THE STRANDING OF NEGATION MARKERS

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Abstract: The inverse scope of the negation marker in a sentence such as *All the students have not read the book* has frequently been described in the literature, and various explanations have been offered for why the negation marker may (but need not) take scope over the more highly positioned QP. I will argue in this paper that the best explanation for this phenomenon is the *Neg Stranding Hypothesis*, according to which the subject of the sentence *All the students have not read the book* with the [¬ > ∀] reading is the negated QP *not all the students* and the negation marker has been stranded by the QP *all the students*.

Keywords: constituent negation, sentential negation, inverse scope, universal quantifier, stranding, Logical Form, reconstruction, partial deletion

1. Introduction

If one quantificational element has a higher position in a syntactic structure than another quantificational element, one normally expects the higher element to take semantic scope over the lower one, particularly if a c-command relationship is present. This is reflected in the way in which Logical Form is used, as laid out in May (1985, 1989). That is, a quantifier that takes scope over another one is moved to a higher position at Logical Form. In the following sentence, one would expect the quantifier *all*, due to its superior position, to take scope over the negation marker:

(1) All the students have not read the book.

In fact, a [∀ > ¬] reading is possible in this type of sentence, with the meaning that all the students have as yet failed to read the book. The subject of this paper is the fact that in example (1) a [¬ > ∀] or *inverse scope* reading is also quite natural in the Germanic languages, with the meaning of the sentences in (2):

(2) a. Not all the students have read the book.
b. The students have not all read the book.

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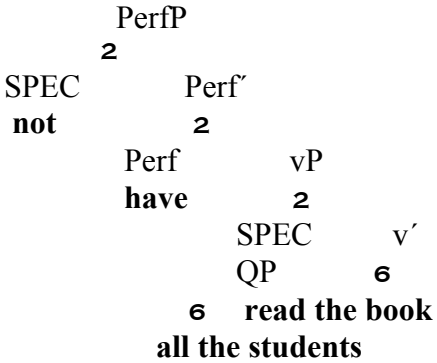
I will argue that (1) is ambiguous because it has two separate syntactic analyses and that the base-structure of its [¬ > ∀] reading is actually reflected in (2a). That is, in the case of the [¬ > ∀] reading of (1), the subject is the negated quantifier phrase [$_{QP}$ [not [$_{QP}$ all [$_{DP}$ the students]]] and the negation marker is stranded in QP by the QP *all the students*. I refer to this approach as the *Neg Stranding Hypothesis*, which I introduce and defend in section 2 below. Sections 3 through 5 are devoted to a presentation and rejection of other syntactic approaches to the [¬ > ∀] reading of (1), and section 6 contains a brief summary and final comments.

2. Neg Stranding

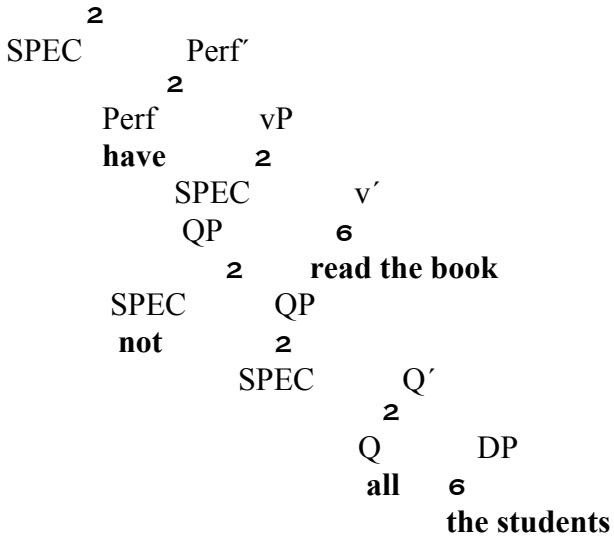
For the sake of clarity I will begin with the reading of (1) in which there is no inverse scope, that is, the reading in which scope reflects Surface Structure word order. Following Zeijlstra (2004) and Cirillo (2009), I assume that the [∀ > ¬] reading of (1) is a classic instance of sentential negation and is derived from the following base-structure:

(3)



The auxiliary verb *have* will move to I/AgrS/T and the subject QP *all the students* will move to SPEC of IP/AgrSP/TP. Regarding the [¬ > ∀] or inverse scope reading of (1), I propose that it stems from the fact that no sentential negation is involved and that the negation marker and the subject QP form a constituent, a negated QP, at some point in the derivation. The base-structure will look like (3) except that the negation marker, instead of originating in [SPEC, PerfP], will be base-generated in [SPEC, QP]:

(4) PerfP



Under this approach, the upper QP node can move to [SPEC, AgrSP], producing (2a), or the lower QP node can move to [SPEC, AgrSP], stranding the negation marker and producing the word order in (1) but the meaning of (2a and 2b). It is also possible, following the standard stranding analysis of floating quantifiers as presented in Sportiche (1988), Giusti (1990), Shlonsky (1991) and Cirillo (2009), for the DP *the students* to move out of QP and strand both the negation marker and the universal quantifier in QP, producing (2b).

After the negation marker has been stranded, the question arises as to how the pre-stranding scopal relations are preserved, since the quantifier has moved above negation and could conceivably produce a [∀ > ¬] reading. Note that this would be equivalent to the sentential negation reading produced by a true sentential negation structure like the one in (3), in which the negation marker originates in the SPEC position of the verbal phrase that it is negating. It is actually not difficult to explain the lack of a sentential negation reading in (4) after Neg Stranding. After all, in the derivation of the [¬ > ∀] reading of (1), as can be seen in (4), the stranded negation marker does not c-command PerfP at any point in the derivation and should not be able to take scope over it. Negation only c-commands the trace of the moved QP.[1]

From a technical standpoint, the Neg Stranding model works, producing the desired output. It also captures a significant generalization by deriving three sentences with the same words and meaning, namely (1) with the [¬ > ∀] reading,

[1] One could perhaps still ask why the derivation in (4) with Neg Stranding does not produce a [∀ > ¬] reading, since the quantifier has moved above negation and could be said to dominate it. This will not be discussed here because of space restrictions. The interested reader is referred to Cirillo (2009: 104-114).

(2a) and (2b), from a common base-structure. Furthermore, there is independent support for a stranding approach, given the evidence that can be found for preposition and quantifier stranding. The question is whether there is any *compelling* evidence for Neg Stranding. Compelling evidence would be any instance in which a negation marker is not a sentential negation marker and is separated from the constituent that it negates. I will now present such evidence, beginning with German sentences in which sentential and constituent negation co-occur.

Imagine a situation in which a student was expected to read a series of books. Teacher A asks in (5a) which books the student has not read. Teacher B, rather disappointed in the student, responds in (5b), with emphasis on the word *all*, that the student has not read any of the books. Teacher C, who happens to know that the student has read one of the books, contradicts Teacher B by saying that it is not true for all the books that the student has not done the required reading.

(5) a. Welche Bücher hat er nicht gelesen?
which books has he not read
b. All die Bücher hat er nicht gelesen!
all the books has he not read
c. Nicht all die Bücher hat er nicht gelesen!
not all the books has he not read

It is possible, if not terribly elegant, to strand the constituent negation marker in (5c) and retain the same meaning:

(6) All die Bücher hat er nicht nicht gelesen!
all the books has he not not read

It could not be the case that both the negation markers in (6) are sentential. If they were, in a Germanic language they would cancel each other out and the meaning of the sentence would be that the student had read all the books. The first negation marker can only be a stranded constituent negation marker. It negates the topicalized object DP *all die Bücher*. Let's now look at some other examples in which there is co-occurrence of sentential and constituent negation markers, since this type of example is perhaps the best evidence in favor of Neg Stranding. Observe the following three sentences in Dutch, German and English, respectively:

(7) a. Al de studenten zijn niet niet gekomen.
all the students are not not come
b. All die Studenten sind nicht nicht gekommen.

all the students are not not come
c. All the students have not not come.

All these sentences are ambiguous for a reading in which the negation markers are both sentential and cancel each other out, with the meaning that all the students have come, and a reading in which the first negation marker takes scope over the subject QP, with the meaning that not all the students have not come. This is strong evidence in support of Neg Stranding.

Another example of compelling evidence for Neg Stranding can be found in contrastive *not...but* constructions, which involve constituent negation:

(8) He fed not the dog but the cat.

The negation marker cannot be a sentential negation marker here, for three reasons. It is not in the position of sentential negation, there is no do-support, and *not...but* constructions are used only in the case of contrastive constituent negation. Let's now take the same sentence in German:

(9) Er hat nicht den Hund gefüttert, sondern die Katze.
he has not the dog fed but the cat

Now let's take this sentence and pre-pose the negated constituent:

(10) Nicht den Hund hat er gefüttert, sondern die Katze.
not the dog has he fed but the cat

This is clearly a case of constituent negation, since the negation marker has been pre-posed along with the rest of the constituent. And, example (10) can undergo Neg Stranding, as shown in (11), in which the negation marker remains a constituent negation marker that has scope over the pre-posed object:

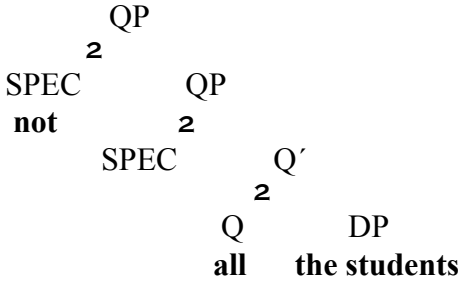
(11) Den Hund hat er nicht gefüttert, sondern die Katze.
the dog has he not fed but the cat

Inverse scope without sentential negation can only mean one thing: the stranding of a constituent negation marker.

As mentioned above, additional support for the Neg Stranding Hypothesis comes from its ability to capture a significant generalization. Consider the following three sentences, which contain exactly the same words and mean exactly the same thing:

(12) a. Not all the students have read the book.
b. The students have not all read the book.
c. All the students have not read the book. (I.e., the [¬ > ∀] reading.)

The first two of these sentences cannot be produced without the following structure:

(13)


Example (12a) could not be produced without (13) because we would otherwise not get the negation marker into sentence-initial position. Example (12b) could also not be produced without the constituent negation marker in (13) because a sentential negation marker would be in the wrong place. This becomes evident if a sentential negation marker is inserted into (12b):

(14) The students have not all not read the book.

If (12a) and (12b) are derived from the structure in (13), a major generalization would be missed if (12c) were not also derived from the same structure. The Neg Stranding Hypothesis captures this generalization. For further discussion of evidence in support of Neg Stranding the reader is referred to Cirillo (2009).[2]

The conclusion that I draw in this section is that Neg Stranding is an indispensable part of a theory of syntax, and since we "get it for free", so to speak, it should at least be considered as a possible explanation for the inverse scope observed in (1). Of course, the fact that it is the most inexpensive explanation does not mean that it is the correct one. In Sections 3-5 we will therefore examine some alternative approaches.[3]

3. Covert movement of negation

[2] Cirillo (2009: 104-108, 115-118 and 149-150).
[3] I first developed the Neg Stranding Hypothesis in 2005. Three years later I heard about an article by Höhle, written in 1991, in which it is suggested that inverse scope can arise when a negation marker c-commands the trace of a moved quantifier. This is not exactly the same as Neg Stranding, but the similarity between Höhle's approach and mine is striking and has to be mentioned. Christopher Columbus had never heard of Leif Ericson, but Ericson found America first.

Whenever there is ambiguity such as that observed in (1), the first thing that comes to mind is that the explanation might be found in covert movement or Logical Form. Under this type of approach, the negation marker in (1) would be covertly moved from its position as sentential negation marker to sentence-initial position, probably [SPEC, QP], which would produce the LF illustrated in (2). The question that immediately arises here is whether we want to allow the covert movement of negation. Consider the following examples from Italian:

(15) a. Tutti gli studenti non l'hanno letto. [∀ > ¬]
all the students not it have read

b. Non tutti gli studenti l'hanno letto. [¬ > ∀]
not all the students it have read

Most Italian speakers find (15a) to be an unnatural sounding sentence, but it is not generally rejected as ungrammatical. Some speakers report that they can get a [¬ > ∀] reading in (15a), but for most speakers only the [∀ > ¬] (Surface Structure) reading is available. Romanian and Portuguese speakers seem to universally reject the sentence. There will be more on Romanian and Portuguese in Section 7. The point that I want to make here is that the [¬ > ∀] reading is either difficult or impossible in the Romance languages. If the covert movement of negation were an option, it would be possible to move the negation marker in (15a) to sentence-initial position, thereby producing the LF represented in (15b) and the corresponding reading. Since the [¬ > ∀] reading is difficult or impossible in the Romance languages, covert movement of negation does not seem to be an option.[4]

Consider now the following German sentence from Höhle (1991):

(16) Alle Politiker hat so mancher nicht verstanden.
all politicians has many a person not understood
'Many people did not understand all the politicians.'

In this sentence the direct object *Alle Politiker* (*all politicians*) has been topicalized. The word *Alle* (*all*) has rising intonation and *nicht* (*not*) has falling intonation and primary stress. The meaning of the sentence is that there are

[4] Space restrictions do not permit a discussion of why the Romance languages tend not to allow inverse scope in sentences like (15a). It has to do with the idea, following Zeijlstra (2004) and Cirillo (2009), that negation markers in the Romance languages are highly positioned syntactic heads, dominating all verbal phrases, while in the Germanic languages they are maximal projections that can occupy the SPEC position of both verbal and nominal phrases. For a detailed discussion see Cirillo (2009: 128-147).

several people who did not understand all the politicians. Scopal relations are thus [∃ > ¬ > ∀]. The question is whether the [¬ > ∀] reading could have been obtained by moving negation at LF. Höhle argues against this option by pointing out that moving the negation marker to the position in front of the universal quantifier does more than just create a [¬ > ∀] reading. It changes a [∃ > ¬ > ∀] reading to a [¬ > ∀ > ∃] reading. Thus, the covert movement of negation does much more than it is supposed to do, and is probably not the right solution. Höhle is suggesting that scope, at least in the case of negation, is determined hierarchically and not via covert movement. The claim that scope is determined hierarchically is consistent with what is presented in Kayne (1998).

Because of the evidence presented in (15) and (16), it is hereby concluded that covert movement of negation is not an option in resolving the ambiguity of (1).

4. Reconstruction

If the covert movement of negation is not available for arriving at the [¬ > ∀] reading in (1), one should perhaps consider another form of covert movement, namely, reconstruction. Following the copy theory of movement in Chomsky (1995), reconstruction is simply the interpretation of a lower copy. The base-structure copy of *all the students* in (1) is presumed to be inside vP and below the negation marker. Interpretation of this lower copy would thus produce the [¬ > ∀] reading. Note that this would be an instance of reconstruction under A-movement. There is widespread agreement in the literature on the need for reconstruction under A-bar movement, but reconstruction under A-movement is controversial. Some, such as Lasnik (1998), have argued that it does not occur at all. The vast majority of the references to reconstruction under A-movement in the literature are made in connection with anaphora that precede their binding antecedents in the Surface Structure. The following is a quote from Barss (2001: 686):

> In general, we will observe reconstruction effects under A-movement only in cases where there is an argument NP (the potential antecedent) which c-commands the deep position but not the surface position of the raised NP which contains an anaphor.

Due to space constraints, I will not dispute in this paper the need for reconstruction under A-movement in the case of anaphora, however I will mention that in Cirillo (2009: 109-111), while discussing Belletti and Rizzi (1988), I attempt to cast some doubt on the ability of reconstruction to resolve all the problems related to anaphora. Here I want to concentrate on the usefulness of

reconstruction in resolving ambiguity. I begin with the following sentence, from Fox (1999):

(17) [Someone from New York]$_1$ is very likely t_1 to win the lottery.

According to Fox's analysis, if no reconstruction takes place in this sentence, the quantifier *someone* takes scope over the raising verb *to be likely* and the meaning is that a specific person in New York who has presumably bought a lot of lottery tickets is probably going to win the lottery. If reconstruction does take place, the raising verb *to be likely* takes scope over *someone* and the meaning is that it is probable that a non-specific person from New York will win the lottery, perhaps because more lottery tickets were sold in New York than in any other city. The question is whether this analysis could be used to explain the type of ambiguity observed in (1). There are a number of reasons why I question the appropriateness of applying Fox's analysis of (17) to a sentence such as (1). I will ignore the fact that nearly all of Fox's examples involve raising verbs and that none of them involve negation or the quantifier *all*, which already casts doubt on the applicability of Fox's analysis to (1). There are other reasons for not adopting Fox's analysis for sentences like (1). First of all, under an approach like Fox's, reconstruction is basically an optional LF operation that undoes the effects of raising. But raising is also optional at the Surface Structure. Both of the following sentences are possible:

(18) a. Someone from New York is very likely to win the lottery.
b. It is very likely that someone from New York will win the lottery.

If an operation is not obligatory, it does not seem very economical to optionally raise an element at the Surface Structure and then optionally lower it again at LF. This is one problem with Fox's analysis. An even bigger problem is the fact that quantifier lowering or reconstruction in (17) does not disambiguate at the Surface Structure. The two sentences in (18), which are based on (17) with and without raising, are both ambiguous. If reconstruction does not disambiguate at the Surface Structure it is not clear how it would be any more effective at LF. This should cast considerable doubt on whether reconstruction at LF is really the way to disambiguate a sentence, whether it be one of the sentences in (18) or example (1). The cause of the ambiguity of the sentences in (18) has nothing to do with syntactic structure but with the specificity or non-specificity of the quantifier *someone*.

Moving away from Fox's analysis, I would like to present some additional evidence that A-movement reconstruction is of questionable use in matters of ambiguity. Consider the following ambiguous sentence:

(19) Everybody loves someone.

Under the reading in which *everybody* takes scope over *someone*, quantifier raising is unnecessary, since *everybody* outscopes *someone* by virtue of its higher position. If the quantifier *everybody* is raised at LF even though raising is unnecessary, reconstruction is also unnecessary and is therefore irrelevant with or without quantifier raising. Consider the reading of (19) in which *someone* takes scope over *everybody*. In order to get this reading, *someone* has to undergo quantifier raising at LF. Reconstruction in this instance would undo the effect of quantifier raising and produce an undesired reading. In other words, regardless of how one interprets (19), reconstruction is inappropriate and not a suitable way to resolve ambiguity.

The following example from Sportiche (2005: 34) illustrates that there are situations in which reconstruction creates ambiguity rather than resolving it:

(20) Everyone seems not to be listening.

This sentence has only a [∀ > ¬] reading. A reconstructed version of this sentence, without raising, is ambiguous for a [¬ > ∀] and a [∀ > ¬] reading:

(21) It seems that everyone is not listening.

One last problem that I must point out with A-movement reconstruction is that it is not permitted in the Romance languages when negation is involved. The following Italian sentence, comparable to (15a), allows only a [∀ > ¬] reading for most speakers:

(22) Tutti gli studenti non hanno letto il libro.
all the students not have read the book

I assume that the base-position of the subject QP *tutti gli studenti* is in [SPEC, vP], below negation. If reconstruction (interpretation of the lower copy of the subject QP) were possible in this sentence, a [¬ > ∀] would be possible, but such a reading is unavailable or difficult in the Romance languages.

To summarize this section, A-movement reconstruction is not a convincing means of disambiguating. It poses economy issues, it sometimes fails to resolve ambiguity, it sometimes creates ambiguity, and it is sometimes not permitted at all. It is no surprise that it is not universally accepted.

5. Partial Deletion à la Nuñes

Another potential explanation for the ambiguity in (1) is partial deletion in the manner of Nuñes (2004). Nuñes' approach is based on the copy theory of movement. Theoretically, in a sentence like (1) optional partial deletion could have taken place as follows:

(23) [$_{IP}$[$_{QP}$ ~~Not~~ all the students] [$_{PerfP}$ have [$_{vP}$ [$_{QP}$ not ~~all the students~~] read the book]]]

Nuñes argues that this type of deletion (called *chain reduction*) is needed for two reasons. First of all, normally only one copy in a chain can be pronounced. Secondly, in keeping with the Linearization Correspondence Axiom (LCA) in Kayne (1994), copies are non-distinct. Consequently, if there is more than one copy of an item, it is unclear which copy should be linearized with the other elements in a clause. Without deletion, linearization cannot take place and the derivation will crash.

Nuñes points out that partial deletion needs to be constrained in order to prevent it from generating absurd sentences. Consider the following sentence from Nuñes (2004):

(24) The tall man appears to have been kissed.

In the derivation of (24) there are three copies of the subject forming a chain:

(25) [The tall man] appears [the tall man] to have been kissed [the tall man].

In order to derive the desired version of this sentence, two deletion operations are needed, as follows:

(26) [The tall man] appears [~~the tall man~~] to have been kissed [~~the tall man~~].

Using partial deletion, one could easily generate the following absurd sentence:

(27) *The appears tall to have been kissed man.

This sentence would be derived by deleting as follows:
(28) [The ~~tall man~~] appears [~~the~~ tall ~~man~~] to have been kissed [~~the tall~~ man].

Nuñes refers to this as "scattered deletion". He blocks this type of output by appealing to principles of Economy. In the correct version of this sentence, as I

just mentioned, there are only two deletion operations. In this nonsensical product of scattered deletion, there are at least four deletion operations. Thus, only the correct version will be generated by the system because Economy will block other outputs.

The problem is that a partial deletion approach is unable to generate the [¬ > ∀] reading of a sentence like (1). Remember that in the base structure of this sentence the subject is the negated QP *not all the students*. If we do not strand the negation marker, we have just one deletion operation in the derivation, as follows:

(29) [Not all the students] have [~~not all the students~~] read the book.

If we want to produce (1) with a [¬ > ∀] reading, not one but two deletion operations are needed, as follows:

(30) [~~Not~~ all the students] have [not ~~all the students~~] read the book.

Nuñes' prediction is therefore that this version of the sentence will never be generated because it involves more deletion operations than (29). This false prediction of the partial deletion approach affects not only Neg Stranding. It affects all kinds of stranding, including quantifier stranding and even preposition stranding. For this reason, Nuñes' partial deletion approach is not a viable alternative to Neg Stranding (or any other type of stranding analysis.)

6. Conclusions

I believe that I have provided strong evidence that the stranding of negation markers occurs in natural language. I have also proposed that since a syntactic theory needs to include the stranding of negation markers anyway, the Neg Stranding Hypothesis might be a good way to account for the inverse scope of negation in sentences like (1). In any case, Neg Stranding seems to be less problematic than other syntactic approaches such as movement of negation at LF, reconstruction, or partial deletion. It may come as a surprise that I would like to end this article by making a proposal for future research that would investigate a semantic explanation for the inverse scope of negation. In Section 3 I pointed out that the Italian sentence in (15a), which is comparable to the English sentence in (1), is judged to be unnatural by most Italian speakers and ungrammatical by virtually all Portuguese and Romanian speakers. The question is why this is so.

I would like to suggest that there is a hierarchy of quantification and that negation is the strongest form of quantification, outranking even universal quantifiers. If a universal quantifier precedes negation, the natural reaction is that

the quantifier, by virtue of its higher position, should be taking scope over negation, but this produces an unnatural feeling because scope, as reflected in word order, is incompatible with the relative quantificational strength of the quantifiers involved. The suggestion is that a universal quantifier should simply not take scope over negation, the stronger quantifier. This could very well be why speakers of Romance languages do not like sentences in which a universal quantifier precedes negation and thus appears to take scope over it. Even in the Germanic languages, many speakers report that the most natural interpretation of sentences like (1) with neutral intonation is the one in which negation takes scope over the universal quantifier, contra word order. All this points to the idea of a hierarchy of quantification. Büring (1997) does not discuss a hierarchy specifically, but he does point out that there are situations in which it is unnatural for negation to be out-scoped by another quantifier, regardless of word order. In Zeijlstra (2004) mention is made of a constraint that seems to exist against moving a universal quantifier above negation at LF. All this does seem to point to a kind of quantificational hierarchy. Gualmini and Moscati (2009) show interesting evidence that in Italian child language negation can have inverse scope over modal verbs that is not allowed in adult speech, again pointing to the strength of negation with regard to other forms of scope-taking elements. Additional support for the idea of a quantificational hierarchy can be found in the following sentences:

(31) a. Everybody loves someone. [∀ > ∃] or [∃ > ∀]
b. Someone loves everyone. [∀ > ∃] or [∃ > ∀]

Both of these sentences allow two readings. That the [∀ > ∃] reading would be more natural than the [∃ > ∀] reading in (31a) is perfectly understandable, given the word order of the sentence. However, the [∀ > ∃] interpretation is more natural than the [∃ > ∀] interpretation in (31b) as well, in spite of the [∃ > ∀] order. This could also have to do with the relative strength of ∀ with respect to ∃. Thus, in spite of the success of the Neg Stranding Hypothesis in explaining inverse scope in purely syntactic terms, I believe that it would be worthwhile to investigate whether there is a syntax-semantics interface that dictates that when two quantifiers co-occur, regardless of syntactic structure, the stronger form of quantification, negation, will take precedence. Such an investigation would ideally involve a large number of different language families.

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