Why *in situ* interpretation must be available for object quantifiers

Word count: 5721

Abstract This paper argues that the *in situ* interpretation of object quantifiers must be a theoretical option, even in a theory that adopts a movement-based account of scope shifts. We show that without this option, a syntactic account of scope has means to constrain QR, thus considerably over-generating scope-shifted readings. Unless we wish to adopt a radically different view of the syntax-semantics interface where PF and LF have a direct connection, allowing *in situ* interpretations of object quantifiers is the only way to remedy this issue.

Keywords: scope shifts; object quantifier interpretation; quantifier raising; syntax-semantics interface

1 Introduction

A sentence like (1) poses two puzzles for theories of the syntax-semantics interface.

(1) Some cat ruined every piece of furniture.

The first problem is that, given common assumptions, it provides a so-called type clash. The assumptions in question are that quantificational arguments are interpreted as sets of properties of individuals and transitive verbs as relations between individuals. Given this, there is no way to compose the VP *ruined every piece of furniture* (van Benthem, 1986; Heim & Kratzer, 1998).

The second problem is that (1) allows for a so-called *scope shifted* reading, where the scope of the object quantifier is wider than that of the subject quantifier: for every piece of furniture there's some cat who ruined it.

Broadly speaking, there are two classes of solutions to both these problems, depending on whether the issues are seen to be dependent on syntax or on semantics. Syntactic solutions posit that the syntactic representation that is interpreted is not one that coincides with the surface word order in (1). That is, the interpretation of *every piece of furniture* is not composed with that of the transitive verb, but its composition takes place at a different locus, thus circumventing the type clash and enabling a scope shift. The most dominant version of this solution is the concept of *quantifier raising* (May, 1977; Heim & Kratzer, 1998) and one reason for its popularity is that it solves the two problems in one swoop.

Within the class of semantic approaches to these problems, the two problems are usually thought to be independent. For instance, Keenan (2016) argues that the type clash can be resolved by dropping the assumption that quantificational DPs are interpreted as sets of properties. Instead, the idea is that they are polymorphically typed as arity reducers. So they map $n+1$-ary relations to relations of arity n. Object quantifiers combine with relations between individuals to return a property of individuals. Subject quantifiers take

such properties and return a truth-value. As such, this approach does away with the type clash and allows *in situ* interpretation of the quantifier, independent of what position it is in.

Keenan's solution leaves the scope of the quantifier unaffected. This means that a different semantic approach is needed for the issue of scope shifts. An example of this is the work of Hendriks (1993), who proposes that the interpretation of transitive verbs is flexible in a way that facilitates both the scope orders that are observed for sentences like (1).

In this paper, we zoom in on the dominant syntactic account to the two puzzles, *quantifier raising*. As we briefly explained, on such approaches, the shifting of scope and the resolution of type clashes are resolved using the same syntactic mechanism. As we will show here, however, contemporary implementations of quantifier movement make the simultaneous solution of the two puzzles untenable. The upshot will be that if one does adopt a syntactic theory of scope shifts, this theory will have to be augmented with a semantic theory of object quantifier interpretation.

To be clear, this paper will not discuss any arguments either in favour or against the available approaches to scope shifting. Instead, we seek to clarify the theoretical landscape by arguing that a purely syntactic treatment of the interpretational puzzles posed by (1) is much less attractive than is commonly assumed.

2 The standard syntactic route towards inverse scope

We illustrate the ingredients of the syntactic account by walking through the derivation step of (1), repeated here.

(1) Some cat ruined every piece of furniture.

First, the object quantifier *every piece of furniture* is merged in its theta-position as a sister of the verb *ruined*. Then the subject quantifier *some cat* is merged in the vP (the vP-Internal Subject Hypothesis, e.g. Koopman & Sportiche, 1991). Assuming the type clash for object quantifiers, *every piece of furniture* is not interpretable *in situ* and needs to attach to a node of type t to be interpreted. Assuming the quantifier moves to the closest node of type t,[1] we can assume that it attaches to the vP-node, as in (2c). Finally, *some cat* overtly moves to its final landing site in TP.

(2)
a. [$_{\text{VP}}$ ruined every piece of furniture]
b. [$_{\text{vP}}$ some cat [$_{\text{VP}}$ ruined every piece of furniture]]
c. [$_{\text{TP}}$ every piece of furniture [$_{\text{vP}}$ some cat [$_{\text{VP}}$ ruined every piece of furniture]]]
d. [$_{\text{TP}}$ some cat [$_{\text{TP}}$ every piece of furniture [$_{\text{vP}}$ some cat [$_{\text{VP}}$ ruined every piece of furniture]]]]

Modern generative aproaches to the syntax-semantics interface assume the Copy Theory of Movement (Chomsky, 1993): When an element moves to a different position, it leaves behind a full copy of itself rather than a trace. The surface scope interpretation can now come about by interpreting the higher copy of both quantifiers and deleting the lower copies, as in (3).

[1] This is the principle called Shortest Move. See footnote 2.

(3) [$_{TP}$ some cat [$_{TP}$ every piece of furniture [$_{vP}$ ~~some cat~~ [$_{VP}$ ruined ~~every piece of furniture~~]]]]

To get the inverse scope interpretation, the higher copy of the object quantifier and the lower copy of the subject quantifier can be interpreted, as in (4).

(4) [$_{TP}$ ~~some cat~~ [$_{TP}$ every piece of furniture [$_{vP}$ some cat [$_{VP}$ ruined ~~every piece of furniture~~]]]]

Thus, the inverse scope interpretation is obtained by reconstructing the subject to its vP-internal position, which in the Copy Theory of Movement is done by simply interpreting the lower copy and deleting the higher one (Chomsky, 1993, 1995). This makes it end up under the higher copy of the object, which results in the desired reading.

Hornstein (1995) and Johnson and Tomioka (1997) have argued for a configuration like the one in (4), where QR involves both movement of the object and Reconstruction of the subject. However, given the assumptions made in the syntactic account, (4) is an inevitable consequence; there is no need to do any special work to obtain this configuration. If the object quantifier moves for type reasons, it will end up above the lower copy of the subject. If movement leaves a full copy rather than a trace, by assuming the copy theory of movement, it will be possible to interpret the lower copy of the subject rather than the higher one. Therefore, (4) *must* be a possible structure that leads to an inverse scope reading. As a consequence, the only difference between surface scope and inverse scope in this system is the deletion and interpretation of a different copy of the subject. Crucially, no additional movement operation is needed to get an inverse scope reading. The surface scope structure in (3) is the same as the inverse scope structure in (4) but for the location of the interpretation of the subject.

In this squib, we argue that this is an undesirable aspect of this system. The reason is that there exist phenomena that are standardly explained by maintaining that the derivation of the inverse scope configuration is more complex than the derivation of the surface scope reading. Given that the assumptions above make it that both readings result from the same configuration (4), such explanations are rendered impossible. As a result, the standard syntactic account of object quantifier scope over-generates, since the system cannot express constraints that govern it.[2] We will show this argument in detail in the next section. Note first, however, that this is not an argument against a syntactic account of scope per sé. The problems we point out here are a consequence of having the same mechanism for scope-taking and for avoiding a type clash for object quantifiers, but they don't arise as soon as we drop this double functionality.

3 Constraints on inverse scope

Fox (2000) proposes the Scope Economy Condition, a constraint on covert movement that can be defined as in (5).

[2] Our argument is independent of two further assumptions made above, namely the vP-Internal Subject Hypothesis and Shortest Move. Regarding the former, if we drop this assumption, the subject will be directly merged in TP. The only node of type t then where the object can attach is this TP. Given that the VP copy of the object is not interpretable, we need to interpret the higher copy of the object. As a consequence, we automatically obtain the inverse scope reading. For the surface scope reading, the subject would need to undergo movement to take scope over the highest copy of the object. In other words, dropping the vP-Internal Subject Hypothesis only makes things worse, since now the derivation of surface scope involves more steps. We leave it to the reader to verify that a similar negative result is obtained by dropping Shortest Move.

(5) *Scope Economy*
Scope Shifting Operations that are not forced for type considerations must have a semantic effect (Fox, 2000:23)

A Scope Shifting Operation is a movement operation that changes the scope relations between operators in a sentence. Although Fox does not explicitly state this, his choice of examples indicates that he considers Scope Shifting Operations to be the covert movement operations of QR and Reconstruction, and not overt movement operations like *wh*-movement, topicalisation, or movement for EPP reasons. These types of movement can also affect scope relations but even when they do not, they affect the phonology interface. It seems that the intuition behind Fox's proposal is that if you move, this should affect one of the interfaces. If it has no impact on the phonology, it should affect interpretation.

We will assume familiarity with the empirical arguments for (5) (Fox, 2000), and just provide the example in (6). On the assumption that an ellipsis of some phrase is only licensed if a parallel phrase can be found in the antecedent sentence, it is expected that an elliptical sentence has the same scope configuration as its antecedent sentence whenever the ellipsis involves a scope bearing element. The observation is that the antecedent sentence in (6) only has its surface scope reading, which Fox explains using (5). Since relative scope to a proper name is semantically vacuous, the elliptical sentence can only have the surface scope configuration. We can observe this by looking at the parallel antecedent sentence.

(6) A cat ruined every piece of furniture. Walter did, too.

Fox (2000) does not assume the Copy Theory of Movement. Instead, he assumes that movement leaves behind a trace that is co-indexed with the moved element. The derivation of the ellipsis sentence of (6) then proceeds as follows. The object is first merged in the VP and then covertly moves up to TP for type reasons. The subject starts off in vP and overtly moves to TP. This is shown in (7). Both movement operations leave behind traces rather than full copies.

(7) $[_{TP}$ Walter$_2$ $[_{TP}$ ever piece of furniture$_1$ $[_{vP}$ t_2 $[_{VP}$ ruined t_1]]]]

The structure given in (7) is the surface scope structure of (6). To get an inverse scope reading, *every piece of furniture* has to QR over Walter to take scope over it, as it has done in (8).

(8) $[_{TP}$ every piece of furniture$_1$ $[_{TP}$ Walter$_2$ $[_{TP}$ t_1 $[_{vP}$ t_2 $[_{VP}$ ruined t_1]]]]]

This last movement step is the one that is blocked by Scope Economy. As *Walter* and *every piece of furniture* are scopally commutative, moving one over the other has no semantic effect and is therefore prohibited.

Now let us consider how the derivation would proceed if you assume the Copy Theory of Movement. The steps displayed in (7) would be exactly the same, except that the movement now leaves full copies instead of traces. The resulting structure is the one in (9).

(9) $[_{TP}$ Walter $[_{TP}$ every piece of furniture $[_{vP}$ Walter $[_{VP}$ ruined every piece of furniture]]]]

As we have seen, the movement operation illustrated in (8) is no longer necessary to get inverse scope now. Instead, the semantic component can simply interpret the higher

copy of the object and the lower copy of the subject and delete the other two copies, as in (10).

(10) [$_{TP}$ ~~Walter~~ [$_{TP}$ every piece of furniture [$_{vP}$ Walter [$_{VP}$ ruined ~~every piece of furniture~~]]]]

How can Scope Economy block semantically vacuous QR in this system? Let us consider each movement step involved in the derivation and see if Scope Economy can block them.

3.0.0.1 Option 1: the first movement step of the object

Can Scope Economy block the movement of the object out of the VP? The way Fox stated Scope Economy, the answer to that question is no. Recall from (5) that Scope Economy restricts movement that is not forced by type reasons. The first movement step of the object *is* forced by type reasons and is therefore not semantically vacuous; without it, the structure would be uninterpretable. Because the movement is semantically motivated, Scope Economy allows it. Therefore, this movement is not blocked.

3.0.0.2 Option 2: overt movement of the subject

Now let us consider the movement step of the subject from vP to TP. Could Scope Economy block this movement step? The answer is no: Scope Economy restricts covert movement, not overt movement.[3] And even if Scope Economy could somehow prevent the subject from moving to TP, this would not help. In fact, it would only make matters worse: the object would still end up above the subject (above the vP copy, which is now the only copy), resulting in an inverse scope reading. The surface scope reading would then be predicted to be unavailable instead of the inverse scope reading.[4]

We have tried to put Scope Economy to work at both steps of the derivation, but neither option is possible. In other words, Scope Economy has no way to prevent (10) from coming into existence. Inverse scope is therefore predicted to be available for the ellipsis sentence in (6). Consequently, Parallelism has no choice but to allow inverse scope in the antecedent sentence of (6). Therefore, we now predict that both surface scope and inverse scope should be available for the antecedent sentence in (6). This is an incorrect prediction.

We have already shown that this problem does not arise if we do not assume the Copy Theory of Movement. Fox did not assume it, and everything went quite well for him. (11) demonstrates that the problem also does not arise if we do not assume that objects move for type reasons. If *every piece of furniture* were interpretable *in situ*, the surface scope structure would be the one in (11a) (which copy of the subject is deleted here is irrelevant). Inverse scope would look as in (11b), which is the same structure we saw earlier, in (10). The difference, however, is that the movement of the object is now not forced for type reasons. Instead, it happens purely so that the object can take scope over the subject. Therefore, it is not exempt from Scope Economy as it was before, and so it can be blocked by it. We correctly predict that inverse scope is impossible.

(11) a. Surface scope: [$_{TP}$ Walter [$_{vP}$ ~~Walter~~ [$_{VP}$ ruined every piece of furniture]]]

[3] If Scope Economy also restricted overt movement, this would have dramatic consequences: every single movement operation in the grammar would have to result in some semantic change.

[4] This problem also arises if we assume the PF movement theory of Reconstruction.

b. Inverse scope: [$_{TP}$ ~~Walter~~ [$_{TP}$ every piece of furniture [$_{vP}$ Walter [$_{VP}$ ruined ~~every piece of furniture~~]]]]

In sum, if we make the two assumptions that movement leaves behind full copies and that objects must move for type reasons, Scope Economy no longer blocks semantically vacuous movement. As soon as we give up one of these assumptions, Scope Economy works again. Put differently, assuming both movement for type reasons and the Copy Theory of Movement breaks Scope Eonomy.

There is a second, broader problem. Scope Economy is but one example of a constraint on quantifier raising. More generally, QR is a severely restricted form of covert movement. For instance, none of the sentences in (12) have inverse scope readings.

(12) a. Some students read exactly two books.
b. No music critic listened to exactly two albums.
c. Every child visited exactly two amusement parks.
d. Every student attended no parties.
e. No child found an Easter egg.
f. No boy read every book.
g. Two people carried three pianos.

Many authors have proposed restrictions on QR that aim to explain observations like these (e.g. Beghelli & Stowell, 1997; Mayr & Spector, 2012). The details of these proposals are not relevant here. What is important is that the proposed restrictions are intended to prevent QR from deriving the inverse scope reading. In the current system – the Copy Theory of Movement combined with employing object QR to prevent type clashes – such constraints are unstatable. For instance, (12a) would get the derivation in (13), where the semantics is free to interpret the lower copy of *some students* and the higher copy of *exactly two books* and delete the other two copies.

(13) [$_{TP}$ Some students [$_{TP}$ exactly two books [$_{vP}$ some students [$_{VP}$ read exactly two books]]]]

As was the case for Scope Economy, any restriction on movement will be unable to prohibit inverse scope for (13).

A final argument comes from processing. Many authors have shown that inverse scope configurations require more processing resources than surface scope configurations (Catlin & Micham, 1975; Micham, Catlin, VanDerveer, & Loveland, 1980; Gillen, 1991; Kurtzman & MacDonald, 1993; Tunstall, 1998; Anderson, 2004). Anderson, for instance, shows in a series of offline and online experiments that participants have more trouble processing inverse scope configurations than surface scope ones. The most obvious reason for this, and indeed the reason Anderson gives for her findings, is that inverse scope configurations have a higher degree of complexity than surface scope configurations. Once more, this cannot follow from the current system, since the derivation of the surface and inverse scope configurations contain the same movement steps.

Dropping one of the assumptions central to our argument would remedy this situation. Without the Copy Theory of Movement, an extra movement step would be required to get inverse scope, and this would lead to a more complex structure, as illustrated in (14).

(14) a. Surface scope:
[$_{TP}$ some cat $_2$ [$_{TP}$ every piece of furniture$_1$ [$_{vP}$ t_2 [$_{VP}$ ruined t_1]]]]
b. Inverse scope:
[$_{TP}$ every piece of furniture$_1$ [$_{TP}$ some cat $_2$ [$_{TP}$ t_1 [$_{vP}$ t_2 [$_{VP}$ ruined t_1]]]]]

Similarly, if we did not assume that object quantifiers need to move for type reasons, we would correctly predict that surface scope is less complex and therefore easier to process than inverse scope, as shown in (15).

(15) a. Surface scope:
[$_{TP}$ some cat [$_{vP}$ ~~some cat~~ [$_{VP}$ ruined every piece of furniture]]]
b. Inverse scope:
[$_{TP}$ ~~some cat~~ [$_{TP}$ every piece of furniture [$_{vP}$ some cat [$_{VP}$ ruined ~~every piece of furniture~~]]]]

In other words, to be able to express constraints on object scope, the syntactic approach to scope shifts, will either need to abandon the Copy Theory of Movement, or it will need to solve the type clash problem with a mechanism that is different from the mechanism that accounts for scope shifts. It seems to us that this latter option is much more attractive, especially since - as for instance Keenan (2016) shows - the type clash is merely an artifact of an overly narrow view of what the interpretation of quantifiers is. In contrast, the theoretical consequences of abandoning the Copy Theory of Movement are huge.

In addition, there is a type of construction that directly demonstrates the need for *in situ* interpretations, namely the one we see in (16)-(17). Here the order of the quantifiers given below the sentences indicate the most prominent readings.

(16) Some shop attendant is likely to bother every customer.
likely > *some* > *every*

(17) Exactly two shop attendants are likely to bother every customer.
likely > *exactly 2* > *every*

For (16), the most salient reading is arguably the reconstructed reading: it is likely that some shop attendant or other will bother every customer. For the sentence to be felicitous, there does not need to be a specific shop assistant that the speaker thinks will bother every customer, which would be the non-reconstructed reading. The point is that under this reconstructed reading, the object *every customer* is still interpreted most naturally as having narrow scope with respect to *some*. The most obvious reading is that it is likely that some shop attendant or other will, by himself, bother all of the customers.

Given that *some shop attendant* is interpreted below *likely* and *every customer* is interpreted below *some shop attendant*, *every customer* must be interpreted in *in situ*. Similar observations can be made for (17).

For these reasons, it seems to us that the syntactic approach to scope shifts should embrace a semantics for quantifiers that allows in situ interpretation of object quantifiers. With that in place, structures like (15a) are interpretable and (crucially) less complex than (15b).

4 Subject quantifiers

Our conclusion about syntactic theories of quantifier scope is based entirely on reasoning about what happens to the object quantifiers. One might think, however, that subject quantifiers have a much larger role to play in the problems we've pointed out. In particular, one might think that the standard framework may be saved by assuming that reconstruction is costly. Consider (18), where *every piece of furniture* has undergone obligatory QR for type reasons. As we saw above, we now only get an inverse scope reading if *some cat* is interpreted low. The idea could now be that inverse scope is more complex, not

because of anything to do with QR, but because it involves the (by stipulation) costly step of reconstructing the subject.

(18) [$_{TP}$ Some cat [$_{TP}$ ever piece of furniture [$_{vP}$ some cat [$_{VP}$ ruined ~~every piece of furniture~~]]]]

In line with this idea, Scope Economy could be replaced by an economy principle on reconstructing subjects:

(19) *Reconstruction Economy*
Reconstruction must have a semantic effect.

Accordingly, the inverse scope reading of *Walter ruined every piece of furniture* is not absent because of a constraint on moving the object, but rather because (20b) involves reconstruction.

(20) a. Surface scope: [$_{TP}$ Walter [$_{vP}$ ~~Walter~~ [$_{VP}$ ruined every piece of furniture]]]
b. Inverse scope: [$_{TP}$ ~~Walter~~ [$_{TP}$ every piece of furniture [$_{vP}$ Walter [$_{VP}$ ruined ~~every piece of furniture~~]]]]

One might argue that this approach has further advantages, because the kind of problems we observed for QR hold for Reconstruction cases that do not involve QR. Fox (2000) claims that Scope Economy restricts Reconstruction for sentences like (21). That is: the antecedent sentence in (21) lacks an inverse scope readingr because Reconstruction would be semantically vacuous in the ellipsis sentence.

(21) Someone from New York is likely to win the lottery. John is, too.

Fox assumes that Reconstruction involves a downward movement operation (Quantifier Lowering, May, 1977). Given the Copy Theory of Movement, Reconstruction can be regarded as simply interpreting the lower copy of the subject, as in (22).

(22) [$_{TP}$ ~~Someone from New York~~ [$_{TP}$ likely [$_{vP}$ someone from New York [$_{TP}$ to win the lottery]]]]

Therefore, as in the QR case, no extra movement step is needed to obtain the inverse scope reading, which leads to the same issues: Reconstruction cannot be constrained by principles like Scope Economy.

Unlike in the QR case, there is no straightforward way to solve this problem. Modern accounts of Reconstruction that assume additional machinery on top of the Copy Theory of Movement give rise to the same issue (e.g. accounts that argue that reconstructed readings can be obtained through a semantic rather than a syntactic mechanism (Chierchia, 1995; Cresti, 1995; Rullmann, 1995; Ruys, 2015) and acounts in which EPP is a requirement that holds at the level of PF rather than at the level of syntax (Merchant, 2001; Sauerland & Elbourne, 2002; van Craenenbroeck & den Dikken, 2006)).

Unless we adopt a constraint like *Reconstruction Economy*, above, if we hold on to obligatory QR for objects, the only way we have to constrain Reconstruction is through Quantifier Lowering, i.e. letting go of the Copy Theory of Movement and assuming a downward movement operation that leaves traces instead. However, this goes against the spirit of Minimalism. For starters, it requires the existence of traces, which is undesirable because it involves adding elements other than the lexical items to the syntax and thereby making *move* a more complex operation than *merge*. In addition, downward movement

involves building up a structure and then taking it apart again to insert an element. This is not considered Minimalist and it violates the No Tampering Condition, which prohibits tampering with an already constructed derivation (Chomsky, 2008).

Given all this, it may seem as if we have been barking up the wrong tree in previous sections. We *can* assume a theory where QR is responsible for both scope shifts and resolving the object quantifier type clash, as long as we recognize that constraints on scope are constraints on reconstruction and not on QR. For instance, the difference between (23a), which has an inverse scope reading and (23b), which doesn't has to be explained in terms of *every party* being an intervener for reconstructing *no boy*, but not for reconstructing *some boy*.

(23) a. Some boy attended every party.
b. No boy attended every party.

Such a theory may or may not be possible. Importantly, however, constraining scope by constraining reconstruction will not work for all cases where scope options are limited.

Consider the data in (16)-(17), repeated from the previous section.

(16) Some shop attendant is likely to bother every customer.
likely > *some* > *every*

(17) Exactly two shop attendants are likely to bother every customer.
likely > *exactly 2* > *every*

This construction not only shows that an *in situ* interpretation of the object quantifier must be a possibility, as argued above, it also demonstrates that the availability of the *in situ* interpretation is independent of Reconstruction. Regardless of whether we choose to reconstruct *some shop attendant* or *exactly two shop attendants* to a position below *likely*, a reading with narrow scope for the object quantifier remains available. In fact, this reading is the most salient reading of these sentences.

What this shows is that even when we know that the subject is interpreted in its vP-internal position, the reading that would result from quantifier raising the object to a position above the subject does not become any more prominent. Thus, even if constraining Reconstruction is needed on independent grounds, we also need to restrict QR.

5 Constraining deletion

In the discussion above we have consistently assumed that constraints on scope have to involve constraints on movement. What if instead we assume that scope constraints can involve the choice what of what to interpret and delete?

Let us see how this could work. In general, the system derives the following configuration.

(24) $[_{TP}$ Subject $[_{TP}$ Object $[_{vP}$ Subject $[_{VP}$ Verb Object]]]]

The only difference between surface scope and inverse scope is that in the former the higher and in the latter the lower copy of the subject is interpreted. We see no independent reasons for why one of these options should be more complex than the other, except that in the inverse scope configuration the subject would be deleted high at LF and low at PF, as in (26), while LF and PF are (more) aligned for the surface scope readings, as in (25):

(25) Surface Scope
   a. LF: [TP Subject [TP Object [vP ~~Subject~~ [VP Verb ~~Object~~]]]]
   b. PF: [TP Subject [TP ~~Object~~ [vP ~~Subject~~ [VP Verb Object]]]]

(26) Inverse Scope
   a. LF: [$_{TP}$ ~~Subject~~ [$_{TP}$ Object [$_{vP}$ Subject [$_{VP}$ Verb ~~Object~~]]]]
   b. PF: [$_{TP}$ Subject [$_{TP}$ ~~Object~~ [$_{vP}$ ~~Subject~~ [$_{VP}$ Verb Object]]]]

Given this, we could propose a preferential ordering grammar is subject to:

(27) **PF/LF alignment**: grammar favours deletion and interpretation choices at LF that align with pronunciation choices made at PF.

We see at least two immediate problems with such an approach. The first is that it is unclear what the status of (27) is. Where in our model of language do we find (27)? This question becomes all the more urgent, since, standardly, LF and PF are entirely separated levels of grammar. The second problem is that it stipulates an ordering of choices. There is no inherent notion of economy that makes (27) plausible. This is most visible if we try and restate Scope Economy in terms of PF/LF alignment. The principle in (28) is such an attempt:

(28) **Scope Economy**: when two copies of the same element are generated, LF and PF can each delete a different copy if and only if this procedure leads to different truth conditions than when LF and PF delete the same copy.

As we think is evident, the intuitions of 'economy' behind the original statement of Scope Economy are absent from (28). Of course, we could try and resolve both problems with (27), by proposing that LF and PF are much closer connection, for instance by claiming that LF precedes PF, as do Bobaljik and Wurmbrand (2012). Indeed, given such a dramatically different take on the relation between LF and PF, a principle as (28) could well become less ad hoc. (See Blok, 2019 for discussion). However, this would entail a drastic departure from our current generative model, where PF and LF are only connected through syntax. Adopting optional QR, on the other hand, is a simple solution that allows our model of the grammar to remain as it is.

6 Conclusion

This paper has argued that the *in situ* interpretation of object quantifiers must be a theoretical option, even in a theory that adopts a movement-based account of scope shifts. We have shown that without this option, a syntactic account of scope has means to constrain QR, thus considerably over-generating scope-shifted readings. Unless we wish to adopt a radically different view of the syntax-semantics interface where PF and LF have a direct connection, allowing *in situ* interpretations of object quantifiers is the only way to remedy this issue. Furthermore, we have shown that constraining Reconstruction does not solve the QR issue: constructions with reconstructed readings may still have a narrow scope reading for the object quantifier. In addition, in a framework where Reconstruction involves the interpretation of the lower copy of the subject and Quantifier Lowering violates the No Tampering Condition, it is not obvious how Reconstruction could be constrained in the first place. We leave a more in-depth discussion of whether we need to be able to constrain Reconstruction to Blok (2019) and to future research.

Competing interests (mandatory)

The author(s) has/have no competing interests to declare.

References

Anderson, C. (2004). *The structure and real-time comprehension of quantifier scope ambiguity*. PhD Thesis, Northwestern University.

Beghelli, F., & Stowell, T. (1997). Distributivity and negation: The syntax of *each* and *every*. In A. Szabolcsi (Ed.), *Ways of scope taking* (p. 71-107). Dordrecht: Kluwer.

Blok, D. (2019). *Scope Oddity: On the semantic and pragmatic interactions of modified numerals, negative indefinites, focus operators, and modals*. Doctoral dissertation, Utrecht University.

Bobaljik, J., & Wurmbrand, S. (2012). Word order and scope: Transparent interfaces and the 3/4 signature. *Linguistic Inquiry*, *43*(3), 371-421.

Catlin, J., & Micham, D. (1975). Semantic representations as procedures for verification. *Journal of Psycholinguistic Research*, *4*(3), 209-225.

Chierchia, G. (1995). Individual-level predicates as inherent generics. In G. Carlson & F. Pelletier (Eds.), *The generic book* (p. 176-223). Chicago: University of Chicago Press.

Chomsky, N. (1993). A minimalist program for linguistic theory. In K. Hale & S. Keyser (Eds.), *The view from building 20* (p. 1-52). Cambridge, MA: MIT Press.

Chomsky, N. (1995). Categories and transformations. In *The minimalist program* (pp. 219–394). Cambridge, MA: MIT Press.

Chomsky, N. (2008). On phases. In *Foundational issues in linguistic theory: Essays in honor of Jean-Roger Vergnaud.* Cambridge, MA: MIT Press.

van Craenenbroeck, J., & den Dikken, M. (2006). Ellipsis and EPP repair. *Linguistic Inquiry*, *37*, 653–664.

Cresti, D. (1995). Extraction and reconstruction. *Natural Language Semantics*, *3*, 79-122.

Fox, D. (2000). *Economy and semantic interpretation*. Cambridge, MA: MIT Press.

Gillen, K. (1991). *The comprehension of doubly quantified sentences.* PhD Thesis, Durham University.

Heim, I., & Kratzer, A. (1998). *Semantics in generative grammar*. Oxford: Blackwell.

Hendriks, H. (1993). *Studied flexibility: categories and types in syntax and semantics*. PhD Thesis, University of Amsterdam.

Hornstein, N. (1995). *The grammar of logical form: From GB to minimalism*. Cambridge, MA: Blackwell.

Johnson, K., & Tomioka, S. (1997). Lowering and mid-size clauses. In G. Katz, S. Kim, & H. Winhart (Eds.), *Reconstruction: Proceedings of the 1997 Tübingen workshop* (p. 185-206). Universität Stuttgart and Universität Tübingen.

Keenan, E. (2016). In situ interpretation without type mismatches. *Journal of Semantics*, *33*(1), 87-106. Retrieved from https://doi-org.proxy.library.uu.nl/10.1093/jos/ffu016

Koopman, H., & Sportiche, D. (1991). The position of subjects. *Lingua*, *85*, 221-258.

Kurtzman, H., & MacDonald, M. (1993). Resolution of quantifier scope ambiguities. *Cognition*, *48*, 243-279.

May, R. (1977). *The grammar of quantification*. PhD Thesis, Massachusetts Institute of Technology.

Mayr, C., & Spector, B. (2012). *Generalized scope economy – Not too strong!* Unpublished manuscript.

Merchant, J. (2001). *The syntax of silence: Sluicing, islands, and the theory of ellipsis*. Oxford: Oxford University Press.

Micham, D., Catlin, J., VanDerveer, N., & Loveland, K. (1980). Lexical and structural cues to quantifier scope relations. *Journal of Psycholinguistic Research, 9*(4), 367-377.

Rullmann, H. (1995). *Maximality in the semantics of wh-constructions*. Doctoral dissertation, University of Massachusetts, Amherst.

Ruys, E. (2015). A minimalist condition on semantic reconstruction. *Linguistic Inquiry*, *46*(3), 453 – 488.

Sauerland, U., & Elbourne, P. (2002). Total reconstruction, PF movement, and derivational order. *Linguistic Inquiry*, *33*(2), 283-319.

van Benthem, J. (1986). Categorial grammar. In *Essays in logical semantics* (Vol. Chapter 7, p. 123-51). Dordrecht: D. Reidel.

Tunstall, S. (1998). *The interpretation of quantifiers: semantics & processing*. PhD Thesis, UMass Amherst.