Distributivity and Negation: The Syntax of *each* and *every*

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1 Introduction

This paper is concerned with the syntax and semantics of quantifier scope construal, focussing on the distributive quantifiers *every* and *each*, and their interaction with negation. Our discussion is based on the theory of the syntax of quantifier scope developed more fully in Beghelli and Stowell 1994 and in Beghelli 1995.

The quantifier *Every* has traditionally been analyzed in natural language semantics as the quantifier $\forall$, familiar from classical logic. We will show that *every* is more complex than this; a number of observations on its logico-semantic behavior lend plausibility to the view that *every* exhibits a kind of quantificational variability characteristic of licensed and bound elements. The quantifier *Each* has been analyzed as a wide-scope variant of *every*, which is supposedly used in order to disambiguate between pairs of possible scope construals. We will show that the distinction between *every* and *each* is more properly characterized in terms of an intrinsic distinction between optional and obligatory distributivity. The effects of this distinction are often masked, however, by the effects of the syntactic mechanisms by which these notions are expressed in the grammar of natural languages, as we will see.

The paper is organized as follows. In Section 2, we introduce the general theory of scope and quantifier types on which the rest of the paper is based. In Section 3, we discuss the syntax of distributivity, concentrating on the distinctive behavior of QPs headed by *every* and *each*, which we refer to as Distributive-Universal QPs (DQPs). In Section 4, we examine the

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scopal interactions of DQPs with negation, bringing to light certain distinctive properties of these QPs, and highlighting some surprising differences between *every* and *each*. In Section 5, we discuss other differences between *every* and *each*, which we will use to explain the differential behavior that they exhibit with respect to negation.

2 Target scope positions for QP-types

2.1 Scope Uniformity

Our analysis of *every* and *each* is formulated within the overall theory of quantifier scope developed in Beghelli and Stowell 1994 and in Beghelli 1995. We present here a sketch of that proposal; the reader is referred to those works for further discussion. We adopt two central assumptions of the standard theory of quantifier scope in generative grammar. First, quantifier scope is determined by c-command relations holding at the level of Logical Form (LF); second, Quantifier Phrases (QPs) are assigned scope by undergoing movement to their scope positions in the derivation of the LF representations.

However, we reject one central assumption that has guided virtually all previous work on scope, namely that all QPs have the same scope possibilities. This can be stated in terms of QUANTIFIER RAISING (QR), as in (1):

(1) **The Uniformity of Quantifier Scope Assignment (Scope Uniformity)**
Quantifier Raising (QR) applies uniformly to all QPs. Neither QR nor any particular QP is landing-site selective; in principle, any QP can be adjoined to any (non-argument) XP.

In this respect, we depart from the standard account in May 1977, May 1985, as well as from refinements of it in Aoun and Li 1989, Aoun and Li 1993, and Hornstein 1995.

The reason why Scope Uniformity cannot be maintained is empirical: different QP-types have correspondingly different scope possibilities. Some of the evidence for this conclusion is reviewed below.[1]

[1] Our approach builds on that of various authors, notably Kroch 1979 and Liu 1990, both of whom observe that quantifier scope is not uniform, in the sense that individual quantifiers differ from each other in their ability to take inverse scope. Our work builds, in part, on proposals in Beghelli 1994, Ruys 1993 and Beghelli et al. 1996, among others.

May 1977, May 1985 assumes that pairs of subject and object QPs are typically scopally ambiguous, and concludes that all QPs normally undergo movement from their (S-structure) Case positions to distinct scope positions at LF. In other words, he assumes that Case positions never serve as scope positions for QPs. On the other hand, Hornstein 1995 proposes that every link in the A-chain of a given QP is a possible scope position for that QP—including both the Case position occupied by the QP at Spell-Out and its θ-position.

In this study, we propose a hybrid theory, incorporating aspects of both May's and Hornstein's approaches.[2] The central innovative aspect of the system developed here is that it draws distinctions among various QP-types; whereas *certain* QP-types may take scope in their Case positions (remaining *in situ* at LF), other QP-types must move to distinct LF scope positions reserved for them. Moreover, there are further distinctions among those QP-types that must undergo movement, in the sense that each type has a designated LF scope position defined in the hierarchical phrase structure of the clause.

2.2 QP types

Although it is possible, *a priori*, to draw many distinctions among various QP-types, we believe that—in a first approximation—the syntax of quantifier scope can be adequately captured by recognizing five major classes of QP-types. Our classification incorporates insights of Szabolcsi 1994 and Szabolcsi 1996 (this volume, Ch. 5). The reader is especially referred to the latter paper, where the relation with our proposal is discussed at length.

QP-Types

1. **Interrogative QPs (WhQPs)**. These are familiar Wh-phrases such as *what, which man*, etc. We adopt the standard convention of attributing a [+Wh] feature to these QPs, encoding their interrogative force.

2. **Negative QPs (NQPs)**. These are QPs such as *nobody, no man*, etc. (In this group belong also French n-words such as *personne* 'nobody', and possibly Italian/Spanish n-words such as *nessuno/nadie* ('nobody'), which sometimes require an overt negative element to license them.) We assume that these QPs bear a feature [+Neg].

[2] The hybrid claim that some quantifiers undergo scopal movement, while others do not, was put forth in Beghelli 1994.

3. **Distributive-Universal QPs (DQPs)**. These are QPs headed by *every* and *each*, which occur only with singular nouns. We attribute to them, in a first approximation, a distributive feature [+Dist(ributive)] (we will revise this assumption in Section 5, where we will attribute to *each* an intrinsic feature of distributivity [+Dist], leaving *every* under-specified for [Dist] and specified merely for universality [+Univ]). Both *each*-QPs and *every*-QPs are usually interpreted as both universal and distributive.

4. **Counting QPs (CQPs)**. These include decreasing QPs like *few, fewer than five, at most six, ...* and generally cardinality expressions built by modified numerals (e.g., *more than five, between six and nine, more (students) than (teachers), ...*). The characteristic semantic property of these QPs is that they count individuals with a given property, have very local scope (take scope essentially *in situ*) and resist specific interpretations.

5. **Group-Denoting QPs (GQPs)**. To this large class belong indefinite QPs headed by *a, some, several*, bare-numeral QPs like *one student, three students, ...*, and definite QPs like *the students*. The fundamental property of GQPs is that they denote *groups*, including plural individuals. Even leaving aside their referential reading (the type of epistemic specificity discussed first by Fodor and Sag 1982), GQPs can easily be construed as taking widest scope within their clause, though they might be c-commanded by other scopal elements. We maintain that this capacity for wide scope derives from their ability to introduce group referents. (Another property of GQPs that derives from this is that they support collective interpretations in contexts where DQPs require a distributive construal.) Indefinite and Bare-numeral GQPs can also support readings where they have very local scope, behaving like CQPs. We factor out such readings (exhibited by some of the members of this class) in terms of an ambiguity between a GQP and CQP reading.

2.3 Logical functions associated with QP-types

On the basis of this typology, we identify the following logical functions and relative LF positions where they are satisfied.

Scope positions for QP types

1. WhQPs take scope in the Spec of CP, where they assume their interrogative force by virtue of their [+Wh] feature being checked via Spec-Head agreement with the question operator Q.

2. NQPs take scope in the Spec of NegP, where their [+Neg] feature is checked via Spec-Head agreement with the (silent) Neg^0 head, as in Zanuttini 1991 and Moritz and Valois 1994. Clausal negation with *not*, which we assume involves negative quantification over eventualities or situations, is licensed in the same way. [3]

3. DQPs headed by *each* and *every* normally move to the Spec position of the Distributive-Universal category DistP, where they undergo Spec-head agreement with the Distributive-Universal head $Dist^0$, resulting in their characteristic interpretation. We will also suggest, however, that *every* can occur in other LF-positions as well, under certain circumstances; details are given in Section 4 and 5.

4. GQPs may select one of several distinct scope positions, resulting in the different interpretations that they receive:

   (a) GQPs that are referentially independent normally occupy the Spec of RefP position (located above CP), where they fulfill the function of (logical) subject of predication, and are interpreted with widest scope relative to other scope-bearing elements in their clause.

   (b) A lower LF position, accessible by GQPs headed by an indefinite or a bare numeral, as well as QPs containing an externally bound variable, is the Spec of ShareP, which we locate just below DistP.[4] GQPs scoping in this position are interpreted with "dependent" specific reference, in the particular sense of specificity developed by Diesing 1990, Diesing 1992, i.e. ranging over individuals whose existence is presupposed. (This allows for a kind of narrow-scope specific reading, discussed below.) Whereas specific *indefinite* GQPs can occupy either the Spec of ShareP or the Spec of RefP

[3] In other words, we assume, with Krifka 1991 and Schein 1993, that the correct logical translation of a negative sentence like *John didn't come* is not $\neg(come(j))$, but rather $no{:}e[come(e) \wedge Agent(e,j)]$ there are no events of coming where John is the agent'.

[4] Definite QPs containing externally bound pronouns may also move to the Spec of ShareP, though we will not consider such cases here.

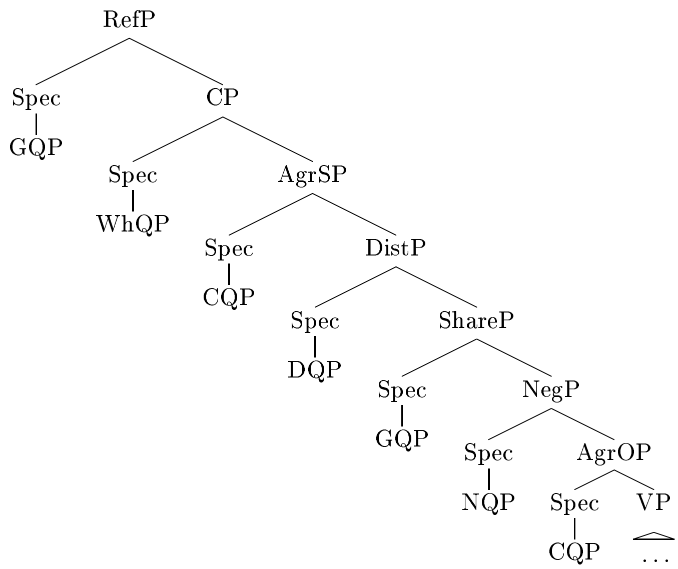
position, specific *definite* GQPs must normally take scope in the Spec of RefP of that clause, and are scopally independent within it.

(c) Indefinite or bare-numeral GQPs may also take scope in their Case positions (i.e. *in-situ*), where they are interpreted non-specifically, like CQPs.

(d) CQPs cannot ordinarily be interpreted as specific. Therefore they are interpreted in their Case positions and take scope *in-situ*. For a discussion of the properties of CQPs, the reader is referred to Szabolcsi 1996 (this volume, Ch. 5).

The relative scope positions of our five QP-types, based on their location in the functional structure of the clause, are given in (2):

(2)



Given the well-known lack of island effects with definite and specific indefinite GQPs—which, like indexical pronouns and names, can have a *de re* construal even when they are embedded within islands—it has often been suggested that a wide-scope referential (*de re*) construal does not depend on movement. We will not be concerned here with the issue of how referential readings (cf. Fodor and Sag 1982) of indefinite QPs should be generated. We refer the reader to Kratzer 1995 for a recent proposal.

We assume that true GQPs become associated with an existential operator over a restricted variable, ranging over witness sets of the GQP[5]. This

[5]We are grateful to Anna Szabolcsi for originally suggesting this idea to us

proposal seems to us essentially similar to that contained in Reinhart 1995, where the existential operator ranges over choice functions[6]. (cf. Abusch 1994, Beghelli 1994, Beghelli 1995, Ruys 1993, Reinhart 1995, etc. for discussion).

Readers who are ill-at-ease with the postulation of functional categories will probably react with some skepticism to our claim that they play a central role in the syntax of quantifier scope assignment. We have several answers to this type of objection. First, with respect to the scope positions for WhQPs and NQPs, we are adding nothing new. Second, it is possible that our Spec of RefP position can be identified with the Topic position, and it is well known that topics undergo overt movement in many languages. (Our use of an LF landing site for GQPs forces us to adopt a somewhat broader notion of the "topic" function than what corresponds to the English Topic position, but many QP-types, including downward-entailing QPs, are forbidden from moving there.) Third, our Spec of ShareP position may correspond to the position of Diesing's scrambled' narrow scope presuppositional QPs, though we make it accessible only to existential QPs of this type. Fourth, DQPs move overtly in some languages, to a position that we believe is none other than our Spec of DistP, as we will show below.

2.4 Scope and feature-checking

In the system that we propose, the movement of DQPs and GQPs to their scope position is driven by the need to check features that are associated to their QP-types. We will therefore refer to our proposal as a checking theory of scope assignment. We will return later on in this paper to the precise characterization of some of these features (in particular, to the different featural specification of *every* vs.*each*). Here we simply wish to present the overall picture, and evaluate some of its consequences.

Membership in any of the QP-types listed in Section 2.2 is indicated by a number of syntactic properties, some of which have been listed in 2.2. These properties are morphologically encoded in the determiner position of the DP or QP: this is obvious in the case of WhQPs and NQPs, as they bear 'Wh-' and 'n-' markings, but it arguably holds for other QP-types as well.

Thus, the determiners of DQPs ('each', 'every') have what we may call 'e-' morphology. Morphological markings (the presence of un-modified numerals, (in)definite article, etc.) distinguish the various subtypes of GQPs,

[6]Kratzer 1995 develops Reinhart's suggestion to deal with the puzzle of island violations with referential indefinites

and CQPs are characterized by the presence of modified numerals. These morphological specifications are not inherently different from the usual ones (agreement, case marking, etc.). We propose that they represent the syntactic encoding of logico-semantic features.

What is special with these, we propose, is that they carry logico-semantic features. WhQPs check their [+Wh] features through Spec-Head agreement with a Wh-operator hosted in C^0, and NQPs check [+Neg] in Spec of NegP, under agreement with the Neg-operator in Neg^0. Let us assume that a similar process obtains with the other QP-types. Feature-checking may appear to be more complex with the latter than it is with the former, but we are interested in pursuing the hypothesis that the process is essentially the same.

Our basic assumption is that DQPs need to check their [+Dist] features under agreement with a distributive operator (which we can indicate as $\forall$) hosted in $Dist^0$, whereas GQPs need to check group reference ([+group ref]) with an existential operator-head ($\exists$). Existential operator-heads occur in both $Share^0$ and Ref^0. The hierarchy in (2) thus corresponds to a hierarchy of operators. We claim that one of the basic roles served by the functional hierarchy of the clause is to encode the structural order in which semantic information is processed.

This gives the basic idea of what we think is going on in the process of scope assignment: scope is simply the by-product of agreement processes. Within this overall scenario, individual sub-types of QPs (and possibly individual quantifiers) realize additional features. GQPs are not, as a class, assigned a unique landing site: though definites typically take scope in Spec of RefP, numerals and indefinites can move to either RefP or ShareP. Extending the logic of our analysis, we suggest that when a GQP is endowed with an extra feature that marks it as the logical subject of predication, it will be driven to move up to (Spec of) RefP; otherwise it will remain in ShareP. If an indefinite GQP lacks the feature [+group ref] altogether, it behaves like a CQP, i.e. it goes no further than its Case position at LF). Unlike DQPs and GQPs, we assume CQPs do not have syntactically relevant features to check.

On a somewhat more technical level, we assume that scope positions can be reached either directly, through (leftward/upward) movement, or by (rightward/downward) reconstruction to a lower link in the chain of the QP. There is no principled difference between movement and reconstruction: each QP-chain is associated with one scope position, defined as the unique link which is compatible with the featural specification of the QP.[7]

2.5 The Checking Theory of Scope Versus Other Approaches

As noted above, the Checking Theory of scope that we develop here is in some respects a hybrid of May's theory (May 1977, May 1985), which holds that all QPs undergo LF movement to their scope positions, and Hornstein's 1995 theory, which holds that quantifier scope is based strictly on chains formed by the movement of QPs to their Case positions in AgrSP and AgrOP. Our theory differs from these approaches in three important respects, however.

In assuming that only certain types of QPs undergo "QR" to a (non-Case) scope position, the Checking theory differs from May's theory, which holds that *all* QPs undergo QR at LF, and also from Hornstein's theory, which assumes that none of them do. More fundamentally, the Checking Theory is sensitive to the inherent semantic type of the QPs involved. First, certain QP-types must undergo LF movement from their Case positions, whereas others do not. Second, the Checking Theory provides targeted scope positions for each QP-type that does move; just as Wh-QPs and NQPs have targeted scope positions in the Spec of CP and NegP respectively, so DQPs headed by *every or* each, definite GQPs, indefinite GQPs, and CQPs have targeted scope positions too.

These distinctive aspects of the Checking Theory of scope are motivated by the central empirical point that we wish to make, namely that scopal ambiguity for pairs of clausemate quantifiers is much more restricted than has traditionally been assumed in the literature on quantifier scope. We are not referring here to the trivial observation that the discourse context may provide information that allows deductive reasoning to eliminate certain scope construals as unlikely or impossible; rather, we maintain that for certain combinations of quantifier-types, the *grammar* simply excludes certain logically possible scope construals. (In order to recognize this point, it is necessary to abstract away from the effects of discourse-related factors associated with Focus and Contrastive Topic intonation.)

We now turn our attention to the empirical generalizations that our theory captures. We begin by discussing the scopal behavior of indefinite GQPs, in terms of their interaction with DQPs and NQPs (including clausal negation). Next, in Sections 3 and 4, we examine DQPs and their scopal

[7] Of course, this theory requires a suitable notion of Minimality to regulate movement. We do not explore this matter here; the reader is referred to Beghelli 1995 for a particular proposal in this direction.

interactions with negation. In each case, one might object that May's or Hornstein's approach could account for the relevant data more simply, without invoking special functional projections for individual QP-types. To this objection, our reply is that the main strength of our approach lies in its ability to account for a range of data involving quantifier scope construals that are *not* ambiguous, where either of the alternative approaches would fail to distinguish in the appropriate way among different QP-types.

Independently of these factors, we believe that the extra complexity inherent in assuming a differentiated account of QP-types is compensated for by its being more theoretically uniform at a higher level. Our approach extends to all QP-types the basic analytical logic that has long been assumed for WhQPs, and more recently, for NQPs as well (cf. Zanuttini 1991, Moritz and Valois 1994).

Finally, we should draw attention to another general feature of the Checking Theory of scope developed here, which follows from the notion of targetted scope positions: the traditional notion that LF movement is typically optional can be dispensed with. Given that QP-types are endowed with certain intrinsic features, they *must* move to those scope positions where the features in question can be licensed.

2.6 Empirical justification

We have stressed that the fundamental motivation for our approach is empirical. We will now review some of the empirical justification for the rich structural representation that we hypothesize. We concentrate on interactions between clausemate QPs surfacing in subject and object positions, where one of the QPs is an indefinite GQP. We present only some of the relevant data in this section; further data will be considered in later parts of this paper. Scopal interactions between DQPs and negation (including both clausal negation and NQPs) are considered in Section 3; scopal interactions involving WhQPs are discussed extensively in Beghelli 1996 (this volume). Furthermore, we will make only passing references, in discussing the predictions of our theory, to the scopal behavior of CQPs, since they bear only tangentially on the focus of the present paper; the reader is referred to Beghelli and Stowell 1994.

2.6.1 Clause-internal scopal asymmetries

We begin our empirical discussion by enumerating three predictions implied by the hierarchy of positions in (2):

(3) a. A WhQP should always take wide scope with respect to any other QP in their clause, other than GQPs when these are assigned scope in Spec of RefP.

b. A GQP should be scopally ambiguous with respect to a clausemate DQP, depending on whether the GQP moves to Spec of RefP or to Spec of ShareP.

c. A GQP object should be scopally higher than clausal negation, owing to the fact that it takes scope in Spec of ShareP or Spec of RefP–except in the case mentioned above where an indefinite or bare-numeral GQP remains in its Case position (Spec of AgrO-P) and receives a counting interpretation; cf. (2.3d.iii)). A GQP subject should always take wide scope with respect to clausal negation and/or a clausemate NQP.

d. A CQP in object position should never be able to take inverse scope over a GQP or DQP occurring in subject position.

Let us now see the empirical status of these predictions, and how they follow from our assumptions. Some of the predictions in (3) are, of course, familiar facts from the literature. For instance, (3a)—that WH-QPs take widest scope—is widely assumed, and we are essentially following a long tradition here.[8] Prediction (3b)—that clausemate GQP/DQP pairs are scopally ambiguous—is also a familiar fact, exemplified in paradigms such as (4):

(4) a. Every/Each student read two books.

b. Two students read every/each book.

In each case, the indefinite GQP headed by *two* can be construed either inside or outside the scope of the DQP headed by *every/each*.

Our account of (4) does not differ empirically from the classical QR-based theory advanced by May 1977, although it derives the scopal ambiguity in a different way. The classical theory of May 1977 captures the ambiguity as a result of QR being free to apply sequentially, in either order, to both QPs. Either QP may adjoin to S, creating a higher S-node; then the other QP will adjoin to the higher S-node, taking wider scope than the QP that moved first. Since either QP can be the first to move, two LF-configurations

[8] There is one apparent counterexample to the claim that WhQPs scope higher than QPs like *every, each, few, ...*, involving so-called pair-list readings of certain QP-types in certain syntactic positions; these are discussed in Beghelli 1996 (this volume, Ch. 10).

are possible, resulting in the ambiguity. (This analysis could be translated into a Minimalist framework, by allowing both QPs to adjoin to AgrS-P, or by allowing one to adjoin to AgrS-P, and the other to adjoin to some other functional category, such as TP.)

In contrast, the Checking Theory of scope that we are advocating here must claim that the DQP will always end up in the same LF scope position, namely in the Specifier position of the Distributive Phrase (Spec of DistP). Hence the scopal ambiguity must arise in some other way. We suggest that it arises because indefinite GQPs have an ambiguous quantifier type, making more than one LF position available to them; in fact, we suggest that they have *four* possible LF landing sites. One of these—Spec of RefP—is superior to the DQP's position in Spec of DistP; another—Spec of ShareP—is inferior to it. The other two positions are both Case positions (Spec of AgrS-P and Spec of AgrO-P, for subjects and objects, respectively); of these, the latter is inferior to the LF position of the DQP, while the former is superior to it.

Consider now (4b), where an indefinite QP occurs in the subject Case position (Spec of AgrS-P) at Spell-Out, and a DQP occurs in the object position. Since the DQP must move to the Spec of DistP position, which is inferior to the Case position of the subject, a narrow scope construal of the subject will be possible only if the subject reconstructs to a scope position *lower* than Spec of DistP. For the GQP subject in (4b), a narrow scope construal of the subject must involve its reconstructing to the Spec of ShareP position, since it cannot reconstruct to the Spec of AgrO-P. (The possibility of its reconstructing to its θ-position is discussed below.)

The reader may wonder how the Checking Theory of scope can account for sentences containing two DQPs, such as *Each boy read every book* or *Every professor gave every student an A*. If DQPs headed by *each* and *every* have a unique LF landing site, then one might expect that a given sentence could contain only one of them. The analytical problem posed by such examples is no different in principle from that posed by multiple Wh-questions or by sentences containing multiple NQPs, e.g., in languages exhibiting "negative harmony" such as Spanish. For such cases, we follow a long tradition in assuming that the Spec positions of scopal categories can be multiply filled, either because there may be more than one specifier for the same projection, or through a process of absorption applying to quantifiers of the same logical type.

The first prediction in (3c)—that *indefinite GQP objects can take inverse scope over negation*—is also a familiar fact, based on examples like (5a-b):

(5) a. The students didn't read two/some books.

b. No student read two/some books.

The second prediction in (3c)—the possibility of a *narrow-scope* construal for an indefinite GQP object, as in (5a), follows from our proposal that some (e.g., bare-numeral) GQPs can be interpreted as CQPs and remain in their Case positions at LF, as in (2.3d.i).

Empirical support for the third prediction in in (3c)—that *indefinite GQP subjects must take scope over negation*—is less widely recognized, though it is supported by (6a-b):

(6) a. Two/some students didn't read this book.

b. Two/some students read no books.

Assuming that the LF scope position of both clausal negation and NQPs is located at the NegP level, the *possibility* of a wide-scope construal of indefinite GQP subjects and objects is expected, given that indefinite GQPs have two possible LF landing sites above NegP in (2)—Spec of ShareP and Spec of RefP. (The distinction between these two positions is not obvious in examples like (5) and (6), and may appear at this stage to be an artifact of our account of 4; however, we will provide justification for this shortly.)

However, the GQP subjects in (6) apparently *must* take wide scope relative to negation, suggesting that there is no position below the scope domain of the negative operator (in Spec of NegP) that these subject GQPs can reconstruct to. Our hierarchical arrangement of scope positions provides an account of this, in the spirit of Hornstein 1995. Unlike an object GQP, whose Case position (Spec of AgrO-P) lies *within* the scope of negation, a subject GQP would have to reconstruct to a position within VP in order to derive a narrow-scope construal relative to negation, since the subject Case position (AgrS-P) is too high up. (Reconstruction to the Spec of ShareP can derive a narrow scope construal relative to a distributive operator in DistP, but it is not low enough to produce a narrow scope construal relative to negation.)

Thus, there is only one way in which a narrow-scope construal of a subject GQP relative to negation might be derived: by reconstruction of the subject GQP to its original θ-position below NegP. Evidently this option must be excluded. A natural way of deriving this result would be to assume that every quantifier phrase must syntactically bind a trace as a variable in the LF representation. (Though the semantic basis for such an assumption is not obvious, we will assume nevertheless that such a condition holds, on

LF representations, at least.)[9] Then reconstruction of a GQP—or another quantifier phrase—to its original θ-position would be excluded, since there would be no trace in a lower position for the GQP to bind.

Simple indefinites (singular indefinites with the article *a/an* and bare plurals) in subject position do seem to be capable of reconstructing below NegP, however, as in (7):

(7) a. A student didn't write this book.
    b. Students didn't write this book.

Furthermore, as is well known, simple indefinites and bare plurals can routinely be bound by generic operators and adverbs of quantification, whereas numerals and *some* do not show this type of variability. We can provide an explanation for the difference between (6) and (7) if we follow much recent work[10] in assuming that simple indefinites and bare plurals are actually restricted variables which can be unselectively bound by a variety of external quantifiers, including negative quantifiers. This will allow them to reconstruct into a θ position because, being variables and not quantifier phrases, they do not need to bind variables themselves. Nor do they need to be checked with an operator-head in Spec,ShareP or Spec,RefP for existential quantification, because they are unselectively bound. Hence the contrast between (6) and (7).

Lastly, we should point out that the introduction of a special type for CQPs is motivated by a basic asymmetry in subject-object scope interactions. Whereas both DQPs and GQPs can, when in object position, take wide scope over a subject GQP (though not in the same way—cf. Section 3), CQPs are not able to take inverse scope:

(8) a. Some/one of the students visited more than two girls.
    b. Some/one of the students visited few(er than three) girls.
    c. Every student visited more/fewer than three girls.

In neither of (8a, b, c) can the object QP take scope over the subject (at least if normal intonation is employed). For example, we cannot construe (8a) to mean that for more than two girls, it is the case that some student, or one of the students, visited her.

[9] This assumption was not made in Beghelli 1995, where it was proposed that CQPs are allowed to reconstruct in their theta-positions. Some of the empirical problems handled by this latter, less restrictive view, remain as open questions in the solution suggested in the present paper.

[10] Heim 1982, Kratzer 1988, and Diesing 1988, Diesing 1990

This is derived directly under our analysis, since an object CQP cannot scope higher than Spec of AgrOP, and a subject GQP, as seen above, cannot reconstruct lower than Spec of ShareP. (Nor can a subject DQP reconstruct below Spec of DistP.) Our assumptions about the local scope of CQPs are further confirmed by the observation that these QPs only support a *de dicto* reading when they are complements of intensional predicates:

(9) Someone wanted to visit more than two professors.

2.6.2 Cross-linguistic evidence

As a second argument for the Checking Theory of scope, we cite empirical evidence from surface constituent order in a number of languages, supporting our contention that there are distinctive scope positions defined in the phrase structure of the clause for DQPs and (particular construals of) GQPs. The paradigmatic case of one-to-one correlation between surface order and scope seems to be Hungarian, a language known to 'wear LF on its sleeve'. Szabolcsi 1996 (this volume) presents striking evidence in support of the Checking Theory, by showing that, in Hungarian, a hierarchy of positions essentially similar to (2) governs the surface order of QPs. In this language, GQPs, DQPs, and CQPs move in the overt syntax to their specified scope positions in the hierarchy of functional projections in (2).

With respect to DQPs, Kinyalolo 1990 has shown that, in the Bantu language KiLega, universally quantified noun phrases that are obligatorily distributive must undergo overt leftward movement in the visible syntax.[11] We interpret this as evidence that KiLega requires DQPs to be spelled out in Spec of DistP, just as English requires (most) WhQPs to be spelled out in Spec of CP. Similarly, Khalaily 1995 shows that the Palestinian Arabic counterparts of our DQPs must undergo leftward movement in the overt syntax in a parallel fashion; he argues that Palestinian Arabic exhibits an overt counterpart to our LF movement to Spec of DistP, a conclusion that we concur with.

Further cross-linguistic evidence comes from the recent literature on scrambling in Hindi (Mahajan 1990) and various Germanic languages (cf. Kratzer 1988 and Diesing 1990, among others). A number of proposals have suggested that specific construals of indefinites are necessarily associated

[11] It is significant to note that in KiLega universal terms that are not obligatorily construed with distributivity do not move leftward. In other words, only the quantifier corresponding to *each, every* triggers movement; the *all* quantifier does not. The latter is distinguished from the former in that it supports collective readings. Cf.. Beghelli 1995 for discussion.

with (overt) leftward movement out of VP. Though the exact location of the landing site of scrambling is still being debated, we believe that the position that we identify as Spec of ShareP is a common landing site for scrambling. We will not develop this point here, however, since this would take us too far afield.

2.7 Semantic assumptions

Thus far, we have sketched out a theory of quantifier scope based on the typology of QPs listed in 2.2, the fixed scope domains ordained by the clause structure in (2), and the assortment of assumptions in Section 2.3 about where the individual QP-types can occur in LF. Before concluding this introductory overview of our theoretical approach, we should make our assumptions concerning the semantic underpinnings of our proposal explicit. We appeal chiefly to the theory outlined in Szabolcsi 1996 (this volume). Szabolcsi's proposal is a development of the core tenets of Discourse Representation Theory (DRT). We give the following as a minimal set of hypotheses on which our approach rests:

(10) a. Following Szabolcsi 1996's modification of standard DRT, we assume that GQPs introduce discourse referents in the form of restricted group variables. Such variables correspond to the minimal *witness set* of the QP in generalized quantifier theory parlance. Thus, a GQP like *two men* introduces a variable X ranging over sets containing two men and no non-men. We have suggested above that the variable introduced by a GQP must be checked with an existential operator-head that can only arise in two positions, as laid out in Section 2.3: Ref^0 and Share^0. Only simple indefinites and bare plurals act as plain variables.

b. Following standard DRT, we assume that CQPs are interpreted as generalized quantifiers. Because they do not introduce discourse referents (=variables), they do not undergo movement in LF above and beyond Case-driven movement.

c. We depart from standard DRT (and follow Szabolcsi 1996) in assuming that DQPs also introduce discourse referents, albeit of a different type than GQPs. Whereas GQPs introduce individual variables (whether singular or plural individuals—the term *group* covers both)—DQPs introduce *set* variables, which are again restricted variables ranging over witness sets of the quantifier. In Section 5 we discuss how the set variable introduced by a DQP gets bound, and by which operator. (Note, for clarification, that the distributive operator ∀ hosted in $Dist^0$ does not bind the set variable; this operator applies at a different level, that of the elements of the set.)

3 Scope and Distributivity

3.1 Varieties of Scope Judgements

Scope judgments involving quantifiers are commonly based on three types of interpretations, and related intuitions. The first type of intuition, usually invoked in assessing the interaction of existential quantifiers with a variety of logical operators (including negation and various intensional predicates), concerns existence presuppositions, as in (11):

(11) a. John wants to marry a Canadian princess.
b. John didn't marry a Canadian princess

If the existentially quantified indefinite QP falls under the scope of *want* or *not*, then the speaker need not be committed to the existence of any Canadian princess; on the other hand, if the QP scopes over the logical operator, then the speaker is committed to the existence of one such individual. This sort of intuition will not concern us in this section.

A second type of intuition involves in scope interactions with negation and other downward-entailing operators. Consider, for example, the scopal interaction between negation and an existential or universal quantifier, as in (12):

(12) a. John didn't read a book
b. John didn't read every book

In these examples, the preferred reading is for negation to scope over the existential QP in (12a) and over the universal QP in (12b); however, the existential quantifier is also free to scope over negation in (12a), whereas in (12b), the universally quantified object can scope over negation only if it is focussed. In these examples, the primary basis for the scope judgements involves the interaction of the logical operator *not* with the logical operators ∀ and ∃.

A third type of intuition, commonly associated with indefinite QPs interacting with a variety of other QP-types, concerns distributivity. If a given QP_1 takes scope over an indefinite QP_2, then QP_1 is usually understood to distribute over QP_2. On the other hand, if QP_1 fails to take scope over QP_2, then distribution fails. Consider (13):

(13) a. Every boy read two books.
     b. Five boys read two books.

If the indefinite GQP object falls under the scope of the subject QP, the total number of books involved is potentially much greater than two; the quantity associated with the existentially quantified GQP object is multiplied by the value of the other QP, so that (13b) can describe the reading of up to ten books, the total number depending on whether some of the boys might have accidentally read the same books. In such a distributive reading, we will describe the wide-scope QP as the DISTRIBUTOR and the narrow-scope indefinite as the DISTRIBUTEE or DISTRIBUTED SHARE (Choe 1987). If *two books* does *not* fall within the scope of the other QP, then distribution fails, and the sentence only describes the reading of a total of two books.

3.2 Collective and Distributive Construals

These intuitions about distribution rely on the possibility that the noun phrase serving as the distributed share is capable of referential variation, e.g. that each boy read a different pair of books in (13) (cf. Beghelli et al. 1996, Ch. 2 of this volume). In a situation where the boys happened to read the same set of books, as in 'Five boys read all the books', the DP *all the books* cannot serve as distributed share in the relevant sense, since there is no possibility of referential variation. Hence, narrow scope readings of some DP-types, including universals, cannot be accessed by intuitions of distributivity. We will assume, however, in agreement with Beghelli et al. 1996, that when a definite DP or DQP lands at LF in a position lower than that of another QP_2, it does take narrow scope with respect to QP_2.

The type of distributivity illustrated in these examples involves an overt indefinite GQP serving as the distributed share. In other cases, distributivity seems to involve distribution of events or agentive functions; this type of distributive reading is often contrasted with a so-called COLLECTIVE reading. Consider (14):

(14) John and Bill visited Mary.

On the distributive reading, John and Bill are each agents of distinct events involving visits to Mary; on the collective reading, John and Bill act together as joint agents of a single visiting event. We will assimilate this collective/distributive distinction to the paradigm in (13) by assuming that there is a covert existential quantifier over events in (14), as suggested by Davidson 1967, Kratzer 1988 and many others; if this existential quantifier falls under the scope of the subject GQP, then a distributive reading results; if the covert existential quantifier takes broad scope, then distribution fails, and a collective interpretation results.

We have labeled the QPs headed by *each* and *every* as Distributive-Universal QPs (DQPs)—*distributive*, because they must usually serve as distributors, and *universal* because they are usually understood to have the force of universal quantification.[12]. The universal force that these QPs typically convey is illustrated in (15):

(15) a. All the boys visited Mary at six o'clock
b. Every boy visited Mary at six o'clock.
c. Each boy visited Mary at six o'clock.

Suppose that the set of boys being quantified over consists of Tom, Dick, and Harry; then these sentences are all true if Tom, Dick, and Harry all visited Mary at six o'clock; they are all false if any one of the boys failed to visit Mary at six o'clock.

The distributive nature of *each* and *every*—as opposed to *all*—can be illustrated by considering contrasts such as the following:

(16) a. The Pope looked at all the members of his flock.
b. The Pope looked at every member of his flock.
c. The Pope looked at each member of his flock.

(17) a. All the boys surrounded the fort.
b. ? Every boy surrounded the fort.
c. ? Each boy surrounded the fort.

In (16), the universally quantified objects all allow for a distributive construal, where the object QP serves as a distributor and a looking event serves as a distributed share; but only *all* allows for a collective construal, where distribution fails and there is a single looking-event. Thus, in (16a),

[12] Actually, the situation is apparently somewhat different in Hungarian, where several non-universal QP occur overtly in what appears to be the Spec of DistP position; cf. Szabolcsi 1996

the Pope might have looked at the assembled multitude with a single glance, but in (16b) and (16c), he must have looked individually at each and every member of his flock.

In (17), the predicate *surround* requires an event with a semantically plural agent; this requires a collective (nondistributive) construal of the subject QP, which must denote a (plural) group. Such a construal is possible with a universal QP headed by *all* in (17a), but not with a DQP headed by *every* or *each* in (17b-c); the DQPs force a distributive construal, where a surrounding-event serves as the distributed share, attributed individually to each member of the set of boys, a reading that is incompatible with the semantics of the predicate.

Another property distinguishing *each* and *every* from *all* is grammatical number: *each* and *every* are grammatically singular, combining with morphologically singular NPs and binding singular pronouns as variables:

(18) a. All the boys$_I$ said they$_I$ were tired.
b. Every boy$_I$ said he$_I$ was tired.
c. Each boy$_I$ said he$_I$ was tired.

We believe this property is related to their strong distributive behavior; we will return to this point in Section 5 (cf. also Beghelli 1995).

Summarizing our discussion thus far, we have reviewed two ways in which a distributed share can be provided to set up distribution. The first involves an overt indefinite GQP functioning as a distributed share for another QP; the second involves a covert existential quantifier over events functioning as a distributed share, on a distributive (non-collective) event construal. We have also seen two contexts where DQPs force distributive (non-collective) event construals in configurations where universally quantified QPs headed by *all* and other QP-types allow a nondistributive (collective) construal. Henceforth, we will refer to *each* and *every* as STRONG DISTRIBUTIVE quantifiers.

3.3 Other Diagnostics of Strong Distributivity

So far, we have not shown that DQPs headed by *every* or *each* differ from QPs headed by *all* (or from other types of QPs, for that matter) with respect to distribution over overt indefinite GQPs. At first glance, they appear not to. For example, in (19), the indefinite object GQPs seem to be allowed to function as distributed shares for various types of subject QPs:

(19) a. Tom, Dick, and Harry read two books about India.

b. Three boys read two books about India.

c. All the boys read two books about India.

d. Every boy read two books about India.

e. Each boy read two books about India.

(For many speakers, the DQP subject headed by *each* in (19e) seems to favor a distributive construal over the indefinite object somewhat more strongly than the other subject QPs do, but this does not appear to be an absolute requirement.) Thus, while *each* and *every* may be more strongly distributive than GQPs (including those headed by *all*) with respect to covert event quantification, such a distinction does not seem to be justified when an overt indefinite GQP functions as the distributed share.

This conclusion turns out to be premature, however. Recall that there are two possible LF scope positions below the Spec of DistP for GQP objects: the Spec of ShareP and the Spec of AgrO-P. (We have already suggested that GQPs may remain in their Case positions at LF, and that when they do so, they have the counting interpretation characteristic of CQPs; this assumption was necessary in order to account for the fact that GQP objects are free to scope under negation.) Thus, it is possible that the GQP objects in (19) are actually occurring in Spec of AgrO-P rather than in the Spec of ShareP.

An interesting difference between DQPs and other QP-types emerges when we consider structures involving singular indefinite QPs modified by the adjective 'different', which functions as an unambiguous marker of true *distributed share* status.[13] Only QPs headed by *every, each* can enforce a distributive reading when they take scope over *a different N*. The following examples illustrate this:

(20) a. Every boy read a different book.

b. Each (of the) boy(s) read a different book.

c. * All the boys read a different book.

d. * The boys read a different book.

e. * Five boys read a different book.

DQPs also differ from GQPs with inverse scope construals. Whereas DQP objects headed by *each* or *every* can assume the distributor function, other QP-types, including GQPs headed by *all*, cannot:

[13]Items like*a different N* also have an anaphoric reading: 'an N which is not identical to the one mentioned before'. This reading is irrelevant here.

(21) a. A (different) boy read every book.
b. A (different) boy read each book.
c. * A (different) boy read all the books.
d. * A (different) boy read Ulysses and Dubliners.
e. * A (different) boy read two books.

In (21c-e), the subject GQPs may not be construed as distributed shares, and *different* must be understood to mean 'different from some other boy mentioned previously in the discourse', whereas in (21a-b), the subjects can be so construed, and *different* can be understood to differentiate among the referents of the distributed share. In addition, in sentences like (19b) the distributive reading 'there are two books about India, such that for each one, two (possibly different) boy read it' is not generally available, as noted by Kamp and Reyle 1993, Ruys 1993 and references cited therein.

Actually, examples where an inverse distributive reading appears to be available with GQPs have been quoted in the literature. In this vein, Reinhart 1995 cites the well-known *American flag* example noted originally by Hirschbuehler 1982, to which we may add a more benign floral example:

(22) a. An American flag was hanging in front of two buildings
b. Blossoms sprang out of two rosebushes

Such examples, however, rely crucially on the special properties of simple indefinites and bare plurals, which—as noted above in the discussion of ex. (7)—are allowed to reconstruct to their VP-internal thematic positions. The inverse distributive readings disappear with different choices for the subject GQP:

(23) a. Five guards stood in front of two buildings
b. Three blossoms sprang out of two rosebushes

Neither of these cases seem to readily allow for a distributive interpretation—which our approach correctly predicts, since reconstruction to the original VP-internal thematic position is precluded for these GQP subjects, as we have already seen. In contrast to such cases, any indefinite GQP can serve as the distributed share when a DQP headed by *every* or *each* functions as the distributor, as observed above. Consequently, we believe that Hirshbuehler's type of example is simply reflective of the special reconstructive abilities of simple indefinites and bare plurals, and does not undermine our distinction between DQPs and GQPs with respect to inverse distributive construals. This suggests that our distinction between strong distributivity with DQPs headed by *every* or *each* and the type of distributivity exhibited by other QP-types does extend to distribution over overt indefinite GQPs after all. The contrast between (19) and (21) also suggests that this distinction is syntactically based, insofar as it is sensitive to c-command relations holding between the two QPs.

We are now in a position to relate the strong distributivity exhibited by DQPs to the syntactic structure for quantifier scope that we introduced in Section 2. We suggested there that DQPs always move from their Case positions to the Spec of DistP at LF, and we pointed out that this movement seems to take place in the visible syntax (before Spell-Out) in some languages. We also suggested that when a DQP scopes over a clausemate GQP, the GQP normally occurs in the Spec of ShareP. We now propose to exploit this structure to characterize the difference between strong distributivity (associated with DQPs) and the type of distributivity exhibited by other QP-types.

Strong distributivity seems to have three characteristic diagnostic properties:

(24) **Strong Distributivity**

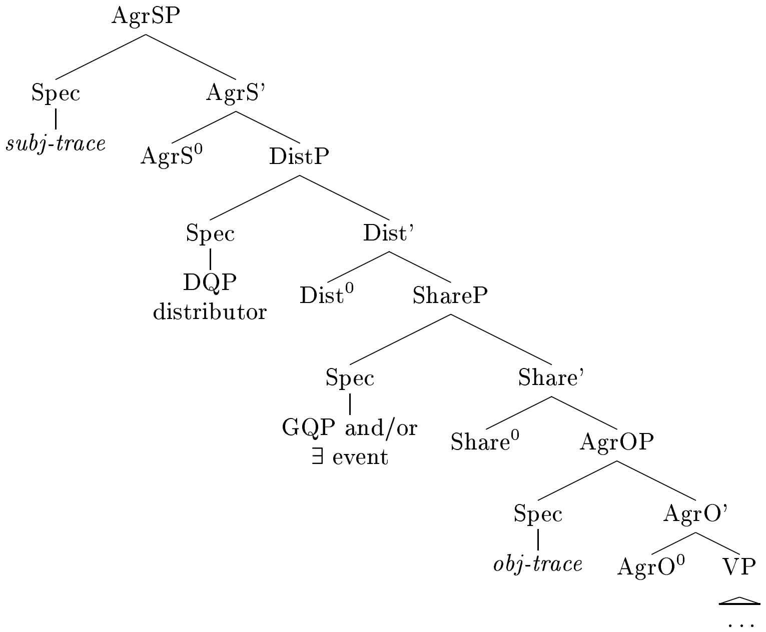
a. DQPs headed by *each/every* are Strong Distributors.

b. Strong Distributivity is obligatory.

c. Strong Distributivity can arise under an inverse scope construal, e.g., where the distributee is in Spec of AgrSP and the distributor is in Spec of AgrOP.

Let us now review our assumptions about scope assignment with DQPs. Suppose that DQPs bear an intrinsic feature of (strong) distributivity [+Dist]. As discussed in Section 2, this feature must be checked in the same way that features such as [+Wh] and [+Neg] must: under Spec-Head agreement with a functional head. Thus [+Dist] DQPs must appear in the Spec of DistP at LF in order for their distributive feature to be licensed. The Dist^0 head selects as its complement a functional category containing the QP corresponding to the distributed share. This functional category, which we label ShareP, requires an existentially quantified indefinite GQP (the distributed share) to occur in its Spec position, just as NegP and [+Wh] CP require NQPs and WhQPs to occur in their Spec positions. When a DQP takes distributive scope over an indefinite GQP, the indefinite moves to Spec of ShareP at LF; when there is no overt indefinite and the GQP simply forces a distributive (non-collective) event construal, a covert quantifier over events moves to the Spec of ShareP. The complement of Share^0 contains the Verb Phrase and various lower-level functional projections (including NegP and AgrOP):

(25)



Thus, a chain of syntactic dependencies captures the strong distributive nature of DQPs. Our account captures the characteristic properties of Strong Distributivity in (21); (21a-b) follow from the mechanism of feature-checking, and (21c) follows from the fact that Spec of DistP and Spec of ShareP are possible LF landing sites for DQPs and indefinite GQPs, respectively.

Let us see how our system works with a few simple examples:

(26) a. Every boy visited Mary at six o'clock. [15b]
b. The Pope looked at each member of his flock [16c]
c. Each boy read two books about India. [19d]
d. A (different) boy read every book. [21a]

In every case, the DQP headed by *each/every* must move to Spec of DistP, where its [+Dist] feature is checked. This requires the presence of an active Dist head, just as the movement of a WhQP to Spec of CP requires the presence of an active [+Wh] Comp head. The active Dist head selects a ShareP with a Share head that licenses (and requires) an existential QP in Spec of ShareP, by the familiar feature-checking mechanism.

We mentioned above that a number of recent studies (Schein 1993, Higginbotham 1985), Kratzer 1988, Diesing 1988, Diesing 1990) have adopted Davidson 1967's proposal for the existence of an event argument and proposed a syntactic position for it.[14] We wish to adopt the proposal that event arguments are syntactically realized, but in a modified form; we suggest that this argument position occurs VP-internally, and that it functions as a θ-position of the usual sort, i.e., as a syntactic position in which overt and covert QPs may originate (cf. Stowell 1991). Adverbial QPs ranging over events such as *rarely, never, always* originate there; the same is true of the WhQP *whether* and the NQP *not* ('clausal negation'), and the covert existential event QP $\exists$. Just as *whether* and *not* move to their scope positions in Spec of CP and NegP respectively to have their quantificational features checked, so $\exists$ moves to the Spec of ShareP.

In (26a-b) there is no overt GQP, so the covert existential quantifier over events must move to the Spec of ShareP, forcing a distributive (non-collective) construal. In (26c-d) there is an overt indefinite, which is free to move into the Spec of ShareP, resulting in distribution over books in (26c) and over boys in (26d). These overt indefinites are also free to move to the Spec of RefP instead, resulting in a wide scope construal, in which case the event quantifier must move to the Spec of ShareP.

Our analysis implies that the covert event QP $\exists$ does not need to move to the Spec of ShareP if there is an overt indefinite GQP that can move there instead, as in (26c-d). This does not seem to be correct, however; it seems that the event quantifier is always forced to move to Spec of ShareP, since it is virtually impossible to construe a DQP as taking distributive scope over an overt indefinite with a collective (nondistributive) event construal. We are not certain whether the latter observation is a fact that the syntax of LF should try to account for, or whether it is a fact about the ontology of permissible event-types; for concretenes, we will assume the latter view, but we will not try to resolve this issue here.

We have provided a syntactic account of Strong Distributivity, but so far we have not attempted to explain the type of distributivity associated with non-DQP distributors. We have seen that the latter type of distributivity,

[14]There is some disagreement on whether this argument position is realized for all types of predicates, or just for stage-level (or possibly just for eventive) predicates; we will assume that the position exists for all types of predicates, but that in the case of individual level predicates, it cannot be existentially quantified: it can only be (semi-)generically quantified.

which we will refer to as WEAK DISTRIBUTIVITY or PSEUDO-DISTRIBUTIVITY, has the following characteristic properties:

(27) **Pseudo-Distributivity (Weak Distributivity)**

a. Plural definite and indefinite GQPs (including QPs headed by *all*) are Pseudo-distributors.

b. Pseudo-distributivity is optional.

c. Pseudo-distributivity cannot arise under an inverse scope construal, e.g., where the distributee is in Spec of AgrSP and the distributor is in Spec of AgrOP.

Property (27c) suggests that Pseudo-distributivity does not make use of distributor movement to a targetted scope position such as Spec of DistP *per se*; otherwise, we would expect that any QP-type that can trigger Pseudo-distributivity should be able to do so regardless of where it originates within the clause. We will not provide an explicit account of Pseudo-distributivity here; the reader is referred to Beghelli 1996 (this volume, Ch. 10) for detailed discussion. We will simply sketch the essentials of the proposal given there. Pseudo-distributivity arises through the agency of a covert distributive element corresponding to floated *each* (cf. Roberts 1987). Like its overt counterpart, 'silent *each*' is optionally generated between AgrSP and AgrOP. Pseudo-distributivity is supported if 'silent *each*' is c-commanded by (the trace of) the GQP that acts as (pseudo-)distributor, and c-commands the LF position of the QP that functions as (pseudo-)distributee. In the case where the distributed share is an indefinite GQP object, the lower scope position in question may be the Spec of AgrO-P.

4 Strong Distributivity and Negation

In Section 2, we outlined the basic scope interactions exhibited by definite GQPs in relation to both DQPs and NQPs (including so-called clausal negation). Thus far, however, we have avoided any discussion of the scopal interaction between DQPs and NQPs. Our structure in (2) suggests that we should expect DQPs to uniformly take scope over NQPs, since the Spec of DistP (the target scope position of DQPs) asymmetrically c-commands the Spec of NegP (the target scope position of NQPs).

The facts of DQP/NQP scope interactions with negation are much more complex than this, however. It turns out that DQP subjects behave differently from DQP objects, and, to make matters worse, *each*-DQPs behave differently from *every*-DQPs. We will concentrate on structures involving clausal negation marked by the particle *not*), which we have analyzed as an NQP that originates in the *Event* argument position and moves to the Spec of NegP (like any other NQP) to have its negative feature checked at LF. Since the same analytical logic extends to other types of NQP such as *nothing*, *no man*, etc., we will not discuss them explicitly here, in order to keep the discussion to a manageable length.

It turns out that DQPs, far from scoping comfortably above negation, seem to be awkward or ungrammatical with it in most cases; in the one example where they seem to coexist happily (29a), negation scopes over the DQP, rather than vice-versa:

(28) a. ?? Every boy didn't leave.

b. ?? Each boy didn't leave.

(29) a. John didn't read every book.

b. ?? John didn't read each book.

Before proceeding further, we should comment briefly on the status of our judgments, since they depart from what is generally assumed about such data. Our judgments are based on a neutral, non-focussed intonation; if the DQP or the negated verb is focussed, these examples become grammatical, with distinct (and generally unambiguous) scope construals. We assume that these focussed readings have distinct LF representations associated with them, but we will say nothing further about them here; we are interested in explaining the marginal status of the non-focussed readings.

The Checking Theory of DQP licensing, combined with our account of event quantification, accounts directly for these data, with the exception of (29a), which we discuss further below. In each case, the DQP should be forced to move to the Spec of DistP, activating $Dist^0$ and its complement ShareP. But there is no existential QP available in any of these examples to occupy the Spec of ShareP and satisfy the checking requirements of its head. None of these sentences contain any overt indefinite GQPs, and in every case the event variable is bound by the (cliticized) event-NQP *n't*—or its null counterpart, if *n't* is really the head of NegP—so there cannot be a covert existential event-QP, either. (There is only one *Event* argument position available, and it is impossible for two distinct QPs to originate there, just as it is impossible for two distinct QPs to originate in any other argument position.) Since there is no indefinite QP that can move to the Spec of ShareP, the checking requirements of the head of ShareP cannot be satisfied, and the Checking Theory predicts that all of these examples to be excluded. This yields the desired result in every case except (29a), to which we return below.

When the DQPs in (28-29) are replaced by (definite) universally quantified GQPs headed by *all*, the results are fully grammatical:

(30) a. All the boys didn't leave.
     b. John didn't read all the books.

These examples seem to behave like the examples involving scopal interactions between indefinite GQPs and negation discussed in Section 2: the subject GQPs must scope over negation—at least on the neutral intonation—while the objects are scopally ambiguous. These examples can thus be assimilated to the treatment of GQPs given earlier. We account for the difference between *each/every* and *all* by assigning QPs headed by *all* to the type of GQPs, with the proviso that the Spec of ShareP position is unavailable to these universally quantified GQPs for reasons already discussed. (Only QPs that are capable of referential variation may occur there, i.e. indefinites and definites containing free variables.) The decision to treat *all* as the head of a GQP also fits in with its ability to occur as the subject of collective predicates, as discussed in connection with examples (16)-(17).

The data in (28-29), as well as the contrast between (30) and (28-29) provides strong support for our approach to Strong Distributivity, as well as our distinction between Strong Distributivity and Pseudo-distributivity. But although our treatment of Strong Distributivity correctly excludes (28a-b) and (29b), these examples do not show that DistP should be place above NegP, as in our proposed structure, rather than beneath it. In fact, we would predict the same result if NegP were placed higher than DistP; since the NQP *not* would still originate in the *Event* argument position and bind its trace there as a variable, which ought to prevent the covert existential event-QP $\exists$ from originating there as well.

The crucial evidence for our relative hierarchical placement of DistP and NegP comes from sentences similar to those in (28) and (29), but with an overt indefinite GQP, as in (31) and (32):

(31) a. Every boy didn't read one book.
     b. Each boy didn't read one book.

(32) a. One boy didn't read every book.
     b. One boy didn't read each book.

The first thing to observe about these examples is that they are markedly better than their counterparts in (28a-b) and (29b). Our account of strong distributivity predicts this; although the presence of *n't* precludes an existential event-QP, there is an overt indefinite GQP that can move to the Spec of ShareP at LF, thus satisfying the requirements of the activated Share^0 head. Moreover, (31a-b) and (32b) have precisely the scope readings that we expect to find, given our structure in (2): on the preferred reading, the indefinite GQP scopes over negation and under the DQP headed by *every* or *each*: thus, (31a) translates as for every boy, there is one book that he didn't read'. The crucial point is that the grammatical scope construal has the DQP and the indefinite GQP both scoping above negation, supporting our hierarchical placement of DistP and ShareP relative to NegP.

The only problematical example in this paradigm is (32a); here, the *every*-DQP seems to be unable to scope over negation, even though there is an indefinite GQP subject available, which should be able to move to ShareP. Our Checking Theory of scope, as outlined thus far, fails to capture this. (32a) is problematical in the same way that (29a) is; the DQP seems to be forced to scope *under* negation, even though we would tend to expect it to have the opposite scope relation, at least if it behaved like *each*. We will discuss both (29a) and (32a) in Section 5.

At this point, we would like to comment on the significance of the data that we have been looking at for our general approach to quantifier scope. In Section 2, we observed that some QP-types support inverse scope construals, while others do not; in Section 3, we saw that only a subset of the former group of QP-types support inverse distributive scope construals (namely, DQPs). In this section, we have seen that even DQPs disallow any scope construal over negation unless they also distribute over an overt indefinite, which must itself scope over negation. We have also seen that universally quantified GQPs headed by *all*, which (unlike DQPs) cannot take inverse distributive scope over subject GQPs, apparently can take inverse nondistributive scope over negation. Such facts are virtually impossible to account for in terms of traditional treatments of quantifier scope, or, indeed, in terms of any theory that does not recognize distinctions among various QP-types in terms their scopal behavior. It is also interesting to note, inter alia, that in (31a-b) and (32b), the inverse scope construal of the object QPs relative to negation represent the *only* grammatical scope construals for these sentences (on the neutral intonation); this should come as a surprise to anyone who might still maintain that inverse scope construals are only marginally available, and that surface c-command relations are the basis of scope construals.

5 *Every* versus *Each*

5.1 Distributive *Each* and Universal *Every*

In our introductory remarks, we mentioned that *each* has sometimes been characterized as a variant of *every*, which allows (or requires) a wide scope construal where *every* does not. Thus Fodor and Sag 1982 describe *each* as "a quantifier that favors wide scope". Based on our discussion thus far, it is evident that we are inclined to seek an account for the distinctive behavior of *each* that goes beyond the statement of a predisposition towards wide scope.

In fact, *each* and *every* exhibit a number of other differences, which collectively suggest that *every*, unlike *each*, can receive a non-distributive universal construal in certain configurations, behaving essentially like *all*. We believe that these differences are related to those discussed in Section 4 (ex. (32)) involving scope interactions between DQP objects and negation, where *each*-DQPs were well-behaved from the perspective of our theory, whereas *every*-DQPs seemed to behave more like GQPs headed by *all*.

As a point of departure, we point to two well-known differences between *each* and *every* that both indicate a more uniformly distributive character of *each*. First, *each*, unlike *every*, occurs in Quantifier Float constructions, which provide unambiguous distributive construals for sentences with GQP subjects, where a collective construal would otherwise be possible. In such cases, *each* arguably occupies the Spec of DistP position (cf. Sportiche 1988, Beghelli 1995). Second, *each*, but not *every*, occurs in Binominal *Each* constructions, which also have a strong distributive interpretation (cf. Safir and Stowell , Beghelli 1995). Although we will not discuss either of these constructions here, the fact that they both occur with *each*, rather than with *every*, does tend to suggest that *each*, rather than *every* is the canonical distributive quantifier in English. To our knowledge, there is no distributive construction that makes the cut in the opposite way.

A third difference between *each* and *every* concerns collective universal construals of DQPs headed by *every* in examples such as the following:

(33) a. It took all the boys to lift the piano.
b. It took every boy to lift the piano.
c. * It took each boy to lift the piano.

Although DQPs headed by *every*, like those headed by *each*, normally force a distributive (non-collective) construal, as we saw above, this requirement seems to be relaxed in contexts such as that in (33). While we do not have an explanation to offer for why the requirement should be relaxed in this construction, the distinction between *each* and *every* that it reveals suggests that, in at least one context, *every* can serve as a non-distributive universal quantifier.

The fourth difference between *each* and *every* concerns modification by *almost*. This particle can qualify any quantifier or numeral designating a fixed quantity that is understood as the end point of a scale, including universal quantifiers like *every* and *all*; but it cannot combine with *each*:

(34) a. One boy ate almost twenty apples
b. One boy has eaten almost nothing.
c. One boy ate almost all the apples.
d. One boy ate almost every apple.
e. * One boy ate almost each apple.

This suggests that *all* and *every*—but not *each*—can designate the end point of a scale, here the full set of apples. Note that the ungrammaticality of (34e) cannot be due to a failure of distributivity, since the DQP should be free to distribute over the indefinite subject.

A fifth difference concerns modification of universal and proportional quantifiers by the particle *not*. Whereas *not* can combine with a variety of proportional quantifiers, including *more/less (than) n*, *many*, or with *every* and *all*, it cannot combine with *each*:

(35) a. Not more than ten boys ate an ice-cream cone.
b. ? Not ten boys ate an ice-cream cone.
c. Not many boys ate an ice-cream cone.
d. Not all the boys ate an ice-cream cone.
e. Not every boy ate an ice-cream cone.
f. * Not each boy ate an ice-cream cone.

Although this test groups *every* with *all*, rather than with *each*, it is not obvious what underlying semantic property is being diagnosed here. (The marginal status of the bare numeral example in (35b) suggests that a proportional function of the quantifier may be relevant, but (35a) seems to have a non-proportional construal.) In any event, it seems reasonable to assume that *every* has a core function of pure universality that *each* lacks.

While none of the differences between *each* and *every* enumerated in this section provides the basis for a coherent analysis of either the syntax or the semantics of these two quantifiers, they all point towards the conclusion that *every* is fundamentally more like a canonical universal quantifier than *each* is, and conversely that *each* is fundamentally more like a pure distributive operator than *every*.

5.2 *Every* and Unselective Binding

A further difference between *each* and *every* pertains to the fact that *every*-DQPs can be construed generically, whereas *each*-DQPs cannot:

(36) a. Every dog has a tail.
     b. Each dog has a tail.

Example (36a) can be construed as a claim about dogs in general, whereas (36b) must be construed as claim about a particular set of dogs previously mentioned in the discourse. In a similar vein, Gil 1991, citing the paradigm in (37-38), observes that *each*-DQPs pattern with definite GQPs (in our terms), whereas *every*-DQPs pattern with generically construed GQPs headed by *all*:

(37) After devoting the last three decades to a study of lexical semantics, George made a startling discovery.
  a. Every language has over twenty color words.
  b. All languages have over twenty color words.
  c. ? Each language has over twenty color words.
  d. ? The languages have over twenty color words.

(38) George has just discovered ten hitherto-unknown languages in the Papua New Guinea highlands.
  a. ? Every language has over twenty color words.
  b. ? All languages have over twenty color words.
  c. Each language has over twenty color words.
  d. The languages have over twenty color words.

Gil accounts for this by attributing to *each* a feature [+Definite], which *every* is supposed to lack: "while for *every*, the domain of quantification is free, for *each* it is contextually determined." (p.20).

While this description of the contrasts in (36-38) seems to be more or less correct, it is not the case that *every*-DQPs must always be construed generically. Consider (39):

(39) Emma and Anna found lots of beautiful shells on the beach.

a. They examined each shell carefully.

b. They examined every shell carefully.

c. They examined all the shells carefully

d. ? They examined all shells carefully.

Here, the *every*-DQP seems to be construed as definite, quantifying over a contextually determined set in just the same way as the *each*-DQP and the definite GQP *all the shells*, in contrast to the generically construed QP *all shells* in (39d). The same is true of all of the *every*-DQPs discussed in Sections 1-3. Thus, the generic construal of the *every*-DQP in (37b) and (38b) seems to be a function of the particular syntactic context in which it occurs, which imposes a generic construal on simple indefinites headed by *a* in much the same fashion:

(40) a. A man (usually) parts his hair on the left. (Generic)

b. Arby met a man at the conference. (Existential/Specific)

The variable interpretation of the indefinites and bare plurals in contexts such as (40) led Heim 1982 and Kratzer 1988 to conclude that indefinites and bare plurals function syntactically as (restricted) variables rather than as true QPs; these variables are supposed to be bound by external unselective quantifiers. The relevant quantifiers are a null generic (weakly universal) quantifier GEN taking clausal scope in (40a) and Heim's existential closure operator in (40b), to which Diesing 1988 assigns VP-level scope, and which we have analyzed as originating in the VP-internal *Event* argument position, and taking scope at the ShareP level.

If we now apply the same reasoning to the data in (36-39), we are led to the surprising conclusion that DQPs headed by *every* are variables, rather than true QPs. This *prima facie* surprising result is reminiscent of an observation due to Groenendijk and Stokhof 1993, who note quantificational variability effects with examples like the following:

(41) For the most part, John knows which book every student bought.

Here *every* seems to be interpreted more like *most* than like either *all* or *each*, suggesting, perhaps, that when *every* seems to behave like *each*, it may be exhibiting a similar type of unselective binding effect. Let us now consider how this might be possible, bearing in mind that we need to preserve the obvious fact that *every* is a kind of universal quantifier.

When *every*-DQPs occur in generic contexts, they are interpreted as though they were universal-generic QPs (just like indefinites in the same environments) because they contain restricted variables (ranging over sets) bound by a silent generic quantifier. The meaning that we want to assign to examples like (36a) *'Every dog has a tail'* under this analysis is thus something like 'in the default situation s where X is the set of all dogs in s, all members of X have a tail'. When *every* occurs in a context associated with reference to a single situation-time, it acquires its contextualized universal-distributive reading, presumably because it is bound by an analogous silent definite quantifier. Thus, a sentence like *'Every boy lifted the piano'* would be translated along the lines of 'there is a (particular) past situation s, a set X of all boys in s, such that all the members of X lifted the piano'.

Of course, this idea raises the issue of how a GQP headed by *every* can be analyzed as a universal variable. The theory presented in Section 2 allows us to account for this. We have assumed, with Szabolcsi 1996, that *every* and *each* introduce discourse referents, in the form of set variables. The set variable of *each*, we will now assume, must be bound by a definite operator—as required by its definiteness features, which we have reviewed above. On the other hand, the set variable introduced by *every* can be bound by other operators as well, including GEN.

On its normal (strongly) distributive, use that shows up in non-generic past-tense contexts, *every* seems to be interpreted identically to *each*. At this point, one might ask exactly what kind of operator it is that licenses this canonical use of DQPs. The most obvious candidate is the existential quantifier over events. But this option is precluded for us, if this quantifier must appear in Spec of ShareP and the DQP headed by *every* or *each* must appear in the Spec of DistP. Another possible candidate is the silent (definite or indefinite) existential quantifier ranging over situation-times proposed by Stowell 1993. This quantifier is an existential counterpart of GEN; it is introduced as the internal argument of a Tense predicate heading the category TP.[15] We have not attempted to locate TP within the hierarchy of functional projections in (2), but it seems reasonable to suppose that it lies below AgrS and DistP. If so, it would be free to move to the Spec of RefP and act as the binder for *every, each*.

[15]More precisely, according to Stowell's proposal, this existential quantifier originates as the Specifier of the time-denoting category ZP, which serves as the internal argument of a Tense predicate such as PAST. A tense predicate is a dyadic predicate of temporal ordering, which relates an event-time or situation-time (denoted by its internal argument) to a reference-time (denoted by its external argument).

5.3 Scope Interactions with Negation, Revisited

Now let us return to a consideration of the puzzling facts concerning object *every*-QPs in sentences containing clausal negation, repeated here:

(29) a. John didn't read every book. (NOT > $\forall$)

b. ?? John didn't read each book.

(32) a. One boy didn't read every book. (NOT > $\forall$)

b. One boy didn't read each book. (EACH > ONE > NOT)

Recall that the *each*-DQPs in these examples are well-behaved, from the perspective of our theory of distribution; it is the *every*-DQPs that are problematic. These *every*-DQPs should be required to move to the Spec of DistP, just like the *each*-DQPs are. (This requirement on *each*-DQPs is responsible for the scope construal in (32b), and for the ungrammaticality of (29b).)

Example (29a) is surprising because it shows that *every*-DQPs are not always required to move to the Spec of DistP above NegP; if they were, (29a) would be as odd as (29b). Example (32a) is even more surprising, because it shows that *every*-DQP objects are not just *allowed* to remain under NegP; here, they are actually *required* to do so. In (32a), the failure of the *every*-DQP to move above negation to the Spec of DistP cannot be attributed to the lack of an indefinite within the clause to satisfy the requirements of ShareP; evidently some other factor is at work here, inhibiting movement of the *every*-DQP to the Spec of DistP.

We would now like to relate these facts to some of the other properties of *every* discussed in this section. The essential idea is that *every*-QPs introduce a set variable, which gets bound by negation when the *every*-QP occurs in its scope. Developing this idea further, it seems plausible to assume that the set variable introduced by *every* must be bound by the closest potential binder available. Since negation is closer to it in the hierarchy of functional projections than the existential quantifier over times in the complement of Tense, it is the closest potential binder and will bind the set variable of *every*. We can then say that *every* fails to be interpreted as scoping over negation in (29a) and (32a) because the set variable that it introduces must be bound by the closest unselective quantifier it can find, and the NQP that ends up in the Spec of NegP serves this role. Thus, (29a) would receive an interpretation roughly along the following lines: 'there is no situation s and set X of (all) books in s, such that John read (every member of) X at s'.

A coherent picture is finally beginning to emerge: whereas *each* is a true distributive QP, *every* is not. Moreover, *every* exhibits some degree of quantificational variability, in the sense that its set variable can be bound by negative and generic operators. We have presented a possible account of this behavior, on the basis of the semantic justification of QP-types originally proposed by Szabolcsi 1996, cf. Section 2.7.

There are, however, two crucial facts about *each* and *every* that we still have to clarify. First, we must account for the fact that *each* is obligatorily distributive, whereas *every* is only optionally so. Second, if *every* is not inherently distributive, i.e., if it is really an unusual kind of universal, then we must explain why it differs from *all* inn exhibiting Strong Distributivity in contexts such as those discussed in Section 3.

We would like to suggest that the solution to these problems lies in the featural specification of *every* and *each*. Both *every*- and *each*-QPs have access to Spec of DistP because they are singular, and this is a pre-condition for the distributive operator in $Dist^0$ to apply to them. On the other hand, *all* is plural, and hence does not have access to DistP.[16]

Each-QPs are endowed with a [+Distributive] feature, which *must* be checked in Spec of DistP; *every*-QPs, on the other hand, are underspecified for [Distributive]. Accordingly, *every*-QPs move to Spec of DistP only when their set variable is not bound by a lower operator, such as negation, which would then be the closer binder. When no negative operator intervenes, the set variable of *every* is bound by the existential quantifier over situation-times that has raised to Spec of RefP.

5.4 Concluding Remarks

In this study, we have drawn attention to previously unrecognized scope interactions involving *each, every*, negation, and various types of indefinite QPs. We have suggested that these can most naturally be accounted for under the assumption that various quantifier types, such as DQPs and NQPs, are associated with fixed scope positions defined in the hierarchical pharase structure of the clause (DistP and NegP, respectively). We have also drawn distinctions among various types of (in)definite and numeral QPs (GQPs and CQPs), and proposed that these too have certain dedicated scope positions in the functional structure of the clause, though a greater amount of

[16]The singular agreement property of every-QPs presumably forces distributive predication even when they do not move to Spec of DistP, but are bound by negative or generic operators. These however, would be cases of Pseudo-distributivity: i.e., we assume that a silent distributor is inserted; cf. Beghelli 1995.

scopal freedom is allowed with these.

In addition, we have claimed that a number of otherwise puzzling differences between *each* and *every* can most readily be explained by extending to QPs headed by *every* the Heim-Kamp notion that NPs that have been traditionally considered purely quantificational in fact introduce variables ("discourse referents" in DRT parlance), and by assuming that such variables can be bound by certain external operators. This, we have argued, yields in some cases additional meanings and scope positions beyond the fixed ones that we have suggested at the outset.

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