

1974
NELSON CONDITIONING THE RULE OF SUBJ.-AUX. INVERSIONMark Liberman
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In (1) I list a set of sentences gathered together for the purpose of suggesting a generalization. Sentences comparable to these were given in Klima's 1959 article on negation, as was the generalization they suggest.

- (1)a John would be happy with no job.
 b With no job would John be happy.
 c With no job, John would be happy.
 d John would be happy with some jobs.
 e With some jobs, John would be happy.
 f ?With some jobs would John be happy.

Sentence (1)a is ambiguous, meaning (roughly) either 1/ that John would be happy if he were unemployed, or 2/ that there is no job such that John would be happy with it. Whatever semantics we adopt for PP's such as we find in the sentences of (1), this ambiguity will be represented as a difference in the scope of negation. If we make (for convenience's sake) the undoubtedly false assumption that the appropriate semantics is a translation into conditional form, then the ambiguity will be represented in the following way:

Reading 1/ If there was no job that John had, he would be happy.

Reading 2/ There is no job such that if John had it, he would be happy.

That is, in reading 1/ the negation is inside the antecedent clause of the conditional, while in reading 2/ the negation is outside the conditional as a whole.

Now, to translate the with-phrases of (1) as conditional antecedents is wrong, for various reasons, but it's not my task here to investigate such phrases. The point is this: whatever semantics we adopt for (1)a, in reading 1/ the negative element will take scope inside the semantic representation of the PP, while in reading 2/ the negative element will take scope over the semantic representation of the whole sentence. Therefore, it is appropriate to call reading 1/ the narrow scope reading, and reading 2/ the wide scope reading.

When the PP appears presententially, two forms are possible, as given in (1)b and (1)c. For the form in which Subj.-Aux. Inversion (SAI, from now on) occurs, only the wide scope reading is possible. For the form in which SAI does not occur, only the narrow scope reading is possible.

If, as in (1)d-f, the PP does not contain a negative element, then any readings which are possible when the PP follows the verb are also possible when it is presentential. In the presentential case SAI cannot occur, except perhaps as an archaism.

The generalization (for cases like these) is obvious enough: a negative element in a presentential constituent has scope over the sentence it precedes just in case SAI applies to that sentence; SAI applies to a declarative sentence just in case there is a presentential negation which has scope over that sentence.

Two caveats: we'll expand this generalization later to include other operators besides negation; and to be quite accurate, I shouldn't equivocate

between the term sentence as it applies to syntactic entities and as it applies to the corresponding entities in semantic representation. The generalization given above can easily be amended to meet these objections, but it is clearer as it stands, and essentially correct.

In order to make the point more pointed, I've chosen a case in which an ambiguity is resolved; however, nothing important hangs on there being such resolution of ambiguity--exactly the same point could be made by considering sentences such as those in (2).

- (2)a Never have I seen a crocus bloom in January.
 b *Never I have seen a crocus bloom in January.
 c Often I have seen a crocus bloom in January.
 d ?Often have I seen a crocus bloom in January.
 e In no way did I intend to offend you.
 f *In no way I intended to offend you.
 g In no time John was out the door.
 h *In no time was John out the door.

Now, what's the problem? We have a set of refreshingly clear judgments, which are accurately described by a simple generalization. The problem is, how do we build this simple generalization into our grammar?

If we allow free use of global conditions on rules, then there is really no problem at all--we simply install the generalization in our grammar, and turn to another problem. Recall what the generalization is--wide scope iff SAI, SAI iff wide scope. Given global grammar, the question of where and how to install this generalization would depend on the rest of the analysis--we might have a rule of SAI, or we might have McCawley-type subject-formation rules, according to which the base form is Aux.-initial; we might establish the scope of negation interpretively, or we might begin with deep structures in which scope is directly represented; but whatever we do, some version of the generalization given above can easily be set up in the form of a global interrelationship of the appropriate rules or their outputs.

In the rest of this paper I'm going to assume that any such solution is ruled out, for the reason that universal grammar contains no provision for globality; instead, I'm going to search for some other solution. This is not the place to argue the issue of globality in linguistic description, but a word or two of explanation is in order. My rejection of unrestricted globality has the goal of restricting the expressive power of the formal devices allowed by linguistic theory--such restriction has been justified at length, primarily on epistemological grounds, by Noam Chomsky and others. I won't repeat the arguments here.

Those who are unfavorably disposed towards globality will applaud my attempt to give a principled and interesting account, within a more restricted set of assumptions, of a phenomenon which seems, prima facie, to require global description. Those of the opposite persuasion will have to relate to what follows as an exercise in the suspension of disbelief, in the hope, perhaps, of getting some good out of the translation of my examples and arguments into whatever system they prefer.

I'll also assume, without further discussion, that the correct analysis of the portion of English which concerns us involves a rule of SAI, and that the scope of negation (as well as other operators) is to be established by rules

of semantic interpretation on surface structure. The content of the rest of this paper will, I believe, provide some empirical support for these assumptions.

Under these assumptions, there are two areas in which a solution to the problem of grammatically representing the generalization about scope and SAI might be found--1/ constraints on the rule of SAI, and 2/ constraints on the rule of scope of negation interpretation (henceforth SNI). There are three types of factors which might be involved in stating such constraints --1/ the nature of the presentential constituent, 2/ the nature of the sentence it precedes, and 3/ the nature of the structure in which they are combined.

Klima's solution to the problem involved the first kind of constraint listed above (that is, a constraint on the syntactic rule of SAI), and a constraining factor of the first kind (that is, having to do with the internal nature of the presentential element). He proposed that the presentential element should be marked with a feature [+ affective], and that the SD of SAI should mention the feature [+ affective]. Now, this is not as ad hoc as it looks in the form in which I've just presented it, because Klima argues that there is a cluster of properties which are associated with the feature [+ affective], and that a number of different sorts of elements show precisely this clustering of properties. So, right or wrong, this was a real attempt at explanation, not just an ad hoc device.

However, it won't do.

There are two reasons to reject it. First, it runs afoul of the so-called thesis of the autonomy of syntax. There are several versions of this thesis, but as we'll see, any version which was compatible with Klima's analysis would be quite empty. The feature [+ affective] is called by Klima a "grammatico-semantic feature," indicating precisely how it straddles the syntax-semantics fence. In the domain we are considering, [+ affective] must be translated as "containing, in semantic representation, a negative which takes wide scope." We observe that certain lexical items are inherently [+ affective] (e.g. seldom, never, only, doubt, etc.) while others are inherently [- affective] (e.g. often, always, even, hope, etc.). Of course, as Klima observes, the distinction depends precisely on whether the lexical item in question contains a negation, semantically--so allowing a syntactic rule to make reference to this feature amounts to allowing syntactic rules to be conditioned by semantic features of lexical entries. This runs counter to the version of the autonomy thesis which says that syntax not only constitutes a separable system of rules, but also has its own set of primitive notions and can be stated without using any of the primitive notions of semantics.

But there is a worse problem. The [+ affective] triggers for SAI need not be individual lexical items, but may have internal syntactic structure, as in (1)b, (2)e, etc. However, it won't do to say that the appropriate term of the SD of SAI merely need contain a [+ affective] element, since we have the parallel cases (1)c, (2)g, etc. in which a syntactically parallel neg. does not trigger SAI.

In other words, as things stand our rule of SAI must look not only at semantic features of lexical items, but also at semantic features which are compositionally derived. We are not merely looking up definitions in the lexicon, we are also looking at the result of semantic interpretation of larger units, and our commitment to nonglobal grammar collapses along with the autonomy thesis.

I want to spend a little more time on this point, since there are some moves one might make in attempting to evade at least some of the difficulties I've just mentioned, while maintaining the basic idea of Klima's analysis. These moves are of two types--first, one might try to modify the application of the notion [+ affective], and second, one might appeal to possible differences in the syntactic relationship of the presentential element to what follows it.

To show that no such move can succeed would take more space than I can reasonably devote to the issue here, but I'd like to knock out a couple of the obvious candidates before proceeding to the more interesting part of this paper.

An example of a move of the first type would be to suggest that there are some occurrences of neg. which are not [+ affective], and that such neg.'s can neither take wide scope nor trigger SAI--on this analysis, [+ affective] would be a truly syntactic feature, although of a somewhat peculiar sort. Without going into detail, it's clear from examples like (3) that a given occurrence of neg. can be [+ affective] in one environment (in that it triggers any, which for Klima is a suppletive form of some appearing under the influence of [+ affective]) while still retaining both options with respect to triggering SAI and taking scope over the broader environment.

- (3)a With no promises from any candidate will I be satisfied.
 b With no promises from any candidate, I will be satisfied.

An example of a move of the second type may be found in Edwin Williams' thesis, where he argues that presentential elements of the type we have been considering may be located either in the Comp position, i.e. between \bar{S} and S , or in some position outside of \bar{S} , and that in the first case both wide scope of negation and SAI would be obligatory, while in the second case both would be impossible.

This suggestion improves matters somewhat, since it provides a conceivable basis for distinguishing between the cases in which SAI applies and the cases in which it doesn't without looking at the results of semantic interpretation. We simply ask, is the [+ affective] element in the Comp? The answer will constrain both SAI and SWI. Whether or not this proposal can be made to work (and I will argue that it cannot), it requires us to look at the semantic content of lexical entries in order to determine whether SAI applies (i.e. seldom is a trigger, but not often). But again, it's not enough that there exists a [+ affective] element somewhere in the Comp position--that element has to be in a position from which it has a chance of taking wide scope.

Thus we cannot get

- (4) *Even with no job would John be happy.

We can't get it precisely because it's characteristic of operators like even that they don't allow negatives syntactically under them to take scope outside them.

- (5)a John would be happy even with no job.
 b John would even be satisfied with no job (*much less happy).
 c With no job would John even be satisfied (much less happy).

It's interesting to note that this property of even must be defined on surface structures. Thus in (5)a, the version of (4) where the PP occurs postverbally:

Negation is still syntactically in the constituent which even modifies, and thus cannot "escape" to take wide scope--i.e. (5)a cannot mean "there is no job such that John would be happy even with it." In (5)b the same is true: negation is in the VP, even modifies the VP, and therefore inside scope negation is required; (5)b cannot mean "there is no job that John would be satisfied with." But in (5)c, where the PP containing the negation is presentential, although it is still interpreted as the complement of the subject satisfied, it is surface structurally outside the constituent modified by even, and therefore the negation may take wide scope.

Although even has this property of blocking certain options that surface interpretive rules would otherwise have, it in general does not interfere with bona fide syntactic operations:

- (6) a John has had many interesting experiences--once he even was kissed by Marilyn Monroe.
 b John even seems to have hired a band.

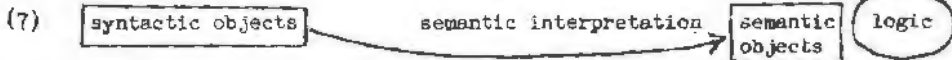
One can argue about how to analyze these particular cases (where do the evens come from, and where are they at the point that Passive and Raising apply?), but the point is that we can't find any cases which under any analysis provide any evidence that syntactic rules care about whether even is there. So, we're back to a global treatment, since the fact that SAI is impossible for (4) must, it seems, be related to the fact that even puts certain constraints on the results of SNI.

Enough of the negative side. What can be suggested, consistent with the autonomy thesis and with non-globality, that will account for the facts of (1) and (2)?

We can establish three conditions on any solution: 1/ there must be a constraint on SNI to give us the distribution of readings in (1)b-c. By the nature of the assumptions we are making, it is impossible that SNI should be free and that SAI should depend on its result. 2/ There must be some account of the distribution of SAI, to give us the acceptability judgments in (1)e-f. Under our assumptions, this account can have nothing directly to do with SNI. It might involve a constraint on SAI, or it might reflect the intervention of other factors. 3/ If possible, the answers to 1/ and 2/ above should be principled. They shouldn't involve ad hoc assumptions, and more importantly, there should be some account of the interrelationship of their results. Why does wide scope of negation correlate with SAI and not extraposition, with an aux before the subject and not with a PP after the main verb? And why does SAI in declaratives go along with a presentential negative with wide scope rather than, say, a presentential existential quantifier with narrow scope?

In order to answer these questions in an interesting way, we're going to have to step back a little, and look at the nature of semantic interpretation in general, as well as the particular nature of the rule interpreting scope of negation.

I take it as given that the following holds:



Semantic interpretation rules are in essence rules of translation, mapping

syntactic structures into semantic ones. Notions such as entailment will be defined on these semantic structures by a logic. We could, of course, combine everything to the right of the syntax box in (7) and call it the "logic," thereby defining entailment etc. on surface structures. The point of the distinction between semantic interpretation (SI) and logic is to sharpen up the question of what, in this system, must be learned in the course of language acquisition.

I will assume that the form of the semantic objects is universal, although differences in morphology and lexicon may leave this level of representation somewhat short of being a Universal Language. Let's also assume that the logic is essentially universal, subject perhaps to the inclusion of language-specific meaning postulates. Thus except where they intersect with the lexicon, semantic representation and logic are universal. But what about the mapping from syntactic to semantic representation, i.e. semantic interpretation? Given the range of variation in surface structure form, it seems highly unlikely that SI could be universal.

However, the same arguments from epistemology which dispose us in favor of a constrained syntax, should dispose us in favor of a constrained semantics. If the language learner can learn to do "any wild thing" in defining entailment on surface structures, then the argument that he couldn't learn to do equally wild things in defining well-formedness of surface structure is weakened considerably. The point of the articulation of theoretical devices in (7) is to allow us to focus on exactly those parts of the system which are language particular (i.e. the lexicon and some aspects of SI), and to investigate what general principles constrain them.

The SI rules that will be considered in this paper are scope rules. I suggest that scope rules should be seen as 1/ associating an element (or elements) of the terminal string of a phrase marker with a non-terminal node in that phrase marker, and 2/ transforming the phrase marker in question into a new one by means of certain specified operations. (There is an obvious parallel with syntactic transformations, but scope rules will have different properties, at least so it seems.)

What, then, is the rule that interprets scope of negation?

For quite a wide range of cases, the answer can be given very simply:

(8) Negation goes on the clause that it's in.

Thus (9)a is translated (roughly) as (9)b, not (9)c; (9)d is translated as (9)e, not as (9)f:

- (9)a That John is not happy is obvious to many of his friends.
 = b (not(John is happy)) is obvious to many of his friends.
 ≠ c not((John is happy) is obvious to many of his friends).
 d For John not to win the race would surprise many oddsmakers.
 = e (not(John win the race)) would surprise many oddsmakers.
 ≠ f not((John win the race) would surprise many oddsmakers).

The same is true for many occurrences of no. No receives the interpretation $\text{not}(\exists x)(\Phi(x))$:

- (10)a John has no job.
 b $\text{not}(\exists \text{job } x)(\text{John has } x)$

Thus (assuming restriction of quantification by the NP which occupies the argument-place of the variable which the quantifier binds) (10)a might be translated as (10)b. However, it's not necessary for the decomposition of no into not ~ to take place as part of scope interpretation--such decomposition could be an independent part of SI, or (as I prefer) the same result could be achieved by a meaning postulate in the logic. In any case, scope interpretation can simply turn (10)a into (11):

(11) (no job)(John has x)

We can leave open now to get from (11) to (10)b--the point here is to extract out the contribution of the SNI rule.

Now parallel to (9) we observe the facts in (12):

- (12)a That John has no job is obvious to many of his friends.
 = b ((no job)(John has x)) is obvious to many of his friends.
 ≠ c {no job}((John has x) is obvious to many of his friends).
 d For John to kill no lions would please conservationists.
 = e ((No lions)(John kill x)) would please conservationists.
 = f (no lions)((John kill x) would please conservationists).

So for these cases as well, rule (8) holds. If we look at the behavior of other sorts of subject phrases, rule (8) must be modified, but only slightly. We see from (12) that in that-clauses and for-to-clauses, negation is restricted to inside scope. For nominal subjects, on the other hand, the normal case is outside scope, i.e. for the negative element to take scope over the upper clause³:

- (13)a No candidate's election is probable.
 = b (no candidate)(x's election is probable)
 ≠ c ((no candidate)(x's election occurs)) is probable
 d The election of no candidate is probable. = (13)b or (13)c.

(13)a must mean that there is no candidate who is a good bet to win; it cannot mean that an election with no outcome is likely. (13)d, however, seems to be ambiguous between these two readings. The anomalous case, from our point of view, is the translation of (13)d as something like (13)c (the reading in which a winnerless election is probable). Here the subject NP, "the election of no candidate," is being translated as a clause in semantic representation, at least to the extent that negation and quantifiers can take its translation as their scope.

This causal semantics for an NP has nothing to do with the issue of derivation of nominalizations--there are cases of pretty hardcore nouns whose NP must, for various reasons, receive a clausal interpretation--thus

(14) The forecast is for no rain.

does not mean that there is no rain such that the forecast is for it, but rather that the forecast is for there to be no rain such that it happens, or something of the sort.

Assuming that we wish to maintain (8), we can go three ways in the face of (13) and (14). 1/we can say that certain NP's are dominated by S in surface

structure; 2/ we can say that an interpretation rule creates such S's prior to the operation of SNI; 3/ we can say that SNI is allowed to apply freely on nominal domains, with the proviso that its output must be interpreted as a clause if it is to receive any interpretation at all. Since the proviso attached to option 3 appears to be true in any event, this option seems to be the most promising one. On this analysis, rule (8) holds, except that we must specify that under certain circumstances, nodes other than S will be translated as clauses, and rule (8) will be understood to say that a negation goes on the (node translated as a) clause that it's in.

Now consider the sentences in (15) (these are from Howard Lasnik's thesis):

- (15)a Senator Eastland didn't grow cotton to make money.
 b Senator Eastland didn't grow cotton, to make money.
 c To make money, Senator Eastland didn't grow cotton.

In (15)a it's clear that the purpose clause is within the scope of negation; in (15)b it's equally clear that it is not⁴. This scope difference correlates with a difference in intonational phrasing (symbolized by the comma), as Lasnik observed. Lasnik concluded that there should be an optionality in the assignment of intonation contours, and that the SNI rule should be intonationally constrained. I wish to reject this solution, partly in order to maintain some version of (8) as the SNI rule, and partly because I believe that no such direct interaction of intonation and scope is possible⁵.

Instead, let's suppose that the same factor, namely surface clausal structure, constrains both SNI and intonation assignment. On this analysis, in (15)a "to make money" will be (in surface structure) inside the clause on which the not is interpreted, while in (15)b it will be outside that clause. In (15)c, the presentential purpose clause is necessarily outside the S "Senator Eastland didn't grow cotton," and therefore only one scope of negation and only one intonational phrasing are possible.

If we consider the corresponding sentences without negation, we see that there is a third thing which co-varies with negation scope and intonational phrasing.

- (16)a Senator Eastland grew cotton to make money.
 b Senator Eastland grew cotton, to make money.
 c To make money Senator Eastland grew cotton.

In using sentence (16)a, we are talking about why Senator Eastland grew cotton, namely to make money. In using sentence (16)b, on the other hand, we are talking about what Senator Eastland did, namely grow cotton, and adding the peripheral observation that he did it to make money. Likewise in using sentence (16)c, we are talking about what Senator Eastland did, only in this case the remark about his reason for doing it is a preface instead of a postscript. There is no intonation for (16)c with which it can be used exclusively to comment on why Senator Eastland grew cotton.

Let's call this question of "what we are talking about" the question of assertability. This term is more than a little misguided, since there is no necessary connection with assertion at all, as can be seen by considering the questions that correspond to (16)a-c. In an earlier version of this paper I tried to use the term "information unit," but I've concluded that the predicate assertable is more intuitive, as long as it isn't taken too literally.

Under the analysis we are considering, something is assertable only if in surface structure it's an S, containing other S's only as verbal arguments, and which itself is not a verbal argument. We haven't yet offered any general rule for predicting intonational phrasing; for the cases dealt with in this paper, it will do to say that the boundaries of an S optionally define an intonational phrase if the S is a verbal argument, but obligatorily do so if it is not. Given rule (8) and some version of the two rules just proposed, we may suggest the following hypothesis:

- (17) Scope of negation, intonational phrasing, and assertability are all predictable from surface clausal structure.

Now, at last, we're in a position to re-examine the sentences in (1). To begin with, we should point out that two rather different kinds of PP are involved in the two interpretations of (1)a. In the reading where no has wide scope, the PP "with no job" is the complement of the adjective happy, as in "John is happy with his way of life." As far as I can tell, when the PP is understood as an adjectival complement in this fashion, wide scope of no is obligatory. In the reading where no has narrow scope, the PP "with no job" is an adverbial adjunct of some kind, which will receive a clausal translation. This case can be brought out more clearly if we change the adjective to one which does not permit with-complements, as in (18):

- (18) John would be dull, with no job.

When, as in (18), the PP is required to be adjunctive, narrow scope of no is obligatory: (18) cannot mean that there is no job such that John would be dull if he had it. Observe also that in (18) the intonational comma becomes obligatory, whereas in the wide scope reading of (1)a it is impossible.

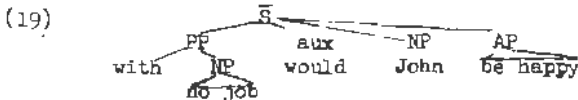
In a sentence such as (1)a, if the with-PP is taken as an adjectival complement, it must be inside the AP, and thus inside the S of which that AP is a part. It seems reasonable that the adjunctive PP in (18) is outside the S "John would be dull." So for (1)a and (18), hypothesis (17) works out quite nicely.

How about the problematic cases (1)b-c? The three factors mentioned in hypothesis (17) maintain their correlation--in (1)b, the scope of no extends over the whole sentence, while in (1)c it is restricted to the translation of the PP; (1)b is intonationally a single phrase, while (1)c has an obligatory break after the PP; and in some sense (1)b is a single information unit, while (1)c is two, one central, one peripheral.

I propose that hypothesis (17) be maintained by instituting the convention that SAI causes the S-node defining the domain of the rule to be pruned. This manoeuvre is very much like cliticization in phonology. To propose the erasure of a phonological boundary in order to get the right output from one rule is ad hoc, but not the worst crime a linguist might ever commit. A boundary erasure proposed in order to get the right output from several rules may well capture a significant generalization--let's call this situation ad haec. If a boundary erasure is predictable on general principles, and also increases the generality of several rules, then the analysis is something to be happy about.

Erasure of S-boundaries following SAI, leaving for (1)b a structure

approximately as in (19), is at worst an ad haec erasure, since we increase the generality of three rules.



Thus whether or not S-erasure by SAI can be made to follow from some general principle, it is reasonable to hypothesize that it happens. We now have all the equipment we need to suggest a solution for the problems that started us off on this whole investigation of scope interpretation.

Before getting to the details of that solution, I'd like to introduce a new set of facts, those relating to the interpretation of so and its relationship to SAI. The point of doing so is that an exact analogy exists between the case of negation and the case of so, so that the generality, and hence the interest, of our solution is increased. Also, certain aspects of the solution are clearer in the case of so than in the case of negation.

From the existence of sentences like (20), we may conclude that it is not correct to generate result-clauses in conjunction with so in the base, extraposing them to their surface structure position. Instead, we should generate result-clauses freely as sentence adverbials, and interpret their relationship to so--of course such interpretation would be necessary in any event, under the assumptions we have been making.

(20) John hit his car so hard so many times with such a big hammer that it finally started.

From the sentences in (21) we see that there exist scope ambiguities with so:

- (21)a Mary claimed that Bill was so weird { that he ate ants.
 { that we didn't invite him to
 dinner.
- b So weird did Mary claim Bill to be { that he ate ants.
 { that we didn't invite him to
 dinner.

When we say "Mary claimed that Bill was so weird that X," there are two possible ways for the relation of so to its result-clause to be established. The two result clauses that I've given in (21)a are intended to suggest this difference. When we say "Mary claimed that Bill was so weird that he ate ants" we mean that Mary claimed a certain thing, namely, Bill is so weird that he eats ants. When we say "Mary claimed that Bill was so weird that we didn't invite him to dinner," we mean that the extent to which Mary claimed Bill was weird was so great that we didn't invite him. In the first case, the scope of the so is confined to the complement of claim, whereas in the second case, it extends over the whole sentence. Now, if we prepose the AP, as in (21)b, SAI is obligatory, and also, one of the readings vanishes--the only interpretation possible for (21)b is the one in which so takes scope over the whole sentence. Thus to say "so weird did Mary claim Bill to be that he ate ants"

is to say that Bill's diet resulted from Mary's assertion.

What should the rule of scope of so interpretation (SSI) be?

There are three facts to be considered: 1/ so involves some sort of quantification over degrees or extents; 2/ there can be many so's to one result-clause, although all of them must be in one surface clause; 3/ there can be no more than one result-clause per so-clause--thus the sentences in (22) are impossible:

- (22)a *The class-of-all-classes paradox was so devastating that Russell became depressed, that Frege abandoned his work in logic.
 b ?The class-of-all-classes paradox was so devastating that Russell became depressed and that Frege abandoned his work in logic.

To capture fact 1/, we propose a translation as in (23):

- (23)a The noise was so loud that John jumped.
 b (so)(the noise was x loud)(that John jumped)

Just as in the case of no-interpretation, we leave open the further interpretation of so (i.e. how it binds its variable(s), and what follows from its relationship to its result clause).

To capture fact 2/, we must allow the SSI rule to establish one semantic so for any number of surface structure so's in a given clause:

- (24) translation of (20): (so)(John hit his car x hard y many times with z big a hammer)(that it finally started)

This correctly suggests that in (20) the effect of the so's is, so to speak, cumulative. That is, the fact that John's car started was the combined result of force, frequency and hammer size, and need not have resulted from any of these factors individually.

We can capture fact 3/ in the definition of so-- the only way so can correctly relate to a result-clause, we suggest, is in a structure of the form

- (25) (so)($\zeta \dots x_1 \dots x_n \dots \zeta$)(that S)

Returning to the sentences in (21), we see that the rule of SSI is really rather like the rule of SNI, except in allowing multiple surface so's to be mapped onto one semantic so:

- (26) so goes on the clause that it's in.

One of the readings we claimed for (21)a, the one in which so takes wide scope, is anomalous with respect to rule (26). That is, the predicted translation is (27)a, but the reading represented by (27)b is also possible:

- (27)a Mary claimed that ((so)(John was x weird)(that we didn't invite him))
 b (so)(Mary claimed that John was x weird)(that we didn't invite him)

I must admit that I have no particular trouble in getting this non-predicted reading. However, if we change "claim" to "make the claim," or substitute a

verb with a little more semantic meat on it, say "announce," then the wide scope reading becomes impossible:

- (28)a Mary made the claim that John was so weird that we didn't invite him to dinner.
 b Mary announced that John was so weird that we didn't invite him to dinner.

This range of facts is exactly like the range of facts concerning extraction rules that Nomi Erteschik discussed in her thesis. The most reasonable conclusion seems to be that rule (26) is basically true, but that certain verbs, e.g. claim, may receive a translation which makes them transparent to scope rules, and that the feature which marks them as (in this sense) transparent also causes them to offer free passage, at least as a matter of performance, to syntactic rules which would otherwise be blocked.

Continuing the analogy with scope of negation, we observe that so sometimes must take scope over a nominal domain interpreted as a clause:

- (29)a The forecast is for so much rain that the river will flood.
 b The forecast is for ((so)(x much rain happens))(that the river will flood))
 c (so)(the forecast is for x much rain)(that the river will flood)

Sentence (29)a is most reasonably interpreted to mean something like (29)b, rather than (29)c, which would tell us that flooding would depend on the extent of the weatherman's prediction of rain, as opposed to the extent to which rain actually fell. However, the (29)c interpretation, while absurd, is quite possible.

The connection of scope of so with intonational phrasing and assertability is established by considering the sentences in (30):

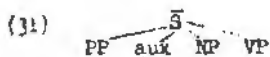
- (30)a Caesar advanced (,) with so many legions that resistance was impossible.
 b With so many legions that resistance was impossible, Caesar advanced.
 c With so many legions did Caesar advance that resistance was impossible.
 d ?With so many legions that resistance was impossible did Caesar advance.
 e *With so many legions Caesar advanced that resistance was impossible.

There are two different possible articulations of the information presented in (30)a. I may say what Caesar did, namely advance, and add that he did it in a certain way, namely with lots of legions. In this usage, there would be an intonational comma before the PP. On the other hand, I may simply say how Caesar advanced, namely with lots of legions. In this usage, there would be no comma before the PP.

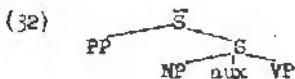
In (30)b, the only possible articulation of information is comparable to the first one mentioned above. When I say (30)b, I am talking about what Caesar did, with a preliminary aside mentioning how he did it. An intonational comma in front of the main clause is obligatory. (30)b cannot be used simply to make a statement about how Caesar advanced.

In (30)c, the only possible articulation of information is comparable to the second option mentioned relative to (30)a. When I say (30)c, I'm talking about how Caesar advanced. Here no intonational comma after the PP is possible.

On to the long-awaited solution.



In a structure like (31), the PP will receive a clauseal translation iff it is interpreted adjunctively. But the PP in (31) cannot be interpreted adjunctively, since there is no main clause for it to be adjoined to. So it will not be translated as a clause, wherefore no or so in it cannot take scope on it. But no or so must receive some scope interpretation, or the sentence will be trash. The only place that they can go is to \bar{S} --so they do, since nothing stops them. Since the PP must be interpreted within the clause, being non-adjunctive, it must be an argument of the clause's verbal element--hence the strangeness of "*with no job would John be dull," since dull doesn't take with-PP's as complements.



In a structure like (32) a no or so in the PP is not in the S, and therefore has no chance of being interpreted on it. If the PP receives a clauseal translation, as in (1)c or (30)b, the no or so will go on the clause in SR, obligatorily.

In such a case, the result-clause associated with so must immediately follow the PP; this is because of the interpretation principle (or feature of a meaning postulate, as you like) given in (25). Thus (33)a is OK, but (33)b blocks:

- (33)a With such a tiring job that he always fell asleep after dinner, John would be dull.
 b *With such a tiring job John would be dull that he always fell asleep after dinner.

If the result-clause in (33)b is on the S "John would be dull," we would wind up with "[so (...x...)](S that S)", which is not an instance of (25); if the result-clause is on "with such a tiring job, John would be dull," then we get "[so (...x...)]S that S", which is again not an instance of (25).

The explanation just given blocks (33)b in case so (actually such) has scope within the PP, i.e. narrow scope; the reason that (33)b blocks with wide scope of so will be given below.

What if, in structure (32), the PP does not receive a clauseal translation? This circumstance is clearly possible, as in (34):

- (34) To Bill, John gave a pocketknife.

Nothing we have said so far will directly block, in this case, the no or so from being interpreted on \bar{S} , which would give it wide scope. We know, however, that this cannot happen.

Remember that we're in a structure like (32), and that the PP is not to receive a clauseal interpretation. If it were clauseally interpreted, the no or so would be stuck inside it. But the PP must be interpreted somehow, or the sentence will be thrown out. The only other possibility is that it is to be interpreted as (part of) the complement of something in the S. Let's look at what this means in some specific case, say sentence (1)c:

(35) $\left[\underset{S}{\bar{S}} \left[\underset{PP}{PP} \text{ with no job } \right] \left[\underset{S}{S} \text{ John would be happy } \Delta \right] \underset{S}{\bar{S}} \right]$

The Δ in the AP is intended to indicate where the PP is to be interpreted. The result of no scope interpretation on (35) is something like (36):

(36) (no job) $\left[\underset{S}{\bar{S}} \left[\underset{PP}{PP} \text{ with } x \right] \left[\underset{S}{S} \text{ John would be happy } \Delta \right] \underset{S}{\bar{S}} \right]$

Now, in order for the PP to receive an interpretation, some kind of SI rule is going to have to relate it to its proper place. Let's say that this is done in the most straightforward imaginable way, namely by putting it there; this would yield (37):

(37) (no job) $\left[\underset{S}{\bar{S}} \left[\underset{S}{S} \text{ John would be happy with } x \right] \underset{S}{\bar{S}} \right]$

(37) is precisely the kind of structure that rules (8) and (26) were intended to block. It contrasts with the output of the comparable rules for (1)b, which would be (38):

(38) (no job) $\left[\underset{S}{\bar{S}} \text{ would John be happy with } x \right] \underset{S}{\bar{S}}$

I'm assuming here that the regularities described in (8) and (26) arise not because of conditions on the operator-extraction rules themselves, but rather because of conditions on possible relationships between quantifiers and their variables in the representation which is the output of the interpretation rules. I believe that a strong argument can be made that the conditions in fact do work in this way; for present purposes, that argument will have to be in the form of an IOU.

The analysis we've just given (of the relation of scope to SAI) covers only structures in which the preposed element happens to be a PP, but it generalizes without apparent difficulty to other cases.

Even generalized, however, this analysis solves only one of the problems that we raised at the beginning of the discussion: the problem of how to constrain scope interpretation rules. We've said nothing directly about the problem of ruling out cases like (1)f, where SAI applies in the absence of presentential so or no.

Since this paper is already too long, and since my ideas for a solution to this last problem are less than crystal clear, I'll spare the reader a detailed presentation of my thoughts on the matter, and limit myself to suggesting a line of inquiry. Since, under our analysis, the root S is pruned in such cases, assertability is lost. To be acceptable, a sentence must have not only a reading, but also some speech act potential. Therefore, the result of SAI will be unfit for service unless rescued by some higher operator. In this respect the advantage of negation over e.g. existential quantification is obvious--there is plausibly a speech act of denial, but none of existential generalization.

What is happening with so I leave the reader to ponder. While (s)he is doing so, I would like to pay a few of the intellectual debts I ran up in writing this paper. I owe thanks to a lot of people--especially to Avery Andrews, for pointing out to me the ambiguity of a sentence similar to (21)a,

and for other discussions about so; to Alan Prince, for discussions on the nature of scope rules and of semantic interpretation in general; and to Noam Chomsky, for advice and encouragement.

FOOTNOTES

- 1 For the sake of simplicity in discussion, it will be assumed that both negation and quantifiers are sentential operators in semantic representation. Negation, in particular, sometimes seems to be limited to surface structure VP's, etc., as we shall see; but this is a separate issue, since the SR might still have an S in the appropriate place.
- 2 In accord with the observation above, partisans of VP negation can translate this as "(John x(not(x is happy)) is obvious...)." Here the negation is still a sentence operator in SR, but is confined to the translation of the surface structure VP. Even if this is right, the distinction is an unnecessary complication from the point of view of this paper.
- 3 As would be expected, poss -ing, acc -ing, and poss -ing of constructions are intermediate between the clear S cases and the clear NP cases, with the first two behaving roughly like S's and the third roughly like an NP.
- 4 Here is a case in which VP negation seems to be forced on us, since "not growing cotton" is interpreted as something that Senator Eastland did--necessarily so, since we proceed to give the reason for his doing it.
- 5 For a discussion of another apparent case of intonational effects on scope, see Liberman and Sag, "Prosodic Form and Discourse Function," CLS X.
- 6 Of course there are dialects of English which exhibit precisely this feature in the case of negation.
- 7 If the interpretive connection were established in some more subtle way, a version of the argument which follows could still be made.

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