Does every Sentence Like This Exhibit a Scope Ambiguity?

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We think recent work in linguistics tells against the traditional claim that a string of words like

(1) Every girl pushed some truck

has two readings, indicated by the following formal language sentences (with restricted quantifiers):

(1a) $[\forall x{:}Gx][\exists y{:}Ty]Pxy$ (1b) $[\exists y{:}Ty][\forall x{:}Gx]Pxy$.

In our view, (1) does *not* have any b-reading in which 'some truck' has widest scope.[1] The issue turns on details concerning syntactic transformations and terms like 'every'. This illustrates an important point for the study of natural language: ambiguity hypotheses are indeed hypotheses—*i.e.*, theoretical claims to be justified in light of various considerations, not theses whose truth can be directly observed by speakers.

Correlatively, strings that appear to be similar may differ with respect to scopal possibilities. While the object cannot take scope over the subject in (1), we hold that in

(2) Some girl pushed every truck

'every truck' can take scope over 'some girl'. But showing that (2) is truth-conditionally ambiguous is hard, especially if natural language involves tacit quantification over events. (A string can be structurally ambiguous without having truth-conditionally distinct readings; consider $[[\alpha \,\&\, \beta] \,\&\, \gamma]$ as opposed to $[\alpha \,\&\, [\beta \,\&\, \gamma]]$.) Other cases are clearer. The subject in

(3) Two girls pushed six trucks

can be distributive or collective. Indeed, we use facts about plural constructions like (3) and

(4) Both girls pushed six trucks

to support the claim that (1) is truth-conditionally unambiguous. Finally, we argue that

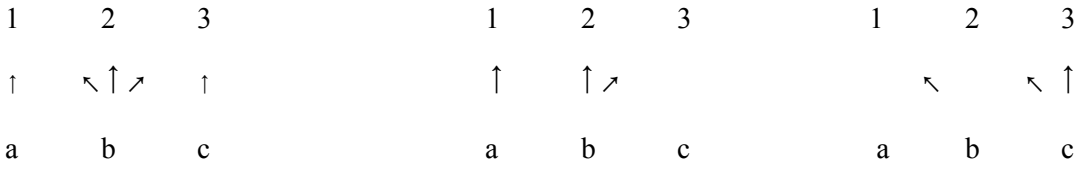
(5) Ralph believes that the richest man is happy

has no reading in which 'the richest man' has scope over 'believes'.

Our particular conclusions are less important, though, than the methodological moral. Linguistic meaning is constrained in ways that ambiguity hypotheses must respect. It can be hard to know how many readings a string of words has, *especially* when the scope of quantifiers is at issue. Far from being paradigms of ambiguity in natural language, (1-2) are complicated cases.

1. It is a familiar point that the inference from (1b) to (1a) is valid, while the inference from (1a) to (1b) is not. Correspondingly, (1a) is true in each of the siutations below:

where letters represent girls, numbers represent trucks, and each arrow represents a pushing of the relevant truck by the relevant girl. Since (1b) is false in the first situation and true in the second, (1a) and (1b) have different truth conditions. It does not follow, though, that (1) is ambiguous. Given that (1) can be verified by either situation, (1) cannot have (1b) as its sole reading. But if (1) has (1a) as its sole reading, (1) is still true in both situations; and one cannot infer that a string of words has two readings, just because it is true in two different situations. After all, (1a) is true in many situations, including



It does not follow that (1) is many ways ambiguous. A quantified expression can be true in various situations *on a single reading*. Indeed, this is the case with (1a), which is true in all five situations above. Similarly, (1b) is true in a plurality of situations, since the truck pushed (by all three girls) can vary.

This helps explain what we mean by 'ambiguity'. If a string of words is ambiguous, it is by virtue of its association with alternative underlying forms. Consider

(6) You cannot stop a philosopher with a thesis.

Here the prepositional phrase can modify the direct object, as in 'stop [a philosopher (with a thesis)]'; or the verb phrase, as in '[stop (a philosopher)][with a thesis]'. This is, like the ambiguity of 'duck', a case of homophony. In a natural language, distinct expressions can sound alike: the sound of 'duck' corresponds to more than one word; the string of words in (6) corresponds to more than one sentence. We

return to the thought that a single English sentence can have two meanings—say, by virtue of its association with distinct sentences of some other language (like Mentalese); and of course, a sentence might be used to "convey a thought" that is not a grammatically possible meaning of the sentence. But in our view, questions about ambiguity turn on whether the word-string in question is associated with different syntactic structures. So we want to focus on—and criticize—the common view that (1) is associated with a syntactic structure in which 'some truck' has scope over 'every girl'.

Facts about usage are at best evidence of underlying structure. But if a string of words can be used veridically in a disparate range of situations, that is indeed evidence of ambiguity. Consider

(7) Meg found Bob a challenge

which can be true if Meg found Bob to be a challenge, or if Meg found a challenge for Bob. But to repeat, any situation that verifies (1b) will also verify (1a); on its a-reading, (1) applies—unambiguously and nondisjunctively—to every situation that can verify (1) on any alleged reading. So the relevant plurality of situations does not divide into subcases in a way that suggests multiple readings.[2]

In thinking about the range of situations that verify (1), a speaker may distinguish various special cases: each girl pushing her own truck; or all three girls pushing the same truck. Speakers familiar with formal logic may attend to such distinctions habitually. But an expression can call different situations to mind without being ambiguous. When we think of (1a), which is unambiguous, we tend to think of the first two special cases depicted above. Hearing (1) might also prompt thought of other sentences, like

(8) There is a truck that every girl pushed

(9) Some truck was pushed by every girl.

But theorists cannot just assume that (1) has a reading with the truth conditions of (8), shared by (9).

One might claim that competent speakers of English would say—or can be led to say—that (1) has an interpretation on which it is *false* in all but one of the five situations indicated above; and this might be construed as support for the claim that (1) has a reading indicated by (1b).[3] Yet even if one can

extract the relevant judgments about *falsification* conditions, it is not clear what this would show. Any speaker sophisticated enough to provide such judgments might be *conjecturing* that (1) is ambiguous, and then letting this conjecture drive her "intuitions". One must also guard against the possibility of conflating claims about truth conditions with claims about communicative intentions. (See Grice 1975, Kripke 1977.) If a speaker used (1) in a context where she wanted to focus on an each-girl-pushed-the-same-truck situation, one might take the *speaker* to have meant that some one truck was pushed by each girl—even if the speaker's *words* did not have this restrictive meaning. Thus, one can't establish the ambiguity of (1) simply by getting informants to agree that someone could use (1) to say what (8) says.

It is a substantive claim that (1) has a reading on which it is true if *and only if* there is a truck such that every girl pushed it. This hypothesis might prove correct. But one should not pretend that this theoretical claim is an innocuous description of speakers' intuitions. There is no evidence that speakers can *intuit* that (1) has a reading on which it is false if one truck went unpushed by one girl. Syntacticians do not assume that speakers can intuit whether a string is ungrammatical (as opposed to unacceptable); 'the rat the cat the dog chased chased ate the cheese' elicits a bizarreness reaction, but is nonetheless grammatical. Similarly, we claim, speakers have intuitions to the effect that certain strings of words are appropriate (or not) in various situations. The rest is theoretical diagnosis requiring justification.

2. Of course, even if speakers cannot just *tell* that a string like

(1) Every girl pushed some truck

is ambiguous, it doesn't follow that such strings are unambiguous. Perhaps natural language quantifiers are relevantly like formal language quantifiers, which bind variables in open sentences and can take any scope with respect to any other quantifier binding a variable in the same open sentence.

Indeed, it can seem that this view is bolstered by work in linguistics. It was once widely held that

(10) Chris was pushed by Pat

has a "surface structure" that is derived from a "deep structure" via some passivizing transformation. On

this view, (10) is associated with *two* transformationally related syntactic structures like

(10S) $[_S\ [_{NP}$ Chris$]\ [_{aux}$ was$]\ [_{VP}$ pushed $[_{PP}$ by $[_{NP}$ Pat$]]]]$

(10D) $[_S\ [_{NP}$ Pat$]\ [_{VP}$ pushed $[_{NP}$ Chris$]]]$.

Instead of saying that a sentence has *one* syntactic form, in addition to its "phonetic form," one says that a sentence has a pair of syntactic structures. May (1985) and others extended this idea, arguing for a third level of syntactic representation. The "logical form" of (11) was said to be (11L)

(11) Every girl pushed Chris

(11L) $[_{S'}\ [_{DP}$ Every girl$]_i\ [_S\ t_i\ [_{VP}$ pushed $[_{NP}$ Chris$]]]$

where 't_i' indicates the site from which the determiner phrase 'every girl' has moved.[4]

The much discussed rule of Quantifier Raising (QR) was introduced in this context. For the idea was that (11-L) was derived, via QR, from the deep structure

(11D) $[_S\ [_{DP}$ Every girl$]\ [_{VP}$ pushed $[_{NP}$ Pat$]]]$

which is also the surface structure of (11). Ignoring details not at issue here, (11L) is true iff every girl is such that she pushed Chris. And *if* (1) is ambiguous, QR provides a simple way of treating this ambiguity as a kind of homophony: given two quantifiers, either quantifier can raise first. If this is so,

(1D) $[_S\ [_{DP}$ Every girl$]\ [_{VP}$ pushed $[_{DP}$ some truck$]]]$

which is the deep (and surface) structure of (1) can be transformed in two ways:

(1L) $[_{S''}\ [_{DP}$ Every girl$]_i\ [_{S'}\ [_{DP}$ some truck$]_j\ [_S\ t_i$ likes $t_j\ ]]]$

(1L*) $[_{S''}\ [_{DP}$ some truck$]_j\ [_{S'}\ [_{DP}$ Every girl$]_i\ [_S\ t_i$ likes $t_j\ ]]]$.

If the interpretation of quantifier scope depends on the scope of raised quantifiers—and pronunciation reflects the unraised quantifiers of surface structure—then (1) is homophonous.

Thus, QR was a proposed *supplement* to the model of lingustic representation on the left:

And at the time, transformations were permitted unless ruled out by enumerated constraints: the operation "move α" allowed for any movement that violated no grammatical principle. So it was natural to think that (1L) and (1L*) were *both* grammatically possible structures. But this is not mandated by the very idea of QR. One can imagine constraints that would exclude (1L*). Suppose that multiple instances of QR must be performed sequentially, with the lowest quantifier raising *first*—or that 'every' has to raise *last* when it starts in subject position. (The first claim implies that 'Some girl likes every truck' is unambiguous; the second does not.) Or suppose that a raised quantifier cannot be *crossed* by another expression undergoing QR, although all determiner phrases must raise. This would preclude instances of

(12) $[_{S''}$ Object $_j$ $[_{S'}$ Subject $_j$ $[_S$ t_i PREDICATE t_j]]]

in which the quantified object moves to a position higher than the quantified subject.[5]

Even if these particular conjectures are not plausible, they illustrate an important conceptual point: independently motivated constraints on transformations might favor the hypothesis that (1) is *un*ambiguous; such constraints might exclude certain logically possible structures from the options made available by the grammar of natural languages. If scopal ambiguity requires syntactic distinctness, then whether or not a given string is scopally ambiguous will depend on whether the grammar provides for relevant structural alternatives. And this is an empirical matter, related to the inventory of grammatical rules and the various restrictions that apply to them.

Moreover, attending to determiners besides 'every' and 'some' suggests that quantified objects are often barred from taking widest scope. It is intuitively clear that

(13) No girl pushed every truck

cannot mean: every truck was such that no girl pushed it. Similarly,

(14) Nobody likes everybody

cannot mean that everybody is liked by nobody—i.e., that everyone is universally disliked. Intuitions also suggest that

(15) Few girls pushed every truck

cannot mean: every truck was such that few girls pushed it. However (15) is read, it seems to allow for situations in which some truck was such that many girls pushed it, so long as only a small number of girls pushed all the trucks. This fact about (15) casts doubt on the idea that

(16) Most girls pushed every truck

is ambiguous, with a reading on which 'every truck' takes scope over the subject. While (16) is true iff

(17) Every truck was pushed by most girls

this is so even if 'every' has narrow scope in (16). If it's not obvious that (16) is ambiguous, perhaps the same is true of (1); and if (13-15) suggest that scopal possibilities are constrained, in ways that distinguish natural from formal languages, that is also relevant.

Other examples illustrate the same point. While

(18) Two girls pushed few trucks

may be ambiguous, it cannot mean that there were few trucks pushed by two girls. Nor can

(19) Few/Most/Several girls pushed no truck

mean that there was no truck that few/most/several girls pushed. And

(20) No girl pushed no truck

does not even entail that: there was no truck that no girl pushed.[6] In light of such examples, one might wonder how typical (quantifier) scope ambiguity is. But in any case, one cannot assume that every expression with multiple quantifiers is ambiguous in natural language. There may be substantive constraints on movement; and if (1) is unambiguous, it is not alone. Still, the QR picture (with unrestricted movement) remains attractive, absent a theoretically motivated alternative. So we want to

recast these issues in the context of Chomsky's minimalist program, which can be seen as a natural extension of positing a level of linguistic representation in which quantifiers have raised. For minimalist grammars are tightly constrained in ways that bear on alleged scope ambiguities.

3. If each sentence has an LF, where LFs are May-style phrase markers generated by grammatical operations, a question of theoretical economy arises. Are other "levels" of syntactic structure—in particular, DS and SS—still needed? Appeal to PF seems unavoidable, at least on the assumption that sentences (of spoken languages) pair sounds with meanings; and if LFs reflect the contributions of grammar to semantic interpretation, they are also ineliminable. Put another way, the human language system presumably interfaces with other cognitive systems devoted to (i) the articulation and perception of linguistic expressions, and (ii) the use of such expressions in thought. This would seem to require, at a minimum, interfacing structures that can be viewed as representations of sounds and meanings; where word order is germane to the former, and scope relations are germane to the latter.

Chomsky (1995) argues that no other syntactic structures, which would be *internal* to the language system, are needed or wanted. On this view, a sentence is a sound-meaning pairing <PF, LF>, and not a quadruple <DS, SS, PF, LF>, each element of which has to satisfy certain grammatical conditions. The picture on the left is thus to be simplified as indicated on the right:

Correspondingly, instead of positing constraints on how lexical items can combine to form deep structures that can be transformed (via surface structures and QR) into representations that reflect the scopal properties of quantifiers, minimalists adopt a more constructionist view of how LFs are formed. Lexical items combine—via a basic operation MERGE—thereby forming labelled structures with which

other items can combine, and so on. For 'pushed some truck', initial stages of the derivation would be: $[_D$ some] + $[_N$ truck] => $[_{DP}$ $[_D$ some]$[_N$ truck]] + $[_V$ pushed] => $[_{V*}$ $[_V$ pushed]$[_{DP}$ $[_D$ some]$[_N$ truck]]]. Given a similar derivation for 'every girl', the following (semantically saturated) structure emerges: $[_{VP}$ $[_{DP}$ $[_D$ every]$[_N$ girl]]]$[_{V*}$ $[_V$ pushed]$[_{DP}$ $[_D$ some]$[_N$ truck]]]].

This "propositional shell" contains the verb, whose transitivity is indicated by the intermediate projection 'V*' between 'V' and 'VP', and its two arguments. This shell is similar to a deep structure. But its features are specified (not by stipulation, but rather) in terms of the relevant lexical items and (repeated applications of) MERGE; and there are no constraints specific to this stage of the derivation. Moreover, subsequent stages of the derivation will be of the same sort; and further structure is indeed required. Sentences have inflectional features, and each argument must be associated with some kind of case—*e.g.*, accusative or nominative. Let us assume, with Chomsky, that such association is established as follows: for each type of case, there is a corresponding functional element that can merge with complex structures; and via transformations, each argument is associated with a position adjacent to the appropriate functional element. Simplifying a little, the structure above is extended as indicated below:

$[_{ZP}$ <u>nom</u> $[_{YP}$ <u>acc</u> $[_{VP}$ $[_{DP}$ $[_D$ every]$[_N$ girl]]]$[_{V*}$ $[_V$ pushed]$[_{DP}$ $[_D$ some]$[_N$ truck]]]]]]

where '<u>nom</u>' and '<u>acc</u>' are associated with positions that must be filled by an argument of the right sort.[7]

Stipulating that arguments move to the relevant positions, leaving traces in their wake, is effectively to introduce a QR rule. If one also requires that the internal argument ('some truck') moves to '<u>acc</u>', this is effectively a restricted QR rule according to which the lower quantifier must move first. But one need not think of transformations as processes in which something is literally moved from one site to another, leaving a mark of its former presence. Following Chomsky, one can think of movement as the result of simpler operations on trees: COPY and DELETE. Suppose that *a copy of* the internal argument must be adjoined to <u>acc</u>, which is associated with accusative case. If a copy of the external argument ('every girl') must also be associated with some case, then the first stage of the transformation will be:

(21) $[_{ZP}\,[_{DP}$ Every girl$]_i\,[_{YP}\,[_{DP}$ some truck$]_j\,[_{VP}\,[_{DP}$ Every girl$]_i\,[_{V*}$ likes $[_{DP}$ some truck$]_j\,]]]]$

ignoring the (semantically irrelevant) functional items. Here the indices 'i' and 'j' indicate what is a copy of what, not a relation between a linguistic expression and a bound variable.

At this point in the derivation, one element of each chain must be deleted: either literally, in the sense that the relevant node is vacated; or at least in the sense that one member of each chain is ignored for purposes of interpretation. (We assume, standardly, that *transformations* of structure cannot introduce new arguments.) The four logical possibilites for deletion are indicated schematically below, parentheses indicating the deleted DP, with the VP—i.e., the original propositional shell—in bold:

(21a) [every girl [some truck **[(every girl) [likes [(some truck)]]]**]]

(21b) [(every girl) [some truck **[every girl [likes [(some truck)]]]**]]

(21c) [every girl [(some truck) **[(every girl) [likes [some truck]]]**]]

(21d) [(every girl) [(some truck) **[every girl [likes [some truck]]]**]]

If higher (c-commanding) elements in the tree have scope over lower (c-commanded) elements, but not conversely, then only in (21b) does 'some truck' have scope over 'every girl'; see Hornstein (1995). That is, (21b) is the candidate for the alleged object-over-subject reading of

(1) Every girl likes some truck.

This is important for two reasons. First, the (highly idealized) minimalist grammar just sketched does not itself rule out the possibility that (1) is ambiguous. Deletion of upper copies is not ruled out a priori; so we are *not* introducing a restricted version of QR which directly implies that (1) is unambiguous. But second, *if* there are independent reasons for excluding (21b), then in so far as the syntactic framework just sketched is motivated, there is reason to doubt that (1) has the alleged object-over-subject reading. In particular, suppose there is independent reason for thinking that the original token of 'every girl' (*i.e.*, the token inside the propositional shell) *must* delete. That would be reason for thinking that (21b) and (21d) are not patterns of deletion permitted by the human language system. In which case, (1) would not have a

reading in which ‘some truck’ takes wide scope.

This illustrates our methodological point. Ambiguity hypotheses are not innocuous; they can lead to substantive (and perhaps unwanted) commitments—e.g., that (21b) is a possible deletion pattern—given an independently motivated theoretical framework. One can, of course, reject the framework and/or any supplementary assumption which leads to the claim that (1) is unambiguous. But it would be rash to do so, especially in light of (13-20), simply on the grounds that (1) “feels” ambiguous. If our best theories suggest that (21b) is not a possible pattern of deletion, this should inform our diagnosis of the intuition that (1) can be used veridically in a plurality of situations. Perhaps this intuition should not be diagnosed as a reflection of the alleged ambiguity of (1). And the point is not merely hypothetical.
We think the VP-internal token of ‘every girl’ must delete, given the kind of determiner that ‘every’ is.

4. It has become standard to distinguish between "strong/definite" and "weak/indefinite" determiners; although there are various characterizations of the distinction, not all of which are extensionally equivalent. As a first (rough) pass, weak determiners are intersective—and symmetric—in a way that strong determiners are not. Some girl swam iff the intersection of girls and swimmers is nonempty; while every girl swam iff the girls constitute a subgroup of the swimmers. Correspondingly, some girl swam iff some swimmer is a girl; but it might be that every girl swam, even though not every swimmer is a girl. And on any view, ‘some’ is the paradigm weak determiner, while ‘every’ is the paradigm strong determiner.[8] We return to a specific proposal about the source of this distinction. But for now, let us assume that strong determiners have some distinguishing property—call it ‘+’.

It is independently plausible that VP-internal determiner phrases must delete when headed by strong determiners. An LF is never interpreted with a strong determiner in the the VP-shell. If this is indeed a grammatical constraint, then (21b) and (21d) are ruled out, as indicated below:

(21a) [every^{+} girl [some truck **[(every^{+} girl) [pushed [(some truck)]]]**]]

(21b) *[(every^{+} girl) [some truck **[every^{+} girl [pushed [(some truck)]]]**]]

(21c) [every^{+} girl [(some truck) **[(every^{+} girl) [pushed [some truck]]]**]]

(21d) *[(every^{+} girl) [(some truck) **[every^{+} girl [pushed [some truck]]]**]]

In which case, 'some truck' cannot take widest scope in (1). We return, in section six, to

(2) Some girl pushed every truck.

But note the analog of (21), namely (22), and the deletion possibilities (22a-d):

(22) $[_{ZP}\,[_{DP}$ some girl$]_i\,[_{YP}\,[_{DP}$ every truck$]_j\,[_{VP}\,[_{DP}$ some girl$]_i\,[_{V*}$ likes $[_{DP}$ every truck$]_j$]]]]

(22a) [some girl [every^{+} truck **[(some girl) [pushed [(every^{+} truck)]]]**]]

(22b) [(some girl) [every^{+} truck **[some girl [pushed [(every^{+} truck)]]]**]]

(22c) *[some girl [(every^{+} truck) **[(some girl) [pushed [every^{+} truck]]]**]]

(22d) *[(some girl) [(every^{+} truck) **[some girl [pushed [every^{+} truck]]]**]].

Even if (22c) and (22d) are ruled out because 'every^{+}' remains undeleted in the VP-shell, this leaves (22a) and (22b); and in (22b), 'every truck' has widest scope. So if the weak quantifier 'some girl' *can but need not* remain in the VP-shell, then (2) *is* scopally ambiguous.

We will provide various arguments that DPs headed by strong determiners cannot remain in the VP-shell at LF. But we want to "warm up" with some theoretical motivations based on work concerning the relation between LF and a more traditional notion of Logical Form. As noted above, LFs are phrase markers that represent what grammar contributes to meaning. So conceived, LFs may underdetermine (logical) structures that more fully represent all aspects of sentential meanings; and in this sense, an LF may not reveal the full Logical Form of the relevant sentence. (For further discussion, see Pietroski [forthcoming-a]). Within linguistics, one influential proposal about Logical Form—developed by Kamp (1981) and Heim (1982)—has been that sentences of natural language have *tripartite* Logical Forms. For example, the Logical Form of (24) is said to be roughly as indicated in (25):

(24) Every dog ate a bone

(25) Every x : dog(x) {Some y [bone(y) & ate(x, y)]}

Quantifier Restrictive Scope Nuclear Scope

On this view, the Logical Form of (24) has *three* major parts. The nominal restrictor of 'every' is located in the restrictive scope, while the nominal restrictor of 'a' is located in the nuclear scope. By comparison, the Fregean representation '$\forall x \exists y \{dog(x) \longrightarrow [ate(x, y) \& bone(y)]\}$' divides into two (complex) parts: the pair of quantifiers and the conditional open-sentence/nuclear-scope, with the latter containing both nominal restrictors. The tripartite Kamp-Heim structure is designed to model the different presuppositional properties of strong DPs like 'every dog' versus weak indefinites like 'a bone': strong DPs presuppose their restrictors, while indefinites assert theirs. The idea is that (24) presupposes the existence of at least one dog, but it flatly asserts the existence of a bone. Asserted material is represented in the nuclear scope, while presupposed material is represented in the restrictive scope of the sentence's logical form. For present purposes, the crucial feature of the Kamp-Heim theory is that strong DPs are (modulo the determiner itself) always associated with the restrictive scope.

We won't survey the considerable evidence in favor of this idea. Of more interest here is Diesing's (1992) proposal concerning the mapping from LF phrase markers to Logical Forms like (25). Diesing provides considerable evidence that the VP boundary in fact marks the syntactic boundary between presupposed and asserted material—i.e., the boundary between the restrictive and nuclear scopes. Diesing thus adopts the following Mapping Hypothesis:

material within the VP-shell (at LF) is mapped into the nuclear scope;

material above the VP-shell (at LF) is mapped into the restrictive clause.

If this is correct, then given the Kamp-Heim thesis that strong DPs are always associated with the restrictive scope, it would follow that strong DPs are never in a VP-internal position at LF. In the context of our little minimalist account, sketched above, this requires the deletion of VP-internal strong DPs. In

short, combining the Kamp-Heim account of Logical Form with Diesing's proposed algorithm for relating LFs to tripartite Logical Forms provides a rationale for ruling out

(21b) *[(every^{+} girl) [some truck **[every^{+} girl [pushed [(some truck)]]]**]]

(21d) *[(every^{+} girl) [(some truck) **[every^{+} girl [pushed [some truck]]]**]]

If these were interpretable expressions of natural language, they would interpreted with 'every girl' remaining in the VP-shell, and thus interpreted with the existence of girls asserted rather than merely presupposed. But (1) has no such interpretation. Or put another way, the claim that (1) is scopally ambiguous leads—via the Heim/Kamp/Diesing view—to the prediction that (1) is also ambiguous with respect to whether or not 'every girl' is presuppositional. But this prediction is wrong.[9]

This is not yet an explanation, much less a syntactic explanation, for *why* strong VP-internal determiners must delete. But the Kamp-Heim-Diesing account can at least serve to filter out certain LFs. And for our purposes, the important point is that the grammar may well determine which LF positions certain DPs *must* occupy given their meanings (taking the strong/weak distinction to be an aspect of meaning). The Kamp-Heim-Diesing approach suggests one kind of determination. But there are other routes to the same conclusion about strong VP-internal determiners. As an illustration, we want to briefly consider some recent work by Hornstein and Uriagerecka (1999).

As already noted, strong and weak DPs differ in that the former seem to be intersective in a way that the latter are not. If (26) is true, then so is (27). But (28) does not imply (29)

(26) At least one man left

(27) At least one leaver was a man.

(28) Every man left

(29) Every leaver was a man

If a determiner—like 'every' or 'at least one'—is a higher-order predicate that takes a pair of predicates as arguments, weak determiners can take their predicates in any order without affecting the truth of the sentence. But with strong determiners, order matters. In (28), 'every' must take 'man' as its first (or internal) argument and 'left' as its second (or external) argument. Correct interpretation requires that

strong determiners impose an order on their predicative arguments. This is reminiscent of the fact that order typically matters with respect to the arguments of transitive verbs. So perhaps the syntax of (28) exhibits a kind of asymmetry characteristic of transitive constructions but not found in (26).

Notoriously, the truth of 'John loves Mary' does not ensure the truth of 'Mary loves John'. For this reason and others, linguists distinguish the internal argument of a predicate (the object of a transitive verb) from its external argument (the subject). As illustrated in (30), the internal argument is typically the syntactic sister of the predicate, while the external argument is more distant but still within a projection of the predicate.

(30) $[_{VP}$ John $[_{V'}[_{V}$ loves] Mary]]

The direct object 'Mary' is in the first projection of V (=V*), while the subject 'John' is in a higher projection of V (=VP). If predicates of all levels order their arguments in the way that transitive verbs do, strong DPs will have to vacate the VP-shell at LF. The reasoning is roughly as follows.

To be interpreted, a strong determiner must find a pair of predicates *and* order them. The internal argument of any determiner will be an immediate constituent of the determiner phrase—the determiner's sister, which may be complex. The external argument will be related to the determiner at a slight distance, but still within some projection of the determiner. Indeed, one can apply the very ordering conventions for transitive verbs noted in (30) to strong determiners. The only requirement is that the LF of a sentence like (28) be roughly as shown in

(28L) $[_{DP}\ [_{D'}\ [_{D}$ every] man][$_{Infl}$ ... $[_{V}$ left]]]

which is isomorphic to (30). In (28L), the predicate 'every' takes the finite verb 'left' (i.e., the verb together with relevant inflectional features) as its external argument. Given some plausible assumptions about the formation of phrases and their labelling, this operation will be restricted to DPs that have vacated the VP-shell.[10] The leading idea is that 'every' cannot order its arguments in a phrase headed by the verb, which is *part* of the determiner's external argument; 'every' needs to (raise and) head its own

phrase that contains the verb as a constituent.

If this is correct, the prohibition against strong VP-internal DPs is related to the fact that strong determiners must order their arguments. (Since weak/intersective determiners need not order their arguments, they can remain in the VP-shell at LF.) And note that this view results in the same hierarchical structures as those suggested by Kamp-Heim-Diesing. This convergence is itself suggestive. In any case, if either of the views sketched in this section is correct, then in examples like (1), 'every girl' must scope over the whole clause. So

(21b) *[(every^{+} girl) [some truck **[every^{+} girl [pushed [(some truck)]]]**]]

is not a possible deletion pattern for (1). In which case, given the minimalist syntax sketched in the last section, (1) is not scopally ambiguous. These arguments are moderately complex; but c'est la vie.

5. There are other considerations which suggest that objects cannot take scope over a strongly quantified subject. Consider a semantic contrast exhibited by

(3) Two girls pushed six trucks

(4) Both girls pushed six trucks.

We readily grant that (3) is ambiguous, having a distributive-subject reading (on which each of two girls pushed six trucks) and a collective-subject reading (on which two girls together pushed six trucks). But (4) has only the distributive reading; (4) is univocally false, if one girl failed to push six trucks, no matter how many trucks the girls pushed between them. This calls for explanation. By any standard, 'two' is a weak determiner, while 'both' is a strong determiner.[11] Other strong determiners also seem to force a distributive-subject reading, as in

(31) Every girl pushed six trucks

(32) Most girls pushed six trucks.

This would be expected if a wide-scope (VP-external) subject triggers the distributive reading and strong determiners cannot remain in the VP-shell at LF. The constrast with (3) would be explained if the weak

determiner ‘two’ can remain in the VP-shell. Spelling out this argument in detail requires a brief digression, since proper treatment of (3) and (4) requires an event analysis. But the detail is instructive.

Following Davidson (1967) and others, we think

(33) Sally pushed a truck quickly down the hill after Jane pushed a car slowly up the hill

has entailments that motivate appeal to a tacit quantification over events, as indicated below:

(34) ∃e{Push(e, Sally, a truck) & Past(e) & Quick(e) & Down-the-hill(e) &
∃f[After(e,f) & Push(f, Jane, a car) & Past(f) & Slow(f) & Up-the-hill(f)]}.

Higginbotham (1983) and Vlach (1983) note that perceptual reports like

(35) Sally heard a truck backfire

(36) Sally heard a truck backfire in her garage

also confirm event analyses. For (35) is true iff ∃e∃f{Hear(e, Sally, f) & Past(e) & Backfire(f, a truck)}; and the adjunct phrase in (36) introduces an ambiguity, since it can modify the hearing or the backfiring. Taylor (1985), Parsons (1990), and Higginbotham (2000) provide further arguments. So we assume that

(37) Sally pushed a truck

involves a quantification over events: ∃e{Push(e, Sally, a truck)}, suppressing tense. Indeed, following Castañeda (1967) and Davidson (1984), we go one step further in holding that metalanguage expressions like ‘Push(e, x, y)’ mask semantic structure exhibited in (37E):

(37E) ∃e{Agent(e, Sally) & Pushing(e) & [∃y:Truck(y)]Theme(e, y)};

where ‘Pushing’ is a predicate of events, ‘Agent(e, x)’ means that x is an Agent of e, and similarly for ‘Theme(e, y)’. Parsons (1990) and Schein (1993) argue for a thematically elaborated event analysis; see also Herburger (2000), Hornstein (forthcoming), Pietroski (1998, 1999, 2000a, 2000b, forthcoming-a, b).

Given this account, one can begin to accommodate plural constructions like (38) as in (38E)

(38) Sally pushed two trucks

(38E) ∃e{Agent(e, Sally) & Pushing(e) & [Two(y):Truck(y)]Theme(e, y)};

Sally was Agent of a Pushing with two trucks as Themes.[12] If (38E) is true, some event had two Themes. This was presumably a "big" event with two subevents, since for each of two trucks y, there was a Pushing (by Sally) whose (unique) Theme was y. But appeal to events with parts is commonplace. If Sally ate her lunch, the relevant event of eating may (like a banquet) have included smaller like eating a sandwich, eating a cookie, *etc*.

Similarly, at least one reading of (39) is captured by (39E)

(39) Two girls pushed Bob

(239E) ∃e{[Two(x):Girl(x)]Agent(e, x) & Pushing(e) & Theme(e, Bob)}

which means that: there was a Pushing, with two girls as Agents, of Bob. On the assumption that an event with two Agents is an event collectively done, a collective reading of (3) is captured by

(3-coll) ∃e{[Two(x):Girl(x)]Agent(e, x) & Pushing(e) & [Six(y):Truck(y)](e, y)};

there was a Pushing, with two girls as Agents, whose Themes were six trucks.[13] On the other hand,

(3-dist) [Two(x):Girl(x)]∃e{Agent(e, x) & Pushing(e) & [Six(y):Truck(y)](e, y)}

captures a distributive reading of (3): for (each of) two girls x, there was a Pushing by x of six trucks. On this reading, there are two "big" events with six Themes each, and as many as twelve trucks pushed.

We return to quantified objects presently. But recall that (4) has only a distributive reading:

(4) Both girls pushed six trucks

(dist) [Both(x):Girl(x)]∃e{Agent(e, x) & Pushing(e) & [Six(y):Truck(y)]Theme(e, y)}

#(coll) ∃e{[Both(x):Girl(x)]Agent(e, x) & Pushing(e) & [Six(y):Truck(y)]Theme(e, y)}.

where '#' indicates that (4) cannot have the collective interpretation. And consider the possible deletions:

(4a) [both^{+} girls [six trucks **[(both^{+} girls) [pushed [(six trucks)]]]**]]

(4b) *[(both^{+} girls) [six trucks **[both^{+} girls [pushed [(six trucks)]]]**]]

(4c) [both^{+} girls [(six trucks) **[(both^{+} girls) [pushed [six trucks]]]**]]

(4d) *[(both^{+} girls) [(six trucks) **[both^{+} girls [pushed [six trucks]]]**]]

where '*' indicates the hypothesized impermissibility of strong VP-internal determiners. If 'both' is interpreted as having wide scope with respect to the event quantifier, while 'two' can be interpreted as having narrow scope, this suggests that: higher copies of the subject are interpreted as having scope over the event quantifier, while lower copies of the subject are interpreted as having scope within the event quantifier. On this view, (4) has no collective reading *because* (4b) and (4d) are not the results of permissible derivations. Similar remarks apply to (31-32).[14] And if 'six trucks' cannot scope over 'both girls' in (4)—or 'every girl' in (31)—then presumably, 'some truck' cannot scope over 'every girl' in

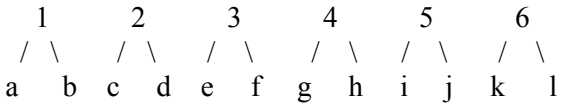
(1) Every girl pushed some truck.

Since that argument was also moderately complex, let us recapitulate. The contrast between (3) and (4)—i.e., the fact that only the former has a collective (subject) reading—calls for explanation; and it can be explained, given an indepedently motivated eventish semantics, by supposing that VP-internal strong determiners must delete. But if VP-internal strong determiners must delete, then given a minimalist syntax, (1) is not scopally ambiguous.

6. Let us turn now to quantified objects. On our view, objects cannot scope over raised subjects. So we predict that 'Two girls pushed six trucks' *cannot* have the meaning depicted below:

[Six(y):Truck(y)][Two(x):Girl(x)]∃e{Agent(e,x) & Pushing(e) & Theme(e,y)}.

And indeed, we cannot hear (3) as having this interpretation, according to which up to twelve girls may have been involved. Our intuitions suggest that (3) cannot be used to describe the following scenario:



We grant that (4) can be used to describe a situation in which six trucks are such that both girls pushed them. But this hardly shows that (4) has a reading on which 'six trucks' takes widest scope; and we see little reason for thinking that (4) has such a reading.

One might wonder whether raised copies of objects have scope over the event quantifier. A

negative answer would confirm that objects cannot scope over raised subjects, which do scope over the event quantifier.[15] But it can seem that an affirmative answer is required, given examples like

(40) Sally ate every chip quickly

which seems to say: [Every(y):Chip(y)]∃e{Quick(e) & Agent(e, Sally) & Eating(e) & Theme(e, y)}; for each chip, Sally's eating of *it* was quick. (Cf. Taylor [1985], who we draw on below.) Indeed, it seems that (40) could be true, even if the "big" event of Sally's eating all the chips was slow—say because she paused after eating each chip. And note that (41-42) exhibit a contrast like that exhibited by (3-4):

(41) Sally ate two chips quickly

(42) Sally ate both chips quickly.

While (42) is unambiguous—each chip had to be eaten quickly—(41) has a collective reading on which the "big" event (of eating two chips) was quick:

∃e{Agent(e, Sally) & Eating(e) & [Two(y):Chip(y)]Theme(e, y) & Quick(e)}.

So one might think that in (42) 'Both(y):Chip(y)' scopes over '∃e'. But distributive readings of (plural) objects need not be due to objects taking scope over the tacit event quantifier we have been discussing.

An event with multiple Themes has subparts. So suppose the correct rendering of (40) is:

∃e{Agent(e, Sally) & [Every(y):Chip(y)]∃f[Subpart(f,e) & Eating(f) & Theme(f,y) & Quick(f)]};

there is a (big) event e, such that for every chip y, some subpart of e is a quick eating of y by Sally. This accommodates the distributivity effect by letting raised objects have scope over *an* event quantifier (concerning the subparts of the big event), but not the *main sentential* event quantifier.[16] One argument in favor of this more complicated rendering of (40) concerns expansions like

(43) Sally ate every chip quickly, and Bob saw it. (It was quite a sight.)

(44) Gracefully, Sally ate every chip quickly.

In (43), the pronoun 'it' apparently refers to the big event of eating all the chips, and not merely the eating of any one chip. Similarly, it seems that 'gracefully' can modify the big event in (44), while

'quickly' is within the scope of 'each chip': ∃e{Graceful(e) & Agent(e, Sally) & [Every(y):Chip(y)]∃f[Subpart(f,e) & Eating(f) & Theme(f,y) & Quick(f)]}. Without appeal to subevents, and letting 'every chip' take scope over the event quantifier, one would have: [Every(y):Chip(y)]∃e{Graceful(e) & Agent(e, Sally) & Eating(e) & Theme(e,y) & Quick(e)}. But this gives the truth conditions for

(45) Sally ate every chip quickly and gracefully

which is *not* truth-conditionally equivalent to (44); see Taylor (1985), Davies (1989, 1991). While this is also an argument for thematically separated event analyses, it is important here because it suggests that objects need not scope over the main event quantifier to generate the distributivity effect in (40-45).

Still, there may be a sense—or senses—in which (1) and/or (2) are ambiguous. Assuming that the weak determiner 'some' can but need not remain in the VP-shell, these strings are structurally ambiguous as indicated by the permissible derivations mentioned above and repeated below:

(21a) [every^{+} girl [some truck **[(every^{+} girl) [pushed [(some truck)]]]**]]

(21c) [every^{+} girl [(some truck) **[(every^{+} girl) [pushed [some truck]]]**]]

(22a) [some girl [every^{+} truck **[(some girl) [pushed [(every^{+} truck)]]]**]]

(22b) [(some girl) [every^{+} truck **[some girl [pushed [(every^{+} truck)]]]**]]

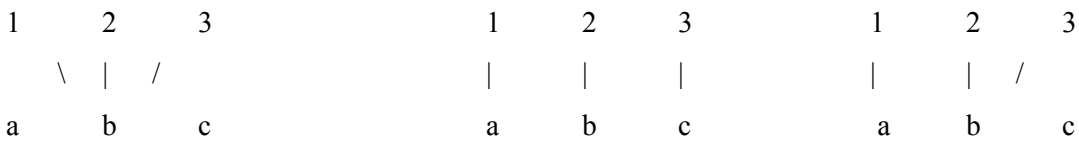
But on our view, (21a) is true iff [∀x:Gx]∃e{Agent(e,x) & [∃y:Ty]Theme(e,y) & Pushing(e)}; while (21c) is true, equivalently, iff [∀x:Gx]∃e{Agent(e,x) & Pushing(e) & [∃y:Ty]Theme(e,y)}.[17] So (1) is not truth-conditionally (or scopally) ambiguous.

Initially, it looks like (22a) and (22b) should differ truth-conditionally, since this pair exhibits a scope contrast; and in the end, we accept this appearance. But relations between form and meaning need not be obvious. Prior to event analyses, the obvious interpretations would have been:

(2a) [∃x:Gx][∀y:Ty]Pxy (2b) [∀y:Ty][∃x:Gx]Pxy.

These formal language sentences have distinct truth conditions. Only the first situation below makes (2a)

true, while all three situations verify (2b)



But correlatively, (2a) implies (2b). So one might wonder if (2b) reflects the sole reading of (2), with (2a) being a special case; if the upper copy of 'some girl' had to delete, for some reason, that would leave only (22b). The situation is similar given appeal to events *without* thematic separation of arguments. If all quantifiers raise above the main event quantifier, the possible readings are:

(2a') [∃x:Gx][∀y:Ty]∃ePexy (2b') [∀y:Ty][∃x:Gx]∃ePexy.

If only raised subjects have scope over the event quantifier, the possible readings are:

(2a'') [∃x:Gx]∃e[∀y:Ty]Pexy (2b'') ∃e[∀y:Ty][∃x:Gx]Pexy.

These are truth-conditionally distinct. But now the details of thematic separation become important.

Suppose (2a'') and (2b'') are replaced by

(2a''') [∃x:Gx]∃e{Agent(e, x) & [∀y:Ty]Theme(e,y) & Pushing(e)}

(2b''') ∃e{[∀y:Ty]Theme(e,y) & [∃x:Gx]Agent(e,x) & Pushing(e)}.

Then the truth conditional difference evaporates: both are true iff some girl is Agent of a Pushing that has every truck as a Theme. One might object that (2b''') is inadequate, precisely because it loses the idea of 'every truck' having scope over 'some girl'; whereas (2b'') captures the idea of a big event in which each truck is pushed by some girl, leaving open the possibility that each truck is pushed by a different girl. On the other hand, the idea of thematic separation is that each thematic role is bound to the event *independently* of other event participants; see Schein (1993). From this perspective, there is something odd about construing (2b'') in a way that binds trucks to events *via* girls.

At this point, one might conclude that (2) is truth-conditionally unambiguous: the difference between (22a) and (22b) is not, after all, truth-conditionally significant. But constructions like (40-45) make appeal to quantification over subevents independently plausible. Thus, we have:

(2a!) [∃x:Gx]∃e{Agent(e, x) & [∀y:Ty]∃f[Subpart(f,e) & Theme(f,y) & Pushing(f)]}

(2b!) ∃e{[∀y:Ty]∃f[Subpart(f,e) & Theme(f,y) & [∃x:Gx]Agent(f,x) & Pushing(f)]}.

This reinstates the truth-conditional distinction. For (2b!) can be true in a situation where each truck was pushed by a different girl. So in the end, we are inclined to agree that (2) is truth-conditionally ambiguous; although the route to this conclusion depends on *much* more than simple intuitions about (2). And *pace* familiar intuitions, we deny that (1) is relevantly like (2).

If this all seems very complicated, so it should. The question of whether (1) and/or (2) is structurally ambiguous in a way that supports a truth-conditional ambiguity depends on a host of considerations: the intuitions of native speakers about a *range* of constructions, the constraints imposed by our best theories of syntax, and the particular kind of event analysis that is best overall, *etc*. These considerations are subtle, and we do not pretend to have established a conclusion here. Our views about the (non)ambiguity of (1) and (2) remain, as all claims about quantifier scope ambiguity should, revisable hypotheses.

7. With these considerations in mind, consider another alleged ambiguity. At least since Quine's (1956) discussion of sentences like

(46) Ralph believes that the richest man is happy.

it has often been supposed that such constructions exhibit a scope ambiguity as indicated in

(46-i) Ralph has a belief whose content is that: the richest man is happy.

(46-ii) The richest man is such that Ralph has a belief whose content is that: he is happy.

One might well be suspicious of the idea that (46)—a *psychological* report—has a reading on which it *entails* that there *is* a richest man to whom Ralph is mentally related. But the motivating intuition is that (46) can be true in different situations: those where Ralph thinks about the object of his belief (say, Bill Gates) *as* the richest man; and those where the object of Ralph's belief is in fact the richest man, whether or not Ralph thinks of him as such. One might render (46-i) and (46-ii), in a formal language with

restricted quantifiers, as

(46a) Believes<Ralph, that{the x: richest-man(x)[x is happy]}>

(46b) the x: richest-man(x){Believes[Ralph, that(x is happy)]}

with 'that' expressing a function from embedded sentences to the (perhaps context-sensitive) referents of 'that'-clauses (whatever they are). But however one formalizes the alleged distinction, (46) seems *not* to be structurally ambiguous in a way that parallels the distinction between (46a) and (46b). It is tempting to think that (46) reflects the surface form of two different LFs:

(46L) [Ralph [believes [that [the richest man [is happy]]]]]

(46L*) [[the richest man][Ralph [believes [that [t [is happy]]]]]

But we doubt that (46L*) is generable in accordance with the principles that govern human languages. It is unlikely that 'the man' can move in the way required by the alleged ambiguity.

Natural languages impose stringent restrictions on movement operations. For example, one cannot form questions like (47) or (48).

(47) *Who$_i$ did John believe that everyone who pushed t_i bought a pig?

(48) *Who$_i$ did you say that t_i bought a pig?

in which the indexes indicate the positions being interrogated. Both of these sentences would make sense were they well formed. The former would have the paraphrase: which person is such that John believes that everyone who pushed her bought a pig? The second would mean (and probably is interpreted as equivalent to): which person is such that you said that he bought a pig? However, these sentences are unacceptable in English due to various locality conditions that restrict movement operations in the indicated structures. And (46L*) seems to flout these restrictions. It is formally parallel to the unacceptable (48) and

(49) *Who$_i$ did Ralph believe that t_i is happy?

Why should 'the richest man' be able to go where 'who' cannot?

Moreover, the same kinds of intuitions that motivate appeal to a "b-reading" of (46) arise with respect to

(50) Mary believes that everyone who saw the richest man is happy.

It is initially tempting to say that (50) exhbits a scope ambiguity indicated by

(50-i) Mary has a belief whose content is that:

the richest man is such that everyone who saw *him* is happy

(50-ii) *The richest man* is such that

Mary has a belief whose content is that: everyone who saw *him* is happy.

But if the syntactic movement corresponding (50-ii) occurred, 'the richest man' would move from the subject of a finite clause (which is typically an island for movement) *and* out of a relative clause, which is an island for movement—as indicated by (47). Again, why should the definite description be able to go where 'who' cannot? The advocate of ambiguity owes an answer.

Indeed, it seems that *no* degree of embedding defeats the kind of intuition that initially suggests a wide scope interpretation of 'the richest man'. One can feel the pull of saying that

(51) John wondered whether Mary said that

everyone who pushed the dog that the richest man bought is happy

has an interpretation on which it is true iff *the richest man* is such that John wondered whether Mary said that everyone who pushed the dog that *he* bought is happy. But if this shows that 'the richest man' can take scope over 'wondered' in (51), and similarly for other examples, one is left with the deeply implausible view that *no* structural distance between a definite description and its trace is too great. (In a formal language, the distance between a quantifier and its variable may not matter; but natural languages are not formal langauges.) So the intuitions in question should not be taken to establish the ambiguity of (46). On the contrary, given independently motivated constraints on natural language grammar, there is reason for doubting that (46L*) is generable in a natural language.

A related line of thought might help to drive this point home. Suppose that

(52) Ralph believes that every senator is dishonest

is true. Ralph may have this belief for either (or both) of two different reasons. He might have a general belief about senators: getting to the Senate requires dishonesty. Or Ralph might have one hundred "object centered" beliefs, each supported by evidence of dishonesty on the part of the relevant senator.[18] This makes it tempting to say that (52) is ambiguous, with

(53) Ralph believes of every senator that he is dishonest

reflecting the wide-scope reading of 'every senator', while the narrow-scope reading is indicated by (52) itself. If this is correct, then on the assumption that the ambiguity of (52) is structural, its wide-scope reading requires that 'every senator' move from the embedded clause to the matrix clause. But this hypothesis faces a serious difficulty. Note that

(54) It is false that every senator is dishonest

cannot mean that for every senator x, it is false that x is dishonest; 'every senator' cannot take scope over 'false that'. Similarly,

(55) Someone believes that every senator is dishonest.

cannot mean that: for every senator, someone or other believes that he is dishonest. But why not? If (52) is ambiguous, so is (55). And if 'every senator' can raise out of the embedded clause, why can't it raise to the highest position, taking scope over 'someone'?[19]

On the other hand, if the intuitions surrounding (46) and (52) are not diagnosed as reflections of ambiguity, (54) and (55) do not present puzzles. One can take the view already suggested by (47-49): there are constraints on movement out of embedded clauses. But if 'every senator' cannot scope over 'someone' in (55), there is little reason for thinking that 'the richest man' can take wide scope in (46), especially since the intuitions motivating this ambiguity hypothesis arise with respect to other examples where the definite description would end up miles from its starting point. Reflection on (55) also

suggests an alternative diagnosis of these intuitions.

If (55) is indeed unambiguous, then a single sentence of natural language is true if *either* someone has the relevant general attitude about senators *or* someone has one hundred relevant object-centered beliefs. And presumably, a compositional semantics that accommodates (55) will have the consequence that an individual x satisifies the predicate 'believes that every senator is dishonest' iff x has a belief whose content is *that every senator is dishonest*.[20] So an individual satisfies this predicate, regardless of whether he does so by virtue of having a general attitude about senators or one hundred object-centered beliefs. In short, there is more than one way to believe that every senator is dishonest. This is hardly surprising; there is typically more than one situation in the world that verifies a sentence. Perhaps an explanatory psychology ought to distinguish the rather different mental attitudes that a thinker might bear to the senate. But it does not follow that (52) and (55) have multiple readings that can be pressed directly into this theoretical service. If one looks at the language, without insisting that *it* reflect distinctions that a scientific psychology should draw, it seems clear that (55) does *not* have a wide scope reading of 'every senator'. In which case, (55) applies unambigously to rather different mental situations.

Given this conclusion, similar remarks apply to (52). So other things being equal, similar remarks apply to

(46) Ralph believes that the richest man is happy.

An individual x satisfies 'believes that the richest man is happy' iff x has a belief whose content is *that the richest man is happy*. If this is correct, (46) is true in various situations, including situations in which: (i) Ralph is disposed to report his belief by saying 'The richest man is happy', and we can correctly report Ralph's belief (in the context at hand) by using this very sentence; or (ii) Ralph is not disposed to report his belief by saying 'The richest man is happy', but we can correctly report Ralph's belief (in the context at hand) by using this very sentence. Type-(ii) situations may call for special comment, and perhaps special investigation. But absent implausibly strong assumptions about the relation of belief to

speech, there is no reason to exclude the possibility of such situations—even if Ralph "speaks our language," in some sense of 'language'. (*Cf.* Kripke 1977; see Pietroski 1996 for discussion.) Perhaps a good psychology will distinguish type-(i) from type-(ii) situations. But it does not follow that (46) has two readings that manifest this distinction. One can engage in Quinean debates about the relative merits of languages that do or do not allow for this scope distinction: is there a payoff in terms of psychological explanation makes up for the costs of "quantifying in"? But one should not confuse this (normative) question with questions about the grammatical structures that can be assigned to (46) given the constraints on the natural languages we actually speak.

Of course, one still wants to know why (46) *invites* an ambiguity hypothesis, given that 'every' cannot scope over 'some' in (55)? And how can (46) be true in a situation where Ralph does *not* think of the richest man *as* the richest man, if the definite description cannot take wide scope? It is not our goal to answer such questions; our point is simply that the invitation should be declined. But it seems relevant that descriptions are often heard as referring expressions akin to names or demonstratives. Whether 'the richest man' is ambiguous, with a demonstrative-like reading, is a matter on which we take no stand here. (*Cf*. Donnellan 1966, Kripke 1977.) But even given a Fregean account according to which (46) is true only if Ralph believes *the* sense of 'the richest man is happy', with 'the' as a genuinely quantificational term, one has to allow for the possibility of hearing a *user* of (46) as "intending to convey" something like: Ralph believes the sense of 'He is happy'; where the the sense of 'He' is a contextually determined way of presenting the intended referent of 'He', and the intended referent of 'He' is (the individual taken to be) the referent of 'the richest man'. Perhaps the intuitions that initially suggest a wide-scope reading of the definite description in (46) reflect the recognition that (46) can be used to convey the following idea: Ralph believes some "singular thought" that invoves the richest man—Bill Gates himself—but Ralph believes this proposition without thinking about its object *as* the richest man. Granting that speakers can use a sentence to convey a thought is not yet to grant that the thought conveyed is a meaning

of the sentence. Claims about meanings have to be evaluated in light of everything we know about meaning and its relation to grammar.

Still, even if strings like

(46) Ralph believes that the richest man is happy

(1) Every girl pushed some truck

are not syntactically ambiguous, one might insist that they are *semantically* ambiguous for some other reason. Perhaps a single LF can be associated with more than one meaning—say, by virtue of its association with two "semantic forms" or "sentences of Mentalese" or "communicative intentions" or "mental models" or sentences of a *Begriffschrift* that reflects how we "ought" to classify real-world situations. Perhaps (1) is ambiguous because a single LF, in which ‘every girl’ has widest scope, is associated with two mentalese sentences whose structures are indicated in

(1a) [∀x:Gx][∃y:Ty]Pxy (1b) [∃y:Ty][∀x:Gx]Pxy.

We can’t show otherwise, and we have no interest in trying. If there is evidence that this conjecture is correct, fine We simply recommend that the evidence consist of more than the "intuition" that (1) is somehow scopally ambiguous; and similarly, *mutatis mutandis*, for (46). There can be no proof that the meanings of sentences are not individuated more finely than syntactic structures we have been discussing. Traditional ambiguity judgments *may* be correct because of scopal ambiguities that are not syntactic ambiguities. But if one endorses this idea, one owes a theory of the alleged nonsyntactic aspects of meaning; encoding intuitions is not enough. The study of natural language has revealed that a host of phenomena pretheoretically regarded as semantic can indeed be accounted for, in rich detail, in structural terms. The discussion above reflects one small aspect of how syntax bears on semantics. (See, for example, Higginbotham [1985, 1986], Hornstein [1984, 1995], Neale [1990], Larson and Segal [1994], and the essays in Preyer [forthcoming].) To the best of our knowledge, there are no *theories* of how a string like (1) or (46) can be related to multiple meanings without being related to multiple LFs. We

suspect that this is no accident, but won't press the point here.

Appeals to ambiguity hypotheses are often viewed as innocuous because it can seem obvious that strings like (1) are either syntactically ambiguous or ambiguous in some other way. We have tried to show that the first disjunct is not at all innocuous; indeed, it is probably false. We leave to others the task of sharpening the second disjunct into an interesting evaluable hypothesis about the meaning of natural language sentences. But so far as we can tell,

(56) Every sentence with multiple quantifiers exhibits a scope ambiguity

is false. There is no quantifier-scope ambiguity that (56) exhibits.

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Notes

1. Standard conditional representations would be: $\forall x \exists y[Gx \Rightarrow (Pxy \ \& \ Ty)]$; $\exists y \forall x[Gx \Rightarrow (Pxy \ \& \ Ty)]$. We return to Davidsonian accounts that further analyze 'Pxy' in terms of a hidden quantification over events, as in '$\exists$ePexy'. We are not alone in challenging the alleged ambiguity of (1); see, *e.g.*, Kempson and Cormack (1981), Reinhart (1979, 1983, 1995), Wilson (1978). But for present purposes, we take no stand on the reasons others have offered for positing less ambiguity than is standardly positied.

2. Zwicky and Sadock (1975) discuss this and other tests for ambiguity. Many others have, of course, emphasized the distinction between ambiguity and generality; see Gillon (1990) for discussion.

3. See Chierchia and McConell-Ginet (1990), who are admirably sensitive to the issue.

4. The terminology was, however, slightly misleading. So it has become standard to use 'LF' in speaking of syntactic structures like (11-L), which may be unlike traditional logical forms in many respects. More about this below.

5. See for example the Minimal Binding Requirement in Aoun & Li (1993) or Rizzi's (1990) Relativized Minimality. Such a condition would effectively prevent an object from scoping over a subject, at least if scope tracked c-command. (Roughly, node A in a tree c-commands node B, iff the node immediately dominating A also dominates B.) Theories that adopt restrictions like the one mooted in the text abandon the following simple principle: A scopes over B, just in case A c-commands B. Citation to Huang on restructuring?

6. And hence that *every* truck got pushed. For simplicity, we treat 'no ___' as 'not [some ___]'. But we could make the same points with a generalized quantifier treatment, according to which 'no' is true of ordered pairs of sets $<Y, X>$ such that $|Y \cap X| = 0$. May (1989) notes that if the object in 'Nobody loves nobody' can take widest scope—yielding $\neg\exists y \neg\exists x Lxy$, which is equivalent to $\forall y \exists x Lxy$, everybody is loved (by someone)—this reading is not entailed by the more obvious reading:$\neg\exists x \neg\exists y Lxy$—*i.e.*, $\forall x \exists y Lxy$, everybody loves somebody. But in our view, the former interpretation is impossible. (We ignore the "double negative" interpretation, equivalent to 'Nobody loves anyone'.) Later on, we argue that subjects (but not objects) can take scope over a tacit event quantifier. On the assumption that negation always takes scope over the event quantification, (18) will be true iff: $\neg[\exists x{:}Gx]\neg\exists e[\exists y{:}Ty]Pexy$; no girl is such that no event was a pushing of some truck by her.

7. Otherwise, the derivation is said to "crash;" it fails to converge on a well-formed structure (due to lack of agreement). One might think of case as a formal feature that encodes a certain relation between an argument and a verb. It is not hard to see how such features might play a role in the *interpretation* of syntactic structures; and one might view case assignment as part of a procedure for "preparing" a propositional shell for interpretation by some other component of the language system. A related point: Chomsky posits an unpronounced verb, labelled 'v', between 'every girl' and 'likes some truck'; and he takes the label of the propositional shell to be 'vP'. But we ignore this complication, which is irrelevant for present purposes.

8. See Milsark (1974). Note the following contrasts: there is a/*every truck on the floor; there are some/many/two/*all/*most/*both trucks on the floor.

9. The alleged (b)-reading of (1) *isn't* a reading in which it follows that there is a girl; the formal sentence '(∃x:Tx)(∀y:Gy)Pxy' is true, vacuously, in a domain where ¬∃xGx. Whether (21b) and (21d) are literally ungrammatical or simply uninterpretable is irrelevant for present purposes. Either way, (1) will fail to have the indicated readings.

10. The main assumption here is that a single subtree cannot function as the theta domain—i.e, the domain in which *ordered* thematic structure is expressed—of two different predicates. Since VP is the theta domain of the verb, it cannot also be the theta domain of the strong determiner, which must therefore express its (ordered) thematic structure in a higher position—viz., the subject-position of the clause. One can, of course, encode the difference between strong and weak determiners (in a minimalist idiom) by saying that only the former has a certain kind of "feature" that must be "checked" outside the VP-shell; and perhaps there is independent support for this claim (see Weiss, this volume). If so, one might look for an explanation (of why all VP-internal strong determiners delete) in these terms. But we suspect that any featural explanation will be compatible with (and perhaps a notational variant of) the account sketched in the text.

11. On standard accounts, the meaning of 'two' is specified interesectively as a special case of 'some' ($|Y \cap X| = 2$, which is a special case of $|Y \cap X| > 0$), and the meaning of 'both' is specified subtractively as a special case of 'every' ($|Y - X| = 0$ & $|Y| = 2$, which is a special case of $|Y - X| = 0$). If both girls swam, it doesn't follow that both swimmers were girls. The distribution test mentioned in note 10 yields the same result: There are two/*both trucks on the floor. Initially, one might think that the distributive reading of (3) is a special case of the collective reading. But this trades on interpreting 'six' as *at least* six. So stipulate that 'six' means *exactly* six, or add 'exactly' to (3-4). Then neither reading of (3) is a special case of the other; and *pace* Kempson and Cormack (1981), we do not think that each reading is a special case of a more nonspecific reading. Note that the plural object is irrelevant. The same contrast arises with: Two/Both girls pushed that truck up the hill.

12. To be precise, one must also specify that the Pushing had no other Themes, else (27) would be true if Sally was one of many girls who (together) pushed six trucks. Thus, '[Two(y):Truck(y)]Theme(e, y)' should be replaced with something like: for some set S of two trucks, ∀y[y ∈ S <–> Theme(e, y)]; see Schein (1993). In the text, quantification over thematic participants should be understood in this way.

13. See Taylor (1985), Davies (1989, 1991). This "big" event can be subdivided in (at least) two ways: in terms of each girl's contribution, or in terms of the six trucks. If each girl pushed three trucks on her own, these divisions do not crosscut; but not so, if each (heavy) truck was pushed jointly by the two girls.

14 While 'both girls pushed some truck' is true if some truck is such that both girls pushed it, this is a special case, in which a single truck happens to be the Theme of both events on the distributive reading: [Both(x):Girl(x)]∃e{Agent(e, x) & Pushing(e) & [Some(y):Truck(y)]Theme(e, y)}. As Liu (1992) notes,

(i) Three linguists reviewed every abstract

has a reading on which it is true iff each abstract was reviewed by three linguists. But it does not follow that the object takes scope over the subject on this reading. For if the *subject* in (i) takes widest scope, the meaning is: for three linguists x, there was a reviewing by x of every abstract; *and so*, every abstract was reviewed by three linguists. Liu also notes that

(ii) Three linguists reviewed few abstracts

cannot mean: for few abstracts y, y was reviewed by three linguists. From our perspective, this is unsurprising; and it does not call for any claims about *which* objects cannot take widest scope. See also Beghelli (1997); Beghelli and Stowell (1997); and Szabolsci's essay in Szabolsci (1997). A

referee drew our attention to Progovac (1999), whose treatment of adverbials seems to fit well with our claims about 'both'.

15 A negative answer would also converge with the independently plausible idea that inflected elements of a sentence (which seem to be asociated with event quantification) c-command raised objects. If (4) is true, then [Both(x):Girl(x)][Six(y):Truck(y)]∃e{Agent(e,x) & Pushing(e) & Theme(e,y)}. For if the two relevant girls each pushed six trucks, then for each girl, there are six trucks that she pushed. But this doesn't show that (4) has a *reading* in which the object scopes over the event quantifier.

16. See Schein (1993) on plurality and the idea of subevents; cf. Pietroski (1998, forthcoming-b).

17. Perhaps raised *singular* objects also induce subevents:
[∀x:Gx]∃e{Agent(e,x) & [∃y:Ty]∃f[Subpart(f, e) & Theme(f,y) & Pushing(f)]}. But at least in this case, the additional complexity makes no difference; and it requires that every event be a subpart of itself. So either way, (21a) and (21c) will be mutually entailing.

18. We use the term 'object centered' as in Neale (1990).

19. This problem is pointed out in Cooper (1983). As we have already noted, diagnosing the relevant intuitions as reflections of a structural ambiguity commits one to admitting long-distance binding relations between quantificational elements and their traces in embedded clauses. And anyone who believes in scope ambiguities at all is committed to the idea that 'every' can scope over 'some'.

20. Citations to others with similar views? For these purposes, we take no stand on the semantics of 'that'-clauses. See Pietroski (1996) for a Fregean account that is fully compatible with our claims here. One could also reformulate the remarks in the text in terms of a "hidden indexical theory" (see Schiffer 1992, for discussion) according to which 'S believes that P' is true in context C, iff x believes the referent of 'that P' under the mode of presentation relevant in C.