infelicitous as New Information, as in (39)a/(40)a. This supports the analysis of (38) that the local definition of a DP renders it New Information and consequently under the Discourse Constraint in (27) it may multiply. Section IV.5 shows that this also holds for definites.

#### IV.5 Discourse Linking and Definites

The indirect binding in a locational D-Linking relation used with a definite DP2 can also tell us a lot about locality, discourse structuring and QDs. Enç claims that definites have a D-Linking relation of identity, represented in the 'j' index. In (41) there is another flavor of D-Linking, a locational relation, that is crucial for the multiplication of definites and which should be reflected in j[+def]. Compare the following:

- (32) a. Each child opened the/those/both box(es).  
(cumulative reading only, no QDs)
- b. Each child opened every/each/most/many/all (the) boxe(es).  
(cumulative reading only, no QDs)
- (41) a. Each child<sub>i</sub> opened the/those/both box(es) in front of her<sub>i</sub>.  
(unambiguous QDs)
- b. Each child<sub>i</sub> opened every/each/all/most/many (of the) box(es) in front of her<sub>i</sub>.  
(unambiguous QDs)

With anaphoric binding due to their presuppositional status DPs with a strong determiner are Given Information and have a text-level definition which results in a fixed quantity, seen in (32). However, just as (presupposed, anaphoric) proper names can be the New Information with respect to the assertion under contrast, seen in Rullman's (1995) example in (23) and discussed in footnote 12, so may specific quantified DPs be New Information with respect to the assertion. However, in this case their assessment as New Information does not depend on contrast but obtains only if they are locally bound, seen in (39)b/(40)b. The local binding of the specific quantified DPs serves the same purpose in Hintikka's example in (38) and in (41) above to coerce a New Information status for them, allowing multiplication under the Discourse Constraint in (27).

If Given Information is [+anaphoric], then the multiple argument in (41) that is definitely [+anaphoric] should be construed as Given Information, which would then challenge the Discourse Constraint for QDs in (27), leaving the data in Section II unaccounted for. From Hintikka's example in (38) and from (41) it is clear that the Locality Constraint on the multiple DP, proposed here to be New Information, must be formulated not only in terms of anaphoric binding but also in terms of another flavor of dependency, indirect binding in the form of D-Linking, distinct from anaphoric binding. Consider for a moment what a multiplied definite means in terms of anaphoricity. *The NP* in the singular means there is a single antecedent for the DP. Yet in *Every child opened the box in front of her*, in a model with 5 children, *the box* means *5 boxes*, for which there is no antecedent. What is the role of the definite determiner here? What is the possible anaphoric relation? It is clear that the D-Linking relation has in some sense cancelled or at least coerced the definite

determiner to a local accommodated resolution of anaphoricity. The power of D-Linking, i.e. of indirect binding, to coerce the interpretation of a DP and consequently its discourse role is one of the central points of this article.

Enç's system is not fine-grained enough to deal with multiplied definites. It either needs a third index to indicate the  $\pm$ anaphoricity of a DP or else anaphoricity needs to be represented in the 'i' index. However if that option is taken, then the definite DP2 in (32) would be  $i_{[+def]}j_{[-def]}$ , since there is no overt D-Linking relation other than anaphoricity, i.e. identity. This would make it a weaker form, in some sense, than the DP2 in (41), which is  $i_{[+def]}j_{[+def]}$ . This is counter-intuitive, to say the least, and would then line up the definites in (32) with those discussed by Condoravdi (1992), sketched in footnote 18. Multiple definites are a problem for Enç's analysis. Both a specific indefinite, including relational nouns, and a definite have a  $j_{[+def]}$  index and therefore should be defined at text-level as Given Information. Nonetheless if a D-linking relation is locally resolved the specific quantified DP patterns with New Information DPs in Section II and multiplies.

#### IV.6 Discourse Linking

What kinds of relations constitute D-linking? (42) lists a few.

##### (42) D-Linking Relations:

- a) a (covert) subset relation, i.e. a partitive (Enç 1991)
- b) defined by relational nouns such as *brother* or *mother*, in (37)b and (38)
- c) cued by occupational nouns such as *doctor* or *mechanic*, in (39)b/(40)b
- d) a *have-in-mind* relation with either the subject (local) or the speaker (text-level), proposed by Fodor & Sag (1982)
- e) a locational relation, in (41)

Surely there are many others.

Finally to return to the issue of whether it is [ $\pm$ anaphoricity] of a dependent D-Linked DP that determines its ambiguity with respect to [ $\pm$ multiplication]. The distinction between the ambiguity in multiplication in (1)/(33) and the lack of ambiguity in (38) is clearly the presence of an overt local binder of the D-Linking relation in (38). This supports the idea that the QDs reading in (1)/(33) is similarly obtained by means of a local dependency relation in the form of accommodated D-Linking. Certainly the accommodation of information seen for the second argument of a relational noun could also apply to the D-Linking relation itself for the specific DP2 in (1)/(33). For a relational noun an argument is accommodated, for the specific DP2 in (1)/(33) it is the D-Linking relation that is accommodated. Consider (1)/(33) in terms similar to those used by Göksel (1998). There is one interpretation of the specific DP2 with a local binder, DP1, for the D-Linking relation. The referents of the multiple DP are elements contained within the world introduced by the referents of the BP. For this discussion call the accommodated D-Linking relation a subset relation, whether the superset is the world introduced by doctors or by patients or something more constrained is irrelevant to our purposes. Consequently the specific DP2s in (1)/(33) are examples of presupposed [+anaphoric] DPs that multiply under local binding, in the same fashion that *a certain woman* multiplies in (38). There is also a D-Linking binder that resides

external to the immediate predicate domain, at text-level, say an accommodated *have-in-mind* relation with the speaker, proposed by Fodor & Sag (1982), resulting in a cumulative 'scope-independent' reading. The ambiguity in multiplication is in fact due to [ $\pm$ anaphoricity], but contrary to expectations here the anaphoric relation is locally resolved resulting in multiplication, while there is also a non-anaphoric accommodated relation with the speaker that results in a text-level definition of the DP and a fixed quantity. Therefore it is not the case that [+anaphoric] necessarily lines up with a fixed quantity and [-anaphoric] lines up with multiplication. It is not the nature of the (indirect) binding but rather the position of the binder that is crucial to the multiple DP under QDs, claimed in (27) to be New Information.

To recap what has been said about D-Linking, a specific DP presupposes both an element within the Common Ground, a presupposed DP, as well as a link between that DP and the specific DP. If the link is a subset relation the specific DP is also presupposed and therefore [+anaphoric]. However this is not necessarily the case for relational or occupational nouns. If the presupposed D-Linking DP is not overt it can be accommodated by the listener, as can the D-Linking relation, frequently with a *have-in-mind* relation with either the 2<sup>nd</sup> argument of the predicate relation or with the speaker (Fodor & Sag, 1982), resulting in a local or text-level definition respectively. Even anaphoricity can be locally resolved, and if so, the specific DP may multiply. So specifics may be bound either locally or at text-level. If locally bound they qualify as New Information and may multiply.

Before formulating a proposal to this effect, consider a summary of the theories and the problems with respect to QDs:

(43) **Theories of Discourse, (In)definites and (Non)specificity Under QDs**

Proposal in (27)	Given = BP	New = multiple DP
extended v.d.Sandt	<u>Given</u> [+anaphoric] presupposed DPs, including subset spec. indef	<u>New</u> [-anaphoric]
Heim	<u>Familiarity</u> definite	<u>Novelty</u> indef, including spec indef.
Enç	definite 'i' +def 'j' +def	spec indef (subset) 'i' -def 'j' +def

These organizations of discourse with respect to (non)specificity and (in)definiteness are not fine-grained enough to handle the following data (with a functional predicate imposed by a D-Op):

(44) **Problematic Data for the Standard Theories in (43)**

Spec indef: [Contrast. Focus = multiple DP] vs. [Given Info. = \*multiplication]  
(10),(16)-(18),(19)-(21)

Spec indef DP2 [ $\pm$ anaphoric][+D-Linked]                      multiple or ambiguous  
(1), (33), (38)

Spec def DP2 [+anaphoric] if [+D-Linked] locally              multiple  
(41)

According to Heim and Enç indefinites are always New Information and therefore they must be [-anaphoric], qualifying them as potential multiple DPs. Under all theories definites are [+anaphoric] Given Information so they would not qualify as multiple DPs under the Discourse Constraint in (27). But this clearly does not reflect the empirical facts. Specifics, both definites as well as indefinites, may have a text-level or local binder for their D-Linking relation and may multiply if and only if they are locally defined. Both (non)specificity and (in)definiteness are then relevant to multiplication only to the extent that they feed or bleed locality, depending on the local vs. text-level binding, and only in this way do they determine discourse roles.

(45) emerges as a proposal:

**Proposal:**

- (45) Local vs. text-level binding of D-Linking relations coerce the status of specific DPs as New or Given Information, respectively.

Now the Locality Constraint in (28) needs to be reformulated, as in (46), with the final formulation to come in Section V.

**Locality Constraint on QDs - Formula 2** - updating (28), to be integrated with (27) in Section V

- (46) A multiple DP under QDs is **defined** within the predicate domain where its BP syntactically resides.

The data in Section IV support the proposal in (45) that D-Linking has the power to coerce discourse structuring. The data here also prompt a revision of the Locality Constraint on QDs in (28) to address the locality of the definition of a DP rather than of its syntactic position. In view of (45) the Locality Constraint in (46) is simply a restatement of (27).

**V    The Proposal: Direct and Indirect Binding - Local and Text-level Definitions**

This section articulates the proposal for the interaction of QDs and discourse structure in terms of indirect as well as direct binding. To discuss the opposition of local and text-level definition of a DP, it is convenient to create a system of indices to indicate where a DP is defined with respect to where it resides in the syntax. Assume that the variable in all specific indefinites is (indirectly) bound by a D-Linking relation, not necessarily the subset relation, as sketched in (42), and that definites optionally have a D-Linking relation in addition to and distinct from their anaphoric relation. That is, specific DPs presuppose a dependency relation with an element in the Common

Ground. Further assume that all nonspecifics are subject to clause internal existential closure, say at IP, as stated in Section I. So there are three distinct types of binding under discussion: D-Linking, anaphoric and existential closure.

**Binding and Indices:**

- (47) The variable contained in a quantified DP is bound either indirectly by D-Linking or directly under identity by a) clause internal existential closure, or by b) an anaphoric relation. A DP whose variable is bound by an element that resides syntactically internal to its same predicate domain, defined in (6), carries an index *l*.

This system of indexation captures the idea that DPs have a default interpretation with a text-level definition, that which obtains under a cumulative reading. It is something extra for a DP to be locally bound. In addition, local binding of a definite overrides its text-level anaphoric interpretation.

A DP is defined locally if its binder resides within the same predicate domain as that DP.

**Local Definition of a DP** - drawing on (6)/(8)

- (48) A  $DP_l$  is said to be defined locally with respect to its predicate domain.

I propose that a quantified DP is New Information if its variable is locally bound.

**New Information**

- (49) A  $DP_l$  is New Information to the discourse.

Under existential closure a nonspecific always carries a *l* index  $DP_l$ , and is then always New Information. But specifics can also be New Information if (indirectly) bound by an element within the local predicate domain. That local binding is overt in the Hintikka example in (38) and for the definite in (41). For a specific indefinite a local D-Linking relation may also be accommodated by the listener, as in (39)b/(40)b, or perhaps an accommodated *have-in-mind* relation with the referent of a DP within the same predicate domain.

The option to local definition discussed here is the text-level or 'global' definition of a DP.

**Text-level Definition of a DP** - drawing on (7)/(8)

- (50) A DP without a *l* index is said to be defined at text-level with respect to the predicate domain where it resides in the syntax.

A DP with a text-level definition with respect to some local domain has a fixed reference for the duration of the Speech Act, the set of utterances that constitute the immediate discourse. I further propose that Given Information is not determined by an anaphoric relation, or by a Familiarity Condition, contra Heim (1982), but rather by a text-level definition.

**Given Information**

- (51) A DP that has a text-level definition with respect to the predicate domain of its syntactic position is Given Information.

A Given Information DP may be bound a) by an anaphoric relation or b) by a D-Linking relation, for example the subset relation. Under (b) a Given Information DP that is a specific indefinite may also be bound by an accommodated *have-in-mind* relation with the speaker, among other possibilities.

### V.1 Locality or Discourse Structure?

Is it locality or discourse structure that is the primitive in QDs? Recall from Sections I and II that in Turkish it is very difficult to get an inverse QDs reading while in English it is by far easier. The difference between the two languages in this respect is not fully understood. Turkish is a discourse configurational language and clearly linearity plays a major role in determining discourse roles, seen in (5), as well as prosody. Grammatical structure in Turkish surfaces in Case suffixes, so word order generally reflects discourse structure. English, on the other hand, uses linearity to determine grammatical structure, which necessarily leaves more flexibility in the structuring of discourse, determined mainly by prosody. At the same time, it must be acknowledged that English also prefers sentence initial Topic/Given Information. In terms of locality *per se* the two languages behave the same but with respect to inverse QDs, the more flexible English also has a greater flexibility for discourse structure. This is the empirical fact, so it is discourse structure as a primitive for QDs that is the more informative constraint. As mentioned previously, by indicating discourse structure as the discriminating primitive the door is left open for further amplification of the definitions of discourse structuring, for example in terms of contrast, and its effect on QDs, discussed in Kennelly (in progress).

The Locality Constraint on QDs constrains not where the DPs reside in the syntax, but rather where they are defined; that is a multiple DP must have a *l* index. So now the Locality Constraint in (46) can be reformulated, integrating it with the Discourse Constraint in (27):

#### **Condition A for QDs** - partially integrating (27) and (46)

- (52) In a predicate relation with QDs, those dependencies are defined by a functional predicate  $R_f$ . Assume a set  $A$  such that  $\forall \alpha \in A$ , the multiple  $DP_l$ , a quantified DP, has a characteristic function  $\{x_l : R_f(\alpha, x_l)\}$ .

### V.2 Locality and the BP

Under QDs, the functional predicate applies to a plurality, the BP. Clearly it resides internal to the predicate domain syntactically, however according to Kempson & Cormack (1980) and Ertshik-Shir (1999:119) it is a Topic, consequently Given Information and therefore, under this analysis, with a text-level definition. This makes sense since an assertion needs to be grounded in the discourse. Their proposal can be reformulated in terms of the previous discussion.

### Condition B on QDs

- (53) Any plural DP may be a BP if it is without a *l* index, residing internal to the pertinent predicate domain but defined at text-level, i.e. Given Information. The BP is partitioned to the minimal elements, usually atomic (Kennelly, in progress), such that a functional interpretation of the predicate may apply.

This is also in the spirit of Szabolcsi's (1997) proposal that the BP is a Principal Filter.<sup>23</sup> Note that while the multiple DP is constrained to a quantified DP, the BP is not. Conditions A and B are integrated in the final formulation for QDs in Section V.3.

In (1) and (33), repeated here, DP1 may operate as a BP iff the set of patients/doctors that forms the domain of quantification is fixed with respect to the sentence in which the DP occurs, i.e. if it has a text-level definition (and crucially if Condition A is also satisfied). The sentence initial position of DP1 is that of the default Topic, i.e. Given Information.

- (1) a. Her hasta-y1 bir doktor tedavi etti. (adapted from Göksel, 1998)  
every patient-Acc a/one doctor-Nom has.treated  
'A doctor has treated every patient.'  
(ambiguous: one or multiple doctors)
- (33) Her doktor bir hasta-y1 tedavi etti. (adapted from Göksel, 1998)  
Every doctor-Nom a/one patient-Acc has.treated  
'Every doctor has treated a patient.'  
(ambiguous: one or multiple patients)

Condition B does not mean that BPs **induce** QDs; it is only a statement of the character of the BP once QDs obtain. No DPs are intrinsically BPs; any (non-negative) plural DP may be a BP if the other relevant factors are operative. No one condition for QDs induces QDs. Certainly there are other factors, such as contrast and Focus Operators which all have their effect (Kennelly, to appear). This article is limited to a discussion of examples with D-Ops which force a functional predicate and the result, if Conditions A and B are adhered to and a collective interpretation is not imposed, is QDs.

### V.3 Locality and QDs

We now have the notational tools to discuss QDs in terms of indices, providing the final formulation of an integration of Conditions A and B:

#### Quantificational Dependencies (QDs):

- (54) QDs are a predicate function  $R_f$  from A into B, where B represents a quantified DP, such that  $\forall \alpha \in A \exists ! \beta_f \in B: \langle \alpha, \beta_f \rangle \in R_f$ .

Under Rullman's analysis all New Information is the result of a mapping, from Given to New Information, QDs or no. This predicts that whenever New Information is a DP it cannot undergo long distance scrambling into a syntactic position external to its clause as it would then lose its (sentential) coherence as New Information. Consequently all long distance scrambling will only regard non-Focus elements. I believe that this holds.

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<sup>23</sup> A Principle Filter is limited to upward entailing DPs whereas all determiners, upward or downward entailing, may appear on the BP (Kennelly, in progress).



reading. Under the assumption that English also prefers the first argument as the Topic/Given Information, in (57) the same predicates and argument structures are reversed to accommodate a New Information role of the indefinites. But those same indefinites, *a boy/few students* from (55), have difficulty assuming a Focus/New Information role in (57). This fact indicates that they are the logical Topics of the predicates *eat/read*, and that this discourse role is somehow incorporated into their role as the logical subjects in terms of argument structure. As a consequence, they resist a local definition, resulting in a text-level definition. They are able to multiply with great difficulty, presumably if context (or perhaps contrast) overrides the intrinsic discourse roles. In (56) inverse QDs are readily available with multiplication of DP1, *computer/flag* etc. In (58) the same predicates and argument structure are reversed to accommodate a New Information role of the indefinites. The felicity of the sentences in (58) indicates that those same DPs *computer/flag* etc. readily accept a Focus/New Information role. Therefore they are not the logical Topics in (56) and in a binary analysis for a 2-place predicate they **must be** defined locally and are available for multiplication.

I propose that 2-place predicates have a default organization of both a logical subject/object and a logical Topic/Focus built into their argument structure. Furthermore a) a garden-variety 2-place predicate like *eat/read* associates the logical subject with the Topic and the logical object with the Focus while b) *accompany* type predicates reverse this structure with the logical subject associated with the logical Focus and the logical object associated with the logical Topic. If this analysis is on the right track then the data in (55)-(58) support the proposal that the multiple DP in QDs must be New Information.

In (33) the immediately preverbal P-Focus position for Focus/New Information in (5) is supported by the organization of intrinsic discourse roles of garden-variety predicates such as *treat* where the subject DP1 is the Topic/Given Information and the object DP2 is the Focus/New Information which may multiply. In (1)a, on the other hand, the default discourse structure inherent in the argument structure is overridden by the P-Focus strategy. The subject DP2 is the New Information that may multiply.

Then what about the data in (9)=(10)b?

- (10) b. Genç bir DOKTOR her hasta-ya eşlik etti.  
 young a doctor-Nom every patient-Dat has.accompanied  
 'A young doctor has accompanied every patient.'  
 (ambiguous: one or multiple doctors)

In (10)b the default discourse role of the subject as the Topic is reversed with an *accompany* type predicate. This reversal is supported by contrastive context, inducing C-Focus which may apply to any preverbal element and which is reflected in the prosody (İşsever, 2001). Either C-Focus or P-Focus may be operative for any one assertion, but not both, so the syntactic position oriented P-Focus does not hold. The specific indefinite DP1 in (10)b must have a local definition with a local binder and an accommodated D-Linking relation, say either a *have-in-mind* relation or possibly a subset relation within the world belonging to doctors. That is, under inverse QDs the D-Linking relation is cued and accommodated due to the Descriptive Content of the multiple DP itself as well as the BP. Here linearity does seem to play a role in cueing accommodation. DP1 then has a *l* index and it may multiply. At the same time there is

ambiguity. But surely the New Information might be a single element as well as a multiple DP. So the lexical choice of the predicate feeds an application of discourse structure that renders inverse QDs available, allowing the realization of the (implicature in the) logical entailment in (3)a.

Next return to the original data that disallow inverse QDs.

- (4) a. (Genç) bir doktor her hasta-yı tedavi etti. (adapted from Göksel, 1998)  
(young) a doctor-Nom every patient-Acc has.treated.  
'A (young) doctor has treated every patient.'  
(one doctor)

Under this analysis DP1 is the logical subject of a garden-variety predicate which is then the default Topic/Given Information. Consequently it has a text-level definition. It has no *l* index, which violates (54), and inverse QDs cannot obtain, blocking the (implicature of the) logical entailment in (3)a. The only other possible reading is the cumulative reading with a relational interpretation of the predicate. In (1)a the P-Focus strategy overrides the intrinsic association of discourse roles and argument structure for garden variety predicates such as *treat*, but in (4)a, even if contrastive context and the appropriate prosody are applied, the 'stronger' C-Focus strategy does not have the same capacity to override the default discourse roles. Without the support of a predicate with inverse discourse roles, the C-Focus strategy is not strong enough of its own to invoke inverse QDs. This is problematic for the analysis presented here, for the C-Focus strategy certainly does invoke New Information, which in (4)a nonetheless cannot multiply. Possibly linearity does in fact play some role in determining QDs.

Note that in all the cases of inverse QDs, DP2 is always a D-Op (Kennelly, in progress). In Section II I argued that linearity and c-command have nothing to do with QDs. Yet that is not quite correct or there would also be inverse QDs without a D-Op on DP2, and for garden-variety predicates they don't obtain in either English or Turkish. There are conditions in which QDs are symmetrical with QDs in both 'directions', and others when QDs are asymmetrical, following linearity. The conditions are outlined in Kennelly (in progress).

Data in Section VI support an analysis of (default) discourse roles as an intrinsic part of argument structure, where those discourse roles are claimed to be crucial to QDs. This is offered as an explanation for the lexical variation with distinct predicates for inverse QDs.

## VII CONCLUSIONS

Inverse QDs in Turkish are used to support the claim that it is discourse structure rather than syntactic structure that is crucial to the multiplication of a DP under Quantificational Dependencies. I argue that there is no unique operator at any point that induces QDs. QDs, which result from an interaction of factors, including discourse roles, are analyzed here as a mapping from Given to New Information. Discourse roles are in turn analyzed with respect to where in the syntax a DP is 'defined', with Given Information defined at text-level and New Information defined locally. Data clearly show that (non)specificity and (in)definiteness are relevant to discourse structuring only to the extent that they feed or bleed locality of the definition of the DP in question. The nature of binding also comes into play. Direct binding is under an identity relation whereas indirect binding in the form of Discourse Linking, a presupposed dependency,

is an equally powerful tool, if not more so, in determining the  $\pm$ locality of the definition of a DP, and consequently the structuring of discourse. And it is discourse structure that shapes the structure of quantification. That is QDs reflect binding structures, one form of dependencies, that can be classified for their interaction with QDs in the way that they determine discourse structure. Once a single operator analysis of QDs is abandoned, the dynamics of pragmatic phenomena such as contrast (Kennelly, to appear; in progress) can also be examined to appreciate their effect on quantification. Although problems remain, nevertheless the study of Quantificational Dependencies has led to a far more fine-grained understanding of discourse structuring.

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## PRAGMATICS AND QUANTIFICATIONAL DEPENDENCIES

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### Abstract

The dependency relation in Quantificational Dependencies (QDs) is analyzed here as a non-assertive DP defining relation that maps from Given to New Information, a form of D(iscourse)-Linking (Pesetsky, 1987). Given and New Information are analyzed by means of their binding structures: Given Information is bound, and hence fixed at text-level while New Information is a local phenomenon. Every multiple DP, under this analysis New Information, is linked by a dependency relation to a local Given DP, such that the multiple DP is then necessarily specific under the D-Linking relation. Drawing on Farkas (1997), the D-Linking dependency in QDs translates into a local dependency of functions that assign values to the variables contributed by DPs. Turkish data show that contrast and Focus Operators may induce QDs, without the overt minimal partitioning elicited by a strong determiner on the Given DP. This article proposes that the *Only Effect* that is associated with contrast and Focus Operators instantiates a shift in the assertive force of the proposition by introducing a negative assertion of the relative alternatives to the focused element. The result is that the lexical predicate is demoted to non-assertive D-Linking status. In this role it may sustain the dependency that defines QDs, and it does.

### I INTRODUCTION

Nominal 'scope effects' are analyzed here as Quantificational Dependencies (QDs) induced by diverse and interacting factors, including pragmatics. This is in opposition to a) any form of Quantifier Raising (QR) (May, 1985) in the syntax or to b) a single Operator mechanism in the semantics. QDs are defined as a 2-place relation

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\* This paper owes a great deal to the work of Farkas (1994; 1997; 2001) and to crucial discussion with C. Bozşahin, J. Hoeksema, S. İşsever, K. Oflazer, E. Ruys, B. Say, S. Şener, M. Steedman, H. deSwart, Ü. Turan, E. Uzun and D. Zeyrek. It draws freely on my dissertation *Quantificational Dependencies* from Utrecht University.

with co-variation of the two arguments whereby the variation, i.e. multiplication, of one is dependent on the variation within the other (Farkas, 1997), exemplified in the salient reading of (1) with multiple books.

**Quantificational Dependencies = Salient Reading**

- (1) Every child read a book  
(ambiguous: (a) multiple books - salient; (b) one book)

Under (1)a, with a QDs construal, call the dependent DP *a book* the 'multiple DP' and *every child* the 'Base Plural'.<sup>1</sup> 'DP1' and 'DP2' indicate the linear ordering of the arguments. In (1)a the multiplication of DP2 depends on the variation within DP1 and that dependency is sustained by *read*, the Main Predicate of the assertion. DP1 is minimally partitioned by the determiner *every*, resulting in multiple applications of the Main Predicate, whether DP2 multiplies or not.<sup>2</sup> Certainly overt minimal partitioning, i.e. distributivity, of a plurality feeds the dependency that constitutes QDs, but neither does it entail QDs nor is it crucial to QDs.

This paper distinguishes between the predicate relation of an assertion and non-assertive relations that **define** a DP. I argue that the dependency relations that result in QDs are DP defining relations rather than assertive; they define a New Information DP in terms of its dependency on a Given Information DP, where New and Given Information are identified in terms of  $\pm$ locality of their binding structures. Consequently dependencies that result in multiplication are DP defining D(iscourse)-Linking (Pesetsky, 1987; Enç, 1991) relations, overt or covert. D-Linking results in the specific interpretation of the linked DP, such that any multiple 'nonspecific' DP has been coerced to a specific interpretation. In other words, I claim it is a contradiction for a 'nonspecific' DP, by definition not linked to the discourse, to be dependent on a DP that is Given Information, i.e. a Base Plural, for its interpretation and multiply. That very dependency defines the multiple DP as D-Linked, and therefore as specific.

Under contrast of (any element within) a proposition with a nonspecific, non-D-Linked argument, the resulting *Only Effect* operates to shift the *assertive force* of that proposition to the negation of the (relative) alternatives. Consequently the 'original' Main Predicate is demoted from assertive to D-Linking status, an attributive role. QDs, which are defined by a local D-Linking relation, obtain within the 'demoted' attributive predicate relation which embodies the *quantificational force* of the proposition; in this case no strong determiner or minimal partitioning is needed, only a plural Given Information DP to act as the Base Plural.

<sup>1</sup> The term 'Quantificational Dependencies' originated from a discussion with J. Hoeksema, but it also appears in Partee et al. (1993); 'multiplication' is from Szabolcsi (1997); I coined 'Base Plural'.

<sup>2</sup> A Minimal Partition Operator is defined in (i) where  $\langle\langle e, t \rangle, t \rangle$  simply identifies X, Y and Z as sets of sets.

**Minimal Partition Operator**

- (i) MinPart-Op := a)  $\lambda X_{\langle\langle e, t \rangle, t \rangle} \lambda Y_{\langle\langle e, t \rangle, t \rangle} [Y \subseteq X \wedge |Y| = 1] \vee$   
b)  $\lambda X_{\langle\langle e, t \rangle, t \rangle} \lambda Y_{\langle\langle e, t \rangle, t \rangle} [Y \subseteq X \wedge \neg \exists Z_{\langle\langle e, t \rangle, t \rangle} (Z \subset Y)]$

Distributivity cannot be analyzed as an atomic Operator because of examples like *The boys and the girls picked 2 flowers each* which allow a 'distributive' reading with the plural individuals *the boys and the girls* resulting in 4 flowers.

By way of introduction to the issues at stake, Section II presents some background, which includes theory challenging data from Turkish to show that standard approaches to QDs cannot be maintained. One offshoot of the Turkish data is that quantification in natural language must necessarily be represented by polyadic quantification (Scha, 1981; Keenan & Westerstahl, 1997; Kennelly & Reniers, 1999). It is assumed that quantified DPs (with a quantifier and a lexical NP) contribute a variable and a descriptive content which is the predication of that variable. Section III briefly presents Farkas' (1997; 2001) structure independent framework where QDs are defined as dependencies of functions that assign values to the variables contributed by DPs. I then elaborate on her proposal, claiming that assignment functions are introduced by means of a) D-Linking, a non-assertive 2-place relation between the value assigned to a discourse referent and that assigned to the variable contributed by the 'D-Linked', *specific* DP,<sup>3</sup> or b) for the variable contributed by a nonspecific DP by default existential closure (Kennelly, in progress). The power of D-Linking lies in its capacity to introduce assignment functions that determine the value of a variable contributed by a DP; i.e. they **define** a DP. Iff that assignment function(s) is dependent on the assignment functions relevant to a local, plural, quantified Given Information DP, under a non-identity, non-subset dependency, the dependent DP is defined as New Information and the D-Linking dependency relation constitutes *quantificational force*.<sup>4</sup> The term *quantificational force* is used here in the sense of the characteristic that is unique to QDs, not simply the minimal partitioning of a set, although that certainly feeds the dependency. The *local domain* is considered the predicate, its arguments, and adverbs.

Section IV looks at potential QDs construals in propositions with a weak determiner on DP1 and a nonspecific object New Information DP2, that is without overt minimal partitioning of the Base Plural. In apparent opposition to English, this structure does not result in QDs in Turkish. In the absence of *quantificational force* elicited by overt morphology, either contrast or a lexical Focus Operator is necessary to allow a QDs construal in Turkish, seen in Section V. Drawing on Rooth (1985; 1992) and Rullman (1995), contrast and lexical Focus Operators are associated with an *Only Effect*, which in turn is associated with exhaustivity, demonstrated in Section VI. This is in opposition to Rullman's claim that an *Only Effect* is associated with maximality. The result of the *Only Effect* is the negative assertion of the (relative) alternatives. Section VII addresses the consequence of the *Only Effect* on QDs while Section VIII summarizes the issues and offers conclusions.

## II BACKGROUND

It is assumed that determiners and their respective DPs are  $\pm$ definite and that while definites are specific, indefinite DPs are  $\pm$ specific; in addition determiners and their DPs are divided into strong specific (*every, all, each, both, most, many*) and weak (*a, some, few, cardinals*) (Milsark, 1974;1977; Partee et al., 1993:385), with weak determiners ambiguous between  $\pm$ specific. Weak determiners and their DPs have been

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<sup>3</sup> *D-Linking* was coined by Pesetsky (1987) to address the behavior of the *wh*-expression *which NP* that presupposes a superset of NPs.

<sup>4</sup> Turkish Base Plurals are confined to quantified DPs while in English they are not.

judged ambiguous between a quantificational (minimally partitioned and therefore a Base Plural) interpretation and a cardinal or 'adjectival' interpretation; strong determiners and their DPs have been judged as quantificational as well as presupposed. Under a syntactic analysis, if a strong DP is in a 'scope-taking' position, c-commanding a weak DP, an indefinite, and QDs do not obtain then the indefinite is said to have 'escaped' that scope, as in (1)b, under covert movement, i.e. QR at Logical Form (LF). Given that there is no distinction in truth conditions between wide scope and scope independence for singulars, as in (1)b, and since *scope* is elsewhere associated with hierarchical relations for negation and modalities while the analysis presented here is structure independent, the term *scope* is avoided.

I argue that DPs do not vary in their interpretation with respect to quantification and there is no covert movement at LF. It is an empirical fact that any determiner may appear on a multiple DP or, if plural, on a Base Plural, briefly exemplified in (2)a/b. Only pronouns and proper names cannot multiply, as in (2)c, and there is no pair of determiners that disallows a non-QDs construal (Kennelly, in progress).

**Any Determiner May Appear on the Base Plural or on the Multiple DP**

- (2) a. Every/each child<sub>i</sub> pushed every/the/both/two button(s) in front of her<sub>i</sub>.
- b. Both/Five/Some children<sub>i</sub> pushed every/those/two button(s) in front of them<sub>i</sub>.
- c. Every/each child pushed it/Lee.

Therefore the *quantificational force* that characterizes QDs cannot be analyzed simply in terms of the semantics of the pertinent DPs. Given that the Main Predicate is multiple under both (1)a and (1)b, then neither can the Main Predicate necessarily characterize the *quantificational force* crucial to QDs. Consequently, another non-assertive dependency relation, i.e. a binding structure, must define that *quantificational force*. I argue that both appropriate discourse structuring, entailing a local definition of the multiple DP (Kennelly, to appear), and *quantificational force*, entailing the dependency of that local definition, are crucial to QDs.

Within a semantic approach to QDs, two distinct positions are attributed with a QDs inducing 'Operator'. Scha (1981), van der Does (1992) and Verkuyl (1994), among others, propose that the Base Plural induces QDs, due to an (c)overt Distributivity Operator (D-Op), and exemplified by *every* in (1)a. Link (1983; 1984; 1986) acknowledges the importance of the Base Plural but nevertheless posits a covert D-Op on the VP to induce QDs, as do Roberts (1989) and many others.

In Kennelly (in progress) distributivity is analyzed as a feature of strong determiners that minimally partitions the elements of a plurality down to the individuals, usually atomic, trivially disallowing overlapping elements and therefore entailing a functional interpretation of the predicate, in the mathematical sense. That is, for each element in the plural domain, in (1) DP1, there is a distinct mapping (predicate application) to a range argument. There is necessarily a functional predicate relation under QDs (Verkuyl, 1988; deMey, 1990), imposing a strict locality constraint<sup>5</sup>, but the

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<sup>5</sup> The counterexamples to this are a) long distance Inverse Scope (Farkas, 1997; Steedman, 1999) and b) Intermediate readings (Farkas, 1981; Ruys, 1992; Abusch, 1994; Farkas, 1994; Reinhart, 1997; Kratzer, 1998). These are addressed in a) Farkas & Giannakidou (1996) and Steedman

functional predicate does not entail QDs. Under QDs the range argument is the multiple DP; with a functional predicate under a non-QDs or 'scope independent' construal, as in (1)b, the range argument is fixed such that each distinct mapping is to the same individual(s). So QDs are not the equivalent of 'distributivity'.

From Verkuyl (1988; 1993:20) it is maintained that there are only two possible forms of quantification for a 2-place predicate in natural language: Cumulativity (Scha, 1981; van der Does, 1992) or Quantificational Dependencies. Since it requires additional machinery to induce QDs, the Cumulative construal is taken as the base form and QDs as derived. Under Cumulativity there is minimally one interpretation with a functional interpretation of the Main Predicate, but without multiplication of the second argument, exemplified in (1)b.

Pragmatics plays a crucial role in determining QDs. In Turkish Inverse QDs with the multiplication of DP1 do not obtain unless the context clearly defines DP1 as New Information (Kennelly, to appear). Based on these data QDs are then analyzed as a mapping from Given to New Information where a New Information quantified DP is defined as locally bound. I then argue that the range argument of a functional predicate does not multiply if it has a *text-level* definition through non-local binding; if it is Given Information. This analysis obviates any need for QR. The non-multiple DP such as *a book* in (1)b is often analyzed as *specific* (Ruys, 1992 among many) rather than Given Information, predicting that a specific DP cannot multiply. Empirically, it can, seen in (3) (adapted from Hintikka, 1986), where I assume *a certain NP* is specific.

#### **A Specific DP Can Multiply**

- (3) Every Englishman<sub>i</sub> loves *a certain woman*, his<sub>i</sub> mother.

Under the analysis put forth here, a specific DP may be Given or New Information with either a text-level or local definition (clause external or internal binder), and as locally defined New Information as in (3) it may multiply. In fact, it is proposed that all multiple DPs have (been coerced to) a specific interpretation.

The Turkish data in (4) solidly contest a unique QDs inducing Operator analysis. Turkish is a head final SOV Altaic language where nonspecific objects are morphologically explicit (Erk , 1982; En , 1991), glossed '@'.<sup>6</sup>

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(1999) and b) Verkuyl (1999) and Kennelly (2000) in terms of a functional analysis, supporting the claim of locality constraints for QDs.

<sup>6</sup> Case marking in Turkish takes the form of a suffix on the lexical stem. Nominative Case is a  $\emptyset$  morpheme and specific (Kennelly, 1997) as is the Accusative suffix (Erk , 1982; En , 1991). Turkish has a system of vowel/consonant harmony which explains the morphophonemic variations in the suffixes. As a result the base form of a suffix is written with phonemes subject to harmony in capital letters. Turkish is taken to be a head final language since the Relative Clause has its head noun to the right. In addition, after a cardinal the noun takes the singular form in Turkish, as does the predicate.

### QDs Induced from Anywhere

- (4) a. 3 kız 4 sepet kaldırmış.  
3 girls-Nom 4 basket-@ lifted  
'3 girls lifted 4 (nonspecific) baskets'  
(4 baskets)
- b. 3 kız-in her bir-i 4 sepet kaldırmış.  
[3 girl-Gen every one-AgrN]-Nom 4 basket-@ lifted  
'Each of 3 girls lifted 4 (nonspecific) baskets.'  
(12 baskets)
- c. 3 kız 4er sepet kaldırmış.  
3 girl-Nom 4-in.one basket-@ lifted  
'3 girls lifted 4 (nonspecific) baskets each.'  
(12 baskets)

In the absence of contrast, a cardinal on DP1 and a nonspecific DP2 do not result in QDs, seen in (4)a. *Quantificational force* is lacking.

Since its interpretation and its effect on the predicate do not alter with the two readings, *every/each*<sup>7</sup> cannot be the unique factor in determining QDs in (1). In (4)b DP2 is nonspecific and therefore without any dependency relation on a discourse referent rendering it necessarily New Information. In this case *each/every* on DP1 is now the crucial element that elicits *quantificational force*, forcing a QDs construal. The distinction between (1) and (4)b supports an analysis of QDs in terms of D-Linking relations since the difference in the two potential multiple DP2s is just that: in (1) DP2 may very well have a specific interpretation (morphologically explicit specific DP objects in Turkish behave as DP2 does in (1) (Göksel, 1998)) which allows a covert text-level binder while in (4)b it is nonspecific which may not have a text-level binder, by definition. The distinction between the two propositions is discussed again after the formal definition of D-Linking in Section III.

While (4)b supports a Base Plural driven analysis of QDs, the *-Er* clitic on the determiner of the multiple DP2 in (4)c elicits the same *quantificational force*, countering either a Base Plural D-Op or a VP-Operator driven analysis. *-Er* on a nonspecific DP is neither a Closure Operator on a plural, since it may also occur on the numeral *bir* 'one', nor can it be an adverbial on the VP – suggested by one anonymous reviewer – because of its syntax as an affix to the determiner. In any event, an adverbial would not suffice since a multiple predicate does not entail a multiple argument, seen in (1)b. In addition, derivational adverbs in Turkish take the form of reduplication and there otherwise exists the adverbial form *4er 4er* 'in groups of 4'. From the data in (4) it is obvious that there is an Anywhere Principle at work in eliciting the *quantificational force* crucial to a QDs construal. The QDs inducing *-Er* Operator on a nonspecific DP in Turkish poses a solid challenge to a unique Operator driven analysis. It also challenges the top down analysis of quantification that obtains under the standard application of Generalized Quantifier theory, where the VP is necessarily treated as a unit. Even worse, a consolidated VP approach to multiplication results in infinite self-generation if the Base Plural is VP internal.

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<sup>7</sup> *Each* and *every* are treated as synonyms in this article since they are both translated by *her* in Turkish.

By abstracting away from a top down consolidated VP analysis, allowing access to the information in either DP in a 2-place predicate relation, Generalized Quantifier theory can be maintained. QDs can also be formulated as a Dyadic Quantifier applied to a 2-place relation (Kennelly and Reniers, 1999). The  $l$  index indicates New Information and a Monadic Quantifier  $M$  is defined in (5)b, using the 1-place relation of a Generalized Quantifier  $GQ$  as the base case.

**Dyadic Quantifier for QDs** (Kennelly and Reniers, 1999)

- (5) a.  $(M_1 \circ M_{2,l})(R^2)$  is the equivalent to the iterative  $(M_1(M_2(R)))$   
 b.  $M(R^{n+1}) = \{ \langle x_1, \dots, x_n \rangle \mid GQ(\lambda y. R(x_1, \dots, x_n, y)) \}$

The representation in (5) abstracts away from the iterativity to give access to information within either DP. Quantification in natural language not only **can** be represented as Polyadic Quantification but the data in (4)c indicate that it **must** be so represented.

Section II has reviewed and argued against a single QDs inducing Operator in the semantics as well as against QR in the syntax, also contesting an analysis of  $\pm$ QDs in terms of  $\pm$ specificity. The Anywhere Principle underlying QDs eliciting morphology in (4) motivate an analysis of QDs quantification as a Dyadic Quantifier. This section then paves the way for a different approach to the dependencies in natural language that result in the multiplication of a DP. Section III presents a structure independent framework for QDs that supports a non-assertive relation as the *quantificational force* characteristic of QDs.

**III THE FRAMEWORK: QDS AND ASSIGNMENT FUNCTIONS**

This section lays out an analysis for QDs stemming from Farkas' (1997) structure independent analysis of dependencies of functions that assign values to variables contained in DPs. It is grounded in a Discourse Representation Theory (DRT) (Kamp & Reyle, 1993) framework. The characteristic *quantificational force* of QDs is pictured here as a D-Linking dependency of assignment functions that maps assigned values from Given to New Information. Consequently it defines a New Information DP in terms of a local dependency relation with a Given Information DP.

Turkish data (Kennelly, to appear; in progress) support an analysis of QDs as a mapping from Given to New Information; only a New Information DP can multiply. In the following discussion an assertion is taken to be of one clause, i.e. one predicate domain. Drawing on the work of Göksel (1998), in Kennelly (to appear) I argue that ambiguity with respect to quantification in sentences like (1) stems from the possibility of more than one binder for the potential multiple DP: one internal to the predicate domain resulting in QDs and one external binder, resulting in a Cumulative reading. Parallel to multiple specifics in (3), I use the  $\pm$ multiplication of definites in (6) to drive home the point.

**QDs Depend on Local Binding of DP2**

- (6) a. Each child opened the/both box(es)  
 b. Each child<sub>i</sub> opened [the/both box(es) in front of her<sub>i</sub>].

If the range argument DP of a functional predicate evoked by a D-Op on a Given DP does not multiply, as in (6)a, it is due to a violation of locality whereby the potential

multiple DP has a text-level definition due to clause external binding; here it is the default anaphoric identity relation for a definite DP. Whereas with local binding, as in (6)b, QDs obtain. Therefore the dependency in QDs is defined by the D-Linking relation.

Since Turkish data show that only New Information DPs can multiply then it follows from (6) that New Information be defined as locally bound. This also makes sense intuitively. Under my analysis, in the syntax, a  $DP_n$  is defined by the position of the binder of the variable  $x_n$  that  $DP_n$  contributes with respect to the position of  $DP_n$ ; that is if its binder and  $x_n$  both occur within the same clause then  $DP_n$  is locally defined and it is New Information, which may then multiply under the dependency of that local definition. The binder of  $x_n$  may also reside at *text-level* with respect to the position of  $DP_n$ , external to the same clause, which renders  $DP_n$  with a text-level definition and therefore it is Given Information. A DP may operate as a Base Plural iff the set of individuals that forms the domain of quantification is fixed with respect to the sentence in which the DP occurs, i.e. if it is Given Information with a text-level definition. For Kempson & Cormack (1980) as well as Erteshik-Shir (1999) it is the Topic.

At first blush this supports a binary analysis of discourse structure. But under scrutiny it is clear that there are two flavors of Old Information that must be kept distinct, as suggested by Vallduví (1992). There is the Given/Old Information that is part of the assertion, which qualifies as a local binder of New Information, and there is the Input/Old Information which is not internal to the immediate assertion, and which qualifies as a text-level binder of the Given Information in the assertion. These two flavors of Old Information determine very different classes of binding, associated with distinct constraints on the introduction of functions that assign values to the variables contributed by DPs. These distinctions then determine discourse structuring, and consequently affect quantificational structures.

DRT is a convenient framework to visualize these distinctions, with one Discourse Representation Structure (DRS)  $K$  for the Input and a distinct DRS  $K'$  for the assertion. The necessity of distinguishing between the flavors of Old Information indicates that information in discourse is processed in blocks, i.e. as propositions, that is in terms of truth values and the Common Ground (Stalnaker, 1978), the set of propositions that constitute the information that both the speaker and listener(s) accept as true. This means that the dynamic processing of information **as it is introduced into the context**, as proposed by Farkas (2001), as well as by many others, must be ruled out. Information as it is introduced into the context must then contribute to provisional structures to accommodate potential binding structures, which may then be discarded or, once the assertion is complete, added to the Common Ground. One framework that makes use of this formalization with provisional structures is van der Sandt's (1992) bottom up analysis of DRT.

The Speech Act  $c$  as defined by Stalnaker (1978) includes a set  $F_c$  of functions which assign values to the variables contributed by DPs, as well as  $P_c$ , the set of propositions that constitute the Common Ground. Drawing on the work of Farkas (1997; 2001), anaphoric relations can then be analyzed in terms of values assigned to the variable contributed by the respective DPs. In the notation, variables and their respective assignment functions that appear in the input DRS  $K$  are without a prime while variables and their assignment functions that appear in the assertion DRS  $K'$  are indicated with a prime. In the assertion DRS  $K'$ , the variable  $x_n'$  contributed by an

anaphoric  $DP_n$  is assigned a value by the function  $f_n'$  such that there must be a variable  $x_n$  in the input DRS  $K$  with an assignment function  $f_n$  such that  $f_n'(x_n') = f_n(x_n)$ . There is an identity relation between the values assigned to the two variables. Since  $x_n$  appears in the input DRS  $K$ , contributed by a DP that is part of the discourse, then the identity relation links the variable  $x_n'$  in the assertion DRS  $K'$  to the discourse; the assignment function  $f_n'$  is introduced by that identity relation at text-level, as for  $DP_2$  in (6)a.

Binding structures are non-assertive dependency relations; they are not limited to anaphoric relations or to existential closure under identity, nor to the quasi anaphoric subset relation where  $f_n'(x_n') \neq f_n(x_n)$  but rather  $f_n'(x_n') \subseteq f_n(x_n)$ . Binding also includes D-Linking (Pesetsky, 1987; Enç, 1991), i.e. a (set of) 2-place non-assertive relation(s) between the value assigned to a discourse referent and the value assigned to the variable contributed by a *specific*, 'D-Linked' DP in the assertion. In (6)b the binding structure for  $DP_2$ , which contributes  $x_2'$ , is a D-Linking locational *in front of* relation,  $R'$ , such that  $\langle f_2'(x_2'), f_1'(x_1') \rangle \in R'$ .  $f_2'$  is introduced by  $R'$  and  $DP_2$  is locally defined New Information. D-Linking relations may be either overt or covert: a locational relation as in (6)b; a kinship relation as in (3) (Hintikka, 1986), or any relational noun; a subset relation; they are also indicated by professional nouns such as *doctor* or *mechanic* without articulating the exact nature of the relation with DPs such as *patients* or *cars*; or a covert *have-in-mind* relation (Fodor & Sag, 1982), explicated in detail by Farkas (1994:5).

Assignment functions may be introduced either by existential quantification or by the context (Farkas, 1997). When introduced by the context I propose that it is the dependency relations in the form of D-Linking, which includes the identity relation, that introduce assignment functions. That is, D-Linking translates into dependencies of functions which assign values to variables. The D-Linking relation may be between the value assigned to a discourse referent  $y$  in the input DRS  $K$  and the value assigned to a variable  $x_n'$  in the assertion DRS  $K'$ , contained in a specific  $DP_n$ . Consequently  $DP_n$  is Given Information. On the other hand, the D-Linking relation may be between the value assigned to a discourse referent  $y'$  in the assertion DRS  $K'$  and the value assigned to a variable  $x_n'$  also in the assertion DRS  $K'$ , contained in a specific  $DP_n$ . Consequently  $DP_n$  is New Information and may multiply. In the following definition, New Information is flagged '*l*' since it is locally defined (here  $y$  is without a prime wherever it occurs).

**D-Linking = Specificity** (drawing on Enç, 1991; Farkas, 2001):

- (7) a. A specific  $DP_n$  contains a variable  $x_n'$  whose assigned value stands in a non-assertive 2-place relation  $R$  with the value assigned to a discourse referent  $y$ .
- b. If  $y$  appears:
- 1) in the input DRS  $K$  with value(s) assigned by the base assignment function(s)  $f$ , such that there is no update of  $y$  in  $K'$ , then the specific  $DP_n$  is Given Information without a *l* flag:  $\langle f(y), f_n'(x_n') \rangle \in R$ .
  - 2) in the assertion DRS  $K'$  as the update of a variable in  $K$ , with equivalent values assigned by the base functions  $f$  and the update assignment functions  $f'$  to the two variables in  $K$  and  $K'$ , i.e. if  $y$  is the variable contained in an anaphoric DP that is part of the assertion, then the specific  $DP_n$  qualifies as New Information and has a *l* flag,  $DP_{n,l} : \langle f'(y), f_n'(x_n') \rangle_l \in R$ .

Semantically, the locality crucial to New Information obtains if the function(s) that assigns a value to a variable  $x_n$  is introduced within the same DRS  $K'$  where the variable occurs; if not it is introduced at text-level resulting in Given Information. In other words, if the assignment function  $f_n'$  for  $x_n'$  is introduced within the DRS  $K'$  of the assertion, then  $DP_n$  represents New Information and may multiply. Assignment functions pertinent to Given Information DPs are introduced by a relation with an element at text-level. Then  $F_c$  can only be augmented when an assertion is complete and all the provisional binding structures are either discarded or established for the interpretation of the assertion, that is at the same time that the Common Ground is also augmented.

Reconsider the data in (6)b. DP1 with a strong determiner is presupposed and therefore anaphoric (van der Sandt, 1992), contributing a variable  $x_1'$  in the DRS  $K'$  such that there is an  $x_1$  in the input DRS  $K$  such that  $f_1'(x_1') = f_1(x_1)$ . The strong determiner minimally partitions the elements of the plurality, such that  $f_1'(x_1')$  is a set of values:  $f_1'(x_1') = \{z \mid z = \text{MinPart}(f_1(x_1))\}$ .<sup>2</sup> That set of values  $f_1'(x_1')$  then feed the locational *in front of* relation  $R'$  where  $\langle f_2'(x_2'), f_1'(x_1') \rangle \in R'$ , resulting in a distinct value for  $f_2'(x_2')$  for each value that results from  $f_1'(x_1')$ . Consequently there is 'multiplication' of DP2 and the (set of) values for  $f_1'(x_1')$  elicit the *quantificational force* in the locational D-Linking relation that introduces the set of functions  $f_2'$ . If *quantificational force* is taken as the multiple predicate relation, then a strong determiner on DP1 necessarily elicits that *quantificational force*. But since a strong determiner does not entail QDs, *quantificational force* must be defined as the local D-Linking relation. If that local relation is fed by a minimally partitioned plural DP, QDs obtain. This analysis takes (6)b as the prototype of QDs.

But is it really the minimal partitioning within a strong DP that is the issue? Now reconsider (1) vs. (4)b. The strong determiner on DP1 clearly renders it a potential binder for the dependency relation in both cases. Why should that be? A DP with a strong determiner is presupposed, i.e. anaphoric. Without a local antecedent it is minimally partitioned Given Information. Since QDs are analyzed here as a dependency which defines the New Information in terms of the Given, then the variable contributed by the New Information DP needs a local binder from a Given DP. The value assigned a variable from a Given DP has the potential to sustain a D-Linking relation with the value assigned to a variable contributed by a New Information DP, unless of course the context has already supplied one. That is, any Given DP may be responsible for grounding the relations that introduce 'dependent' assignment functions. Therefore a DP with a strong determiner is always a potential binder for New Information DPs, while a DP with a weak determiner is not, crucially unless the context establishes it as Given Information. A (potentially) specific DP2, as in (1), is by definition subject to a D-Linking dependency. Without overt indications, covert D-Linking is then in need of a binder. Both a text-level *have-in-mind* relation with the speaker or a local *have-in-mind* relation with the denotation of DP1 are possible, resulting in ambiguity. If the D-Linking relation is local and with a plural DP, not necessarily minimally partitioned as seen in the data in Section V, QDs obtain. In (4)b the multiple DP2 is nonspecific, by definition without D-Linking. I claim that the assignment functions for the variable contained in a nonspecific DP, if no Given Information binder within the local domain is available, is subject to default existential closure. Once binding is available, the nonspecific status is overridden by a DP

defining dependency relation with the Given Information DP1. The crucial qualification for the binder cannot be the overt minimal partitioning of a DP, since a) that does not entail QDs and b) QDs also obtain without overt minimal partitioning of the Base Plural.

Empirically, a specific DP does not multiply without a strong determiner and therefore without overt minimal partitioning of the Base Plural. That is, that specific DP must have a default text-level D-Linking relation defined by the context, that can only be overridden by the imposition of a local DP that is clearly Given Information to act as a binder. Other pragmatic elicitation of *quantificational force* only effect the multiplication of 'nonspecific' DPs, which by definition have no D-Linking relation (Enç, 1991). In these cases no strong determiner is needed on the Base Plural for QDs to obtain. The rest of this paper addresses the multiplication of DPs that are generally considered nonspecific. Under multiplication, I argue that the assigned values for the relevant variables are coerced to a local D-Linking dependency relation. I also claim that for a 2-place predicate if there is a plural Given DP and a 'nonspecific', all local non-assertive non-identity non-subset dependency relations between the two arguments result in the application of the Dyadic Quantifier in (5), i.e. in QDs.

#### IV TURKISH RESISTANCE TO QDS - THE ISSUES

Sections V–VI are a study of the multiplication of 'nonspecifics' without the presence of a strong determiner on the Given DP. In Section IV (4)a is re-examined for the issues it provokes, repeated here as (8)a. Without a context of contrast a Turkish proposition with a weak DP1 and a nonspecific DP2 results in a Cumulative construal, evidence for a default mechanism of existential quantification of the assignment function(s) relevant to a nonspecific DP. '#' indicates a correct but anomalous sentence.

##### Weak DP1 - \*QDs

- (8) a. 3 kız 4 sepet kaldırmış. = (4)a  
 3 girls-Nom 4 basket-@ lifted  
 '3 girls lifted 4 (nonspecific) baskets'  
 (only 4 baskets)
- b. # 3 çocuk/ Çocuklardan üçü taze bir çekirdek çitlemiş.<sup>8</sup>  
 3 child/3.of.the.children-Nom fresh a sunflower.seed-@ crunched  
 '3 children crunch/ate a fresh sunflower seed.'  
 (only one seed)
- c. 3 children ate a fresh sunflower seed.  
 (multiple seeds)

The unambiguous Cumulative construal in (8)a is brought home in (8)b where the proposition is anomalous since 3 children cannot eat one seed. Is it possible that cardinals in distinct languages have distinct interpretations and in Turkish they don't lend to an individualized interpretation that would evoke a functional interpretation of the predicate, patterning with any 'official' collective such as *the committee*? This simplistic 'parameters' analysis of cardinals is far fetched at best; frankly it makes little

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<sup>8</sup> *Bir* is both the cardinal 'one' and the indefinite article. When it appears between an adjective and a noun the indefinite article interpretation is forced.

sense that a cardinal such as *three* means one thing in one language and something else in another. Aygen-Tosun (1999:3) argues that numeral quantifiers simply do not interact with each other in Turkish. Data in Section V refute this. The line of inquiry to be pursued is to look at the environments where QDs do obtain.

First let me comment on the research and on the data in (8). I asked well over 50 native speakers of Turkish, all with university degrees of various sorts, if (8)a with a QDs reading, but more specifically if (8)b were acceptable. Only 3 people out of 50 accepted (8)b, all linguists. The few people who accepted (8)a with a QDs construal consistently added a contrastive context. At that point I asked 15 native speakers of English, all with university degrees of various sorts but crucially no linguists, if the English equivalent of (8)a could have a reading with 12 baskets. Their response was overwhelming; for 12 out of 15 people no such reading was available and therefore (8)c was anomalous. But there were 3 who accepted (8)c as felicitous. After having discovered the Turkish data where contrastive context induces QDs, to be given in (10), I added a context of contrast to the parallel English data. Then all but 2 of the informants agreed that a QDs reading was possible. So what is going on? My assumption is that linguists are more experienced in supplying context, and to obtain QDs in (8) the context of contrast is necessary. Parallel to 'presupposition accommodation' (Lewis, 1979), linguists are more adroit at 'context accommodation' to accommodate the QDs reading with a contrastive context. Essentially I am proposing that Turkish and English are in fact identical with respect to cardinal, i.e. weak DPs on the potential Base Plural for a QDs construal. The issue is to appreciate what contexts allow a QDs construal, and once available, how that context effects the dependency relations.

#### V QDs IN TURKISH: CONTRAST AND FOCUS ELICIT *QUANTIFICATIONAL FORCE*

Section V reconsiders sentences parallel to (4)a=(8)a within a context where they do have a QDs construal. As Rullman (1995) notes, Focus/New Information<sup>9</sup> has a stronger and a weaker form, frequently coded as [ $\pm$ contrast]. Although Erki's (1982) evaluation of Turkish discourse structuring is a direct mapping between discourse function and linearity as shown in (9), İşsever (2001) updated this to distinguish between the two forms of Focus/New Information: the weaker form appears immediately preverbally, while the stronger, contrastive form may appear anywhere preverbally, with contrastive pitch accent.

##### Turkish Discourse Structure (Erki 1982)

- (9) Topic = Given Information > Focus = New Information > Predicate

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<sup>9</sup> Rullman's term *background* for non-Focus Information is also used in many tripartite assessments of discourse structure with a Topic = Given, Focus = New, and Background, information that is unaffected by the assertion, which may contain Given and/or New Information. This 'background' is also termed the *Tail* by Vallduví (1992), who terms the Topic the *Link*. There are also two flavors of Focus: Presentational and Contrastive. It seems that the clearest terminology available for a binary partition of discourse structure within the assertion is simply Given and New Information so I generally stick to them, sometimes adding or substituting 'Topic' or 'Focus'.

Consonant with the assessment of nonspecifics (objects) as intrinsically New Information they may only appear in the immediately preverbal position in Turkish. The weaker form of Focus is seen in (8)a/b, crucially without contrastive context, where the immediately preverbal DP2 is the Focus/New Information.

A parameters approach that cardinals in Turkish and English have distinct interpretations in sentences like (8)a/b, or Aygen-Tosun's (1999) analysis that numeral quantifiers do not interact, loses force once any element in either DP1 or DP2 is contrasted. The information in brackets in (10) may come from previous discourse or it may be implied.<sup>10</sup>

- (10) a. **Contrast of Quantity in the Determiner in DP2**  
 (5 öğrenci 6 kitap okumuş, ve) 5 öğrenci 4 kitap okumuş.<sup>11</sup>  
 5 student-Nom 6 book-@ read and) 5 student-Nom 4 book-@ read  
 '(5 students read 6 (nosp) books and) 5 students read 4 (nosp) books.'  
 (2<sup>nd</sup> conjunct is ambiguous: 4 or 20 books)
- b. **Contrast of Quality in the Noun in DP2**<sup>12</sup>  
 (5 öğrenci 2 şiir okumuş, ve) 5 öğrenci 2 kitap okumuş.  
 5 student-Nom 2 poem-@ read and) 5 student-Nom 2 book-@ read  
 '(5 students read 2 (nosp) poems and) 5 students read 2 (nosp) books.'  
 (2<sup>nd</sup> conjunct is ambiguous: 2 or 10 books)
- c. **Contrast of Quantity in the Determiner in DP1**  
 (5 öğrenci 2 kitap okumuş, ve sonra) 3 öğrenci 2 kitap okumuş.  
 5 student-Nom 2 book-@ read and later) 3 student-Nom 2 book-@ read  
 '(5 students read 2 (nosp) books and later) 3 students read 2 (nosp) books.'  
 (2<sup>nd</sup> conjunct is ambiguous: 2 or 6 books)
- d. **Contrast of Quality in the Noun in DP1**  
 (5 öğrenci 2 kitap okumuş, ve) 5 profesör 2 kitap okumuş.  
 5 student-Nom 2 book-@ read and) 5 professor-Nom 2 book-@ read  
 '(5 students read 2 (nosp) books and) 5 professors read 2 (nosp) books.'  
 (2<sup>nd</sup> conjunct is ambiguous: 2 or 10 books)

Whether there is contrast that claims there are only books and not poems as in (b), or only 4 and not 6 as in (a), that is regardless of whether there is contrast of quality or quantity, the result is the *quantificational force* that is necessary for a QDs construal.

<sup>10</sup> Thanks to Selçuk İşsever of Ankara University Linguistics Dept. and to Kemal Oflazer of Sabancı University Computer Science Dept. for having independently pointed this out to me.

<sup>11</sup> The effect of contrast in inducing QDs is brought out more readily if the other marker for 'and' is used. It is the Focus clitic *DA* 'also/even' that would appear following the subject of the second conjunct. Although this in itself would support an argument against the determiner on the Base Plural as the crucial Operator that induces QDs, I have preferred to leave the weaker form with *ve* 'and/with' only to show unequivocally that it is the contrast of the diverse elements that is inducing QDs rather than the Focus marker which of itself can also induce QDs as shown in (16). I have omitted the interrogative Focus clitic *mi* which may appear following any element that is to be questioned as I would like to constrain this study to positive assertions.

<sup>12</sup> A small number of informants didn't get the QDs reading here. The vast majority of those asked did.

Contrast discounts all other contextually possible alternatives (Rooth 1985). One anonymous reviewer proposed that the result of the negative assertion of the alternatives provides ‘quantification’, the operation on a set that results from the exhaustive investigation of a subset. The idea is then that the contrastively focused element should behave as a universal quantifier. There are two problems with such an analysis. First it predicts that when the contrasted element is DP2 as in (10)a/b, then DP1 should multiply under Inverse QDs, but it doesn’t. The second problem is that the focused DP is contrasted and examined as a whole, say the 5 students vs. the 5 professors in (10)d, that is with respect to an ‘external’ alternative. There is no minimal partitioning that examines each member of the set of professors to feed a distinct application of the predicate.

I propose that the result of contrast within the arguments of a 2-place predicate with one nonspecific argument is twofold. First it establishes the specific argument, in Turkish the linearly initial DP, as Given Information, wherever the contrast, invoking presupposition accommodation for a non-local antecedent or D-Linking element. Second it results in the demotion of the status of the Main Predicate to that of a D-Linking relation between the two arguments. It is then **that** dependency relation that introduces the assignment functions that assign a value to the variable contributed by the ‘nonspecific’ DP, coerced to a D-Linked dependency relation. If the Given DP is plural, the dependency relation results in QDs. Before the analysis is elaborated, consider two other groups of data.

Turkish data show that all modified numerals, upward and downward entailing, as well as nonmonotonic on a potential Base Plural, pattern together, and that they pattern with the Focus/New Information Operator *Only* to ambiguously induce QDs. When a Focus Operator or a modified numeral in (11)-(15) is added to DP1 in sentences that otherwise pattern with (8)a, a QDs construal is allowed. *Few* in Turkish is a complex determiner parallel to a modified numeral and patterns with them with respect to QDs.

**Focus Operator *Sadece* 'Only' on DP1 -  $\sqrt{QDs}$**

- (11) Sadece 3 öğrenci 4 kitap okumuş.  
 only 3 student-Nom 4 book-@ read  
 ‘Only 3 students read 4 (nonspecific) books.’ (not 4 or 5 students)  
 (ambiguous: 4 or 12 books; 12 books is the salient reading)

**Modified Numeral – Upward Entailing -  $\sqrt{QDs}$**

- (12) En az 10 öğrenci 2 kitap okumuş.  
 at least 10 student-Nom 2 book-@ read  
 ‘At least 10 students read 2 books.’ (not 9, 8, or 7 students)  
 (ambiguous: 2 or 20+ books)

**Modified Numeral – Downward Entailing -  $\sqrt{QDs}$**

- (13) En fazla 10 öğrenci 2 kitap okumuş.  
 at most 10 student-Nom 2 book-@ read  
 ‘At most 10 students read 2 books.’ (not 11, 12 or 13 students)  
 (ambiguous: 2 or 20 (or fewer) books)

**'Few' as a Modified Numeral - √QDs**

- (14) Az sayda öğrenci 2 kitap okumuş.  
few counted student-Nom 2 book-@ read  
'Few students read 2 books.' (not more students)  
(ambiguous: 2 or multiples of 2 books)

**Modified Numeral – Nonmonotonic - √QDs**

- (15) Tam 10 öğrenci 2 kitap okumuş.  
exactly 10 student-Nom 2 book-@ read  
'Exactly 10 students read 2 books.' (not 9 or 11)  
(ambiguous: 2 or 20 books)

Bonomi & Casalegno (1993:7 ft.7) propose that the modified numeral *at least n* is a Focus/New Information Operator since it cannot combine with the standard Focus Operator *only*: \**only at least n NP*. Reniers (1997) independently ranked all modified numerals as Focus Operators, and in fact, modified numerals do not combine with *only*. Taken together with the Turkish data in (11)-(15) a generalization emerges that all modified numerals are in fact Focus/New Information Operators.<sup>13</sup>

The Focus Operator *DA* 'even/also/and' also induces QDs, patterning with (10)d in the contrast of quality.

**Focus Operator DA 'even/and' - √QDs**

- (16) 3 öğrenci da 4 kitap okumuş.  
3 student-Nom also/even 4 book-@ read  
'Even 3 students read 4 (nonspecific) books.' (not teachers or doctors)  
(ambiguous: 4 or 12 books; 12 books is the salient reading)

A local Given Information DP is always a potential source to ground a relation that may introduce assignment functions for the free variable contributed by a 'nonspecific', as in (4)b. The problem in (4)a/(8)a is not just the absence of obligatory/overt minimal partitioning, since one of the interpretations under the Cumulative construal has a functional interpretation of the predicate, but also the fact that the initial argument is not clearly Given Information. The Given Information in the proposition could theoretically be the predicate. Although a nonspecific DP2 is by definition not D-Linked, a multiple DP is dependent on an individual within the Base Plural for its definition. I propose that the Given Information status of a DP makes available a covert D-Linking relation to introduce the assignment functions for the variable contributed by the 'nonspecific' DP2, obviating the default existential quantification for those assignment functions. The nature of the coerced dependency is the subject of Section VI.

**VI CONTRAST = EXHAUSTIVITY**

Given that contrast discounts all other contextually possible alternatives, it is consequently associated with an *Only Effect* (Rooth, 1985;1992 and Rullman, 1995). Then what is the link between an *Only Effect* and dependency relations? Why should it

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<sup>13</sup> Szabolcsi (1997) shows that there are two distinct syntactic positions in Hungarian for a) Focus Operators, including *only* and *exactly*, while b) *at least* appears in the distributivity slot. This would seem to be a counterexample to the analysis of Bonomi & Casalegno (1993) and Reniers (1997), but it doesn't explain the impossibility of combining a Focus Operator such as *only* with modified numerals. I leave this as an open question.

elicit *quantificational force*? First consider what an *Only Effect* is. Under Generalized Quantifier theory *only* on the subject, here DP1 as a contrast of quality as in (10)d, defines a subset relation between the set that represents the denotation of the VP and that of DP1. However under contrast of quantity the relation between the two sets is intersective. But then so is it for, let's say, a cardinal on the DP1 subject without *only*. What does *only* add? Wherever *only* is inserted it adds the implication of exhaustivity, since all relevant alternatives are discounted.

Rullman (1995) proposes that an *Only Effect* is associated with maximality. However, in the same environment, not all maximals allow QDs while an *Only Effect* does. Then QDs can be used to differentiate between exhaustivity and maximality. English data in (17) clarify that maximality and an *Only Effect* are distinct. Maximality by itself, a simple sum, does not have the same effect as maximality under contrast, where it is the contrast that elicits the *Only Effect*. This is clear in the following paradigm:<sup>14</sup>

**Contrast Induces QDs**

- (17) a. \*The 10 women in the room had a baby.   √max   \*contrast \*Only Op   \*QDs  
           (one baby)  
       b. √The women in the room had a baby.    √max   √contrast √Only Op   √QDs  
           (multiple babies)  
       c. √10 women in the room had a baby.    \*max   √contrast √Only Op   √QDs  
           (multiple babies)

In (17)a there is a sum of *women-in-the-room* with the cardinality of 10; it does not allow or imply any possible contrast, and the multiple interpretation of DP2 *a baby* is unavailable, rendering the proposition infelicitous. In (b) and (c), *the-women-in-the-room* and *10-women-in-the-room* are both contrastive and QDs ensue. In (b) there is the sum of *the-women-in-the-room* with the implication that there are also non-women in the room and therefore that these other persons did not have babies, only the women did. In (c) there is the sum of *baby-having-women-in-the-room* with the cardinality of 10, with the implication that there are more than 10 women in the room but that only 10 of these woman had babies, a covert partitive. Consequently DP1 in (c) is not a maximal while those in (a/b) constitute maximals of individuals of that descriptive content. At the same time the implied contrast in (b/c) results in an *Only Effect* of *a-baby-havers*. In (b) there is both maximality and contrast, therefore an *Only Effect* and QDs obtain. But that doesn't mean that *Only* does not elicit maximality. In (c), however, it becomes clear that contrast, and therefore an *Only Effect*, does not necessarily associate with maximality. A maximal without contrast is simply a sum, as in (a).

Consider an example of contrast, using the English instead of the Turkish for (10)b and modifying it somewhat and assuming that the DP2 in both clauses maintains the Turkish 'nonspecificity'.

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<sup>14</sup> One informant did not get the QDs reading in (b), four others did, but (a) and (c) are sufficient to make my point.

### **Contrast of Quality**

- (10)' b. (5 students read 2 poems and) 3 students read 2 books.  
(2<sup>nd</sup> conjunct is ambiguous: 2 or 6 books)

In (10)'b there are two groups of students, call them group (a) and group (b). Group (a) read poems and group (b) read books. The contrast renders the statements much richer than the immediate assertions. The statement that is proffered by the contrast, the implication, is that group (a) does not read either books or any other relevant choice while group (b) does not read either poems or any other relevant possibility. That is there is another assertion other than that expressed by the Main Predicate. The implied assertion is the negation of a *read* relation applied to the (relevant) alternatives. The effect of the implied assertion is that the poem-reading of group (a) is an attribute of that group, used to distinguish it from the book-reading of group (b). That is, the Main Predicate loses its assertive power and becomes attributive instead, rendering it a non-assertive relation. The result is that DP2 becomes an attribute of DP1, defined in terms of a dependency relation that takes the form of the demoted predicate. This relation introduces the assignment functions for the variable contributed by DP2, overriding the default existential closure for those functions.

### **VII EFFECT OF THE ONLY EFFECT ON QDS**

The *Only Effect* results in the negative assertion of all relevant alternatives, seen in Bonomi & Casalegno's (1993:3) summary of Rooth's (1985) analysis for (18), seen in (19):

- (18) Only [John]<sub>F</sub> cried.

#### **Only Effect for Only [John]<sub>F</sub> cried:**

- (19) For every  $\alpha$  belonging to the set of alternatives determined by [John]<sub>F</sub>,  $\alpha$  satisfies '*cried(x)*' if and only if  $\alpha = [[\text{John}]]$  (where  $[[\text{John}]]$  is the denotation of *John*).

I propose that the result of the *Only Effect* is that the negative assertion of the relative alternatives takes on the role of the Main Predicate, thereby constituting the assertion that is to be communicated to the listener(s).

#### **Predicate Shift Underlying the Only Effect**

- (20) For every  $\alpha$  belonging to the set of alternatives determined by  $[\beta]$ <sub>F</sub> within a proposition *P* with predicate *p*, where  $\alpha \neq \beta$ , the Main Assertion of *P* becomes  $\neg p(\alpha)$ .

For (18) the assertion is then that the unique crier was John, rendering John's crying an attribute of his, as opposed to an assertion of what it was that John did. That statement would be: *John [cried]<sub>F</sub>*, without any implication of what others did. As a consequence of (20) the Main Predicate undergoes a demotion from the assertive status of a Main Predicate to that of attributive predication.

#### **Rule of Predicate Demotion**

- (21) The Main Predicate *p* in an assertion that sustains an *Only Effect* is reduced to non-assertive predication.

Empirically, Focus Operators in (11)-(15) elicit the *quantificational force* that characterizes QDs, patterning with the data in (10). For a 2-place predicate, I have proposed that it is a D-Linking relation that introduces the relevant assignment functions that define QDs due to data such as that seen in (6). However, under contrast, where the assertion is other than that of the Main Predicate, and which consequently results in the application of (21), in this case I propose that it **is** the ‘demoted’ non-assertive predicate relation that introduces the assignment functions that define the DPs within a QDs relation. For a 2-place predicate I further propose that all non-identity non-subset local dependencies on a plural Given DP result in the application of the Dyadic Quantifier in (5), that is they result in QDs.

### VIII SUMMARY AND CONCLUSIONS

It is maintained that QDs are a non-assertive definition of a New Information DP with reference to a dependency relation on a Given Information DP. The *quantificational force* that is characteristic of that dependency takes the form of a local D-Linking relation that introduces functions to assign a value to the variable contributed by the New Information DP. The multiple DP is then always D-Linked, so it consistently has a specific interpretation. An assertive predicate relation does not embody QDs, as they are a DP defining relation rather than assertive. This can be seen in the data on contrast. A predicate relation between a specific but not necessarily Given Information DP and a nonspecific object is an assertive relation and no dependency obtains. For the same proposition, however, a QDs construal may be elicited by either a lexical Focus Operator or contrast, which defines the specific DP as Given and instantiates an *Only Effect*. The *Only Effect*, distinct from other implications, alters the predication structure of the assertion to that of exhaustivity, a negative assertion of the predication of the alternatives. Then the original assertion becomes attributive, a D-Linking relation, with the result that, if the Given argument is plural, QDs obtain.

An offshoot of this analysis of D-Linking is the definition of New and Given Information in terms of (non)locality of the introduction of their relevant assignment functions. That is, in terms of dependency relations, i.e. binding structures. The crucial point is the position of the binder that grounds the dependency. If it is clause external, the bound DP is Given Information with a text-level definition, rendering it fixed in reference for the duration of the Speech Act – the set of utterances that constitute the discourse. If the binder is local with respect to the DP in question, that DP is New Information. This means that discourse must be processed in blocks of propositions, making use of provisional binding structures until the sentence is completed and the inappropriate structures are discarded. Consequently communication cannot be processed dynamically, as the pieces of a proposition are added to the context. The analysis of QDs put forth in this paper contests any single Operator to induce QDs in the semantics. It also obviates the need for any form of QR in the representation of natural language, or any other form of covert movement to explain quantification.

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## CONCLUSIONS

Both **(non)specificity**, i.e. D-Linking, and **predication** are themes that run throughout the five articles that make up this dissertation. Both themes are considered in terms of their behavior with respect to information structure and to quantification, proposed here to be intimately interwoven in a pragmatics-semantics interface. It is proposed a) that specificity or D-Linking can be defined as a binding system, which includes anaphoric binding, b) that that binding system is the backbone of information structuring, and furthermore, c) that information structure is a crucial element in determining the quantificational interpretation of an assertion.

The role of the predicate with respect to a nonspecific DP is shown to be highly constrained in Turkish, in Art. #1; a nonspecific cannot occur without predicate contiguity; it cannot be a subject DP, only an object. Consequently a nonspecific argument always and only occurs in the immediately preverbal P(resentational)-Focus position. Art. #2 develops the role of predication. From Chomsky (1971) and Herburger (1995) Focus is analyzed as the derived predicate with the result that the nonspecific argument is then the derived predicate, motivating the nonspecific DP-predicate contiguity constraint. That is, in order to maintain its role as a derived predicate a nonspecific DP relies on the syntactic proximity of the predicate. While this contiguity is crucial, it is not a case of the incorporation of the nonspecific argument into the predicate. Art. #2 argues convincingly against such incorporation, demonstrating that it is the nonspecific without a determiner that is the incorporated argument, but once a determiner occurs on the DP, the same behavior patterns do not apply. The distinction between the two can readily be seen in English; it is the distinction between *catching a fish*, which may occur over several hours but not several days, and *fish catching* or simply *fishing*, which may very well continue for several days. In the former case the DP is a distinct linguistic element while in the second the predicate-NP are clearly incorporated. These two articles provide an introduction or background for the body of the dissertation with the discussion of predication and specificity, i.e. D-Linking – later deemed the backbone of information structuring.

Art. #3 picks up the argument against predicate DP incorporation, this time pointing directly at QDs rather than confining the discussion to nonspecifics. In many examples of QDs, but certainly not all, the multiple argument is nonspecific. In the case of QDs without a D-Op to ensure the minimal partitioning of the BP and the resulting functional predicate, such as *Three boys ate an apple*, the nonspecificity of the multiple argument is a requirement. Art. #3 demonstrates conclusively that multiplication cannot stem from an incorporation of the predicate and the multiple argument, quite independently of the discussion of the specificity of the latter. For three place predicates, with two arguments held fixed in quantity and one multiple argument, if the verb and the multiple argument are treated as a unit, the result is overgeneration. A multiple predicate and a multiple argument are two distinct phenomena, although closely interrelated since both must occur under QDs. In Art. #4 it is proposed that the multiple predicate results in a multiple DP if and only if that DP is locally defined, i.e. it is locally bound New Information. This includes nonspecifics which are by definition locally bound. Text-level binding of a DP renders it Given Information and therefore

disallows its multiplication, whatever the status or behavior of the predicate. In Art. #5 predication takes on a very different role; under contrast it is demoted to a non-assertive D-Linking relation which in turn are analyzed as the fundamental relation in QDs.

The strength of the dissertation lies in the solid challenge of many preconceived ideas, together with new proposals put forth to replace them. Quantifier Raising (QR) or scopal shift, a reflection of the (inappropriate) application of first order logic to arrive at the interpretation of natural language quantification, is soundly disputed. In fact the term 'scope' is deemed unsuitable with respect to quantification. Closely related to an analysis of quantification in terms of scope and scopal shift is the analysis of a one-to-one relation between (non)specificity and multiplication whereby nonspecifics remain *in situ* and may multiply while specifics, due to their 'escape' of the scope of the quantified DP under QR at LF, do not (Ruys 1992; Farkas 1994;2001 plus many many others). Such analyses of QDs based on covert movement are rebuffed. The replacement for the analysis of quantification based on scopal shift lies in the proposal of the definition of a DP in terms of binding, also the basis for a tangible definition of discourse roles and specificity, i.e. D-Linking. The proposal draws heavily on van der Sandt's (1992) work which first associated pragmatics and binding, suggesting that presupposition be analyzed as anaphora. Göksel (1998) puts forth the idea of an association of binding and QDs. This dissertation takes up these ideas and proposes that D-Linking or specificity, encompassing anaphoric binding, provides the binding structure whereby New and Given Information can be concretely diagnosed.

Then the traditional across-the-board one-to-one association of the semantics of a DP with a discourse role whereby an indefinite is New Information and a definite is Given (Heim 1982) is also contested in favor of a more fine-grained definition of discourse roles. The proposal allows definites to be New Information if locally D-Linked, such as in *Every girl opened the box in front of her*, while (specific) indefinites are Given Information if they have text-level binding, seen in the single box reading of *Every girl opened a box* with consecutive or collective box openings. Then it is not indefinites that may multiply under QDs but rather locally bound New Information DPs.

Another preconception that is solidly challenged is the analysis of QDs in terms of a consolidated VP, which is crucially part and parcel to a traditional Generalized Quantifiers analysis of quantification. Once the consolidated VP analysis is contested, so also is the traditional GQ analysis. But to do away with GQs would leave the contemporary field of semantics in a quandry. In Art. #3 Kennelly & Reniers come up with a solution to the problem with their development of Scha's (1981) and Keenan & Westerståhl's (1997) work on polyadic quantification. They propose two Dyadic Quantifiers: each one makes use of two Monadic Quantifiers input which make use of GQs as their base case. There is also empirical evidence from Turkish of an Anywhere Principle at work for QDs, whereby QDs may be elicited from any point in the dependency, including from the multiple argument. These data alone are sufficient to do away with the generally held notion that QDs stem from a single operator on either the BP, which interacts with the entire VP, or an Operator on the VP itself. The data also contest the traditional use of GQs which rely on a consolidated VP analysis. The proposal in Art. #3 of QDs as a Dyadic Quantifier neatly accounts for the Anywhere

Principle since the two input DPs have equal consideration while conserving the principles of GQs.

The backbone of the dissertation lies in the recognition of Verkuyl's (1988) analysis of quantification as a binary phenomenon: there is cumulativity, which I have proposed as the base form, or QDs. This is in opposition to the traditional trinary approach of quantification which is based uniquely on the semantics of the DPs. The traditional approach includes distributivity, with the assumption that a distributive DP effects QDs, while in reality it does not, as well as cumulativity and collectivity (Scha 1981; van der Does 1992). My proposal is that the semantics of the DPs feed binding structures that define the discourse roles of the relevant DPs, which in turn determine the quantificational structures within a two place transitive predicate relation. The extension I have presented of Verkuyl's Law of Quantification allows for Inverse QDs, which his original formulation did not. At the same time, in that extension there seems to be an overgeneralization, since Inverse QDs are definitely a constrained phenomenon. This is an intriguing area for research which is not addressed in this dissertation. Nevertheless a Law of Quantification in itself must allow for Inverse QDs, since they do occur in natural language, while the constraints on Inverse QDs should come from a study of the limitations on the application of the Law, not on the formulation of that Law. The step from trinary to binary assessment of quantification is already a major advance. The next step is to identify the constraints. Empirically, with a D-Op on the BP and a locally defined second DP QDs appear to be two directional: *Everybody opened a box* or *A nurse accompanied every patient*. However once the functional predicate is not forced due to the distributivity (D-Op) of one of the arguments, then QDs are found to be an asymmetrical left-to-right phenomenon, as in *Three girls ate two sunflower seeds* where there is the possibility (and probability) of six sunflower seeds but not of six girls. It is proposed that Information Structure, a strong constraint in Turkish, might provide an explanation for the asymmetry of QDs under contrast, i.e. QDs without a D-Op. However the same constraint on directionality of QDs applies in English, which is not a discourse configurational language. Hence the attempted explanation is inadequate and the problem remains an open question. Predicate variations are also considered as a piece of the puzzle, since some predicates allow Inverse QDs more readily than others in English, such as *accompany*, and those same predicates are the only that allow Inverse QDs in Turkish, even with a D-Op on DP2 and contrast on the potential multiple DP1. The rationale that these predicates have incorporated discourse roles in their argument structure is an attempt to account for the facts of asymmetry, but clearly there is more to it than that.

While the first two articles are not directly part of the final analysis, their input is to provide a deeper appreciation of specificity, i.e. D-Linking. It is D-Linking that provides the building blocks for the proposal; it is the essential form of binding that sustains the analysis. Given that binding structures are seen as the definition of a DP and of information/discourse structure, until those binding structures are established in the mind of the listener, an assertion cannot be interpreted. Van der Sandt (1992) has proposed an analysis of temporary binding structures that are confirmed or discounted at the termination of the assertion. If binding is seen as the basis for the interpretation of quantification, as proposed in this dissertation, then van der Sandt's proposal gains considerable backing. This means, however, that an assertion cannot be interpreted dynamically, as the assertion unfolds. It can only be interpreted once all the binding

structures have been substantiated at the conclusion of the assertion. That is language can only be interpreted in terms of propositions with truth values, as proposed by Wittgenstein (1921).

The weaknesses of the dissertation are striking. The lack of an explanation for the asymmetry of QDs under certain conditions has been mentioned. The analysis of contrast as an impetus to quantificational force and then to QDs is also missing one very crucial step: there is no attempt at providing the motivation why an attributive predicate relation should be functional with the minimal partitioning of DP1. It is clear that contrast results in an *Only Effect* whereby the assertive force of the proposition is shifted to the negative assertion of the relevant alternatives. That part of the analysis is comprehensible. That the result of such a shift is the demotion of the predicate relation to an attributive relation of the DP is also clear and sustainable, but that an attributive relation should necessarily be functional – resulting in QDs – remains at an observational level rather than at an analytical level. One anonymous reviewer of Art. #5 suggested that the very act of contrast would result in the individualizing each member of the set of the BP, and therefore would result in the minimal partitioning of the members of the set, and consequently in a functional interpretation of the predicate relation. However it is not the case that the relevant contrast is between the individual members of the set of objects represented by the Given Information DP such that a counting or partitioning effect occurs, which would be the same as distributivity; the contrast is between say poems and books, or between three books and four books, not between the individual poems or individual books. There is a missing step in the analysis that an attributive relation results in minimal partitioning with a functional predicate and QDs; it is simply an empirical fact without motivation, albeit unnoticed previously in the literature on quantification. It is this point that sorely needs further research in the hope that an explanation will be forthcoming. Or perhaps in such an effort a totally different analysis of how contrast results in QDs would emerge.

Another weakness of the dissertation is the dismissal of Verkuyl's (1993/1994) data that there may be subgroupings within the BP for QDs, at least in Dutch, as well as data from Reniers (p.c.) that the present analysis of cumulativity cannot allow for nonparticipants within the group. Certainly if Verkuyl has found data in Dutch, thorough research will find similar data in other languages. It is difficult to believe that any one language might have a unique capacity for quantificational interpretation. Languages are systems, not happenstance occurrences of various possible interpretations. The possibilities of subgroupings, including zero participation in the predicate relation, in both QDs and cumulativity are areas of quantificational structures that have not been addressed here and that need investigation for there to be a serious understanding of quantification in natural language.

I must admit that the area of research that fascinates me particularly is the interface between aspect & tense and quantification. It is noted that a specific object DP with Accusative marking in Turkish may take on a nonspecific interpretation with the dubitative aspectual markers on the verb. These data need careful inspection in order to appreciate exactly how this works. This is also tied up with the idea that Turkish is an aspectual language, without tense. What effect an aspectual language would have on quantificational interpretation is an area of research as yet untapped.

With all its limitations, for which I assume full responsibility, I offer this dissertation as a step in the investigation of the interpretation of natural language

quantificational structures. In my attempt at discounting some previously held preconceptions about quantification it was the idea that radically new perspectives must be considered in order to reach any level of real understanding that motivated my position. Crucially, it will most likely lie within the investigation of 'non-Western' languages, languages that operate within systems based on other perspectives, for example aspectual systems rather than temporal ones, that a more profound understanding of quantification will be achieved.

## **CURRICULUM VITAE**

Sarah D. Kennelly was born Brenda Barry Rorden on November 22, 1944 in Berkeley, California, U.S.A. In 1969 she completed her undergraduate degree at Stanford University where she majored in Communications and in French. From 1969-1981 she lived in Turkey where she completed an M.A. in linguistics in 1981 at Boğaziçi University. She taught English at the University of Rome 'La Sapienza' from 1981-1987, and then at the University of Siena at Arezzo from 1988-1994. Her name was changed to Sarah D. Kennelly in 1988 for personal reasons. She completed a second M.A. in linguistics at Rutgers University in 1996. She joined the Utrecht Institute of Linguistics OTS as an international Ph.D. student in 1997. The present dissertation, in the major part, is a result of the research she carried out there. She is now the owner and head gardener of an organic flower farm, Giardini Toscani in Casentino, in Tuscany, Italy where she grows Paeonia and Tall Bearded Iris.