The Semantics of Aux-Inversion
and Anaphora Constraints

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Background

Cognitive linguistics seeks, in part, to maximize cognitive semantic explanations for what were previously seen to be purely syntactic phenomena. The present paper is in that spirit. It presents two related results, one of them positive, the other negative. The positive result shows the existence of a semantic condition on a class of auxiliary inversions. The negative result shows that an important class of anaphora constraints cannot be syntactic, and that as a result, the c-command condition on anaphora is fundamentally incorrect.

Inversion

Let us begin with auxiliary inversion, in particular, the obligatory inversion that typically occurs with preposed negative adverbs, as in:

-Never have I seen such behavior.
-*Never I have seen such behavior.

-At no time did he leave the building.
-*At no time he left the building.

-Nowhere could he be found.
-*Nowhere he could be found.

-By no means will he be allowed to stay in the country.
-*By no means, he will be allowed to stay in the country.

-Under no circumstances will he be admitted.
-*Under no circumstances he will be admitted.

But not all preposed negative adverbs trigger aux-inversion. While *never, at no time, at no place, by no means* and *under no circumstances* all do, *with no help* does not.

-With no help, he moved the piano upstairs.

-*With no help did he move the piano upstairs.

Various other kinds of adverbials marked with *with* work the same way.

-With no thought for his own safety, he jumped into the river.
-*With no thought for his own safety did he jump into the river.

-With no hat on, he went out into the cold.
-*With no hat on did he go out into the cold.

As these cases show, inversion occurs with negative adverbs that entail that the event expressed in the main clause does not occur. For example, since everything that occurs must occur at some time, at some place, and under some circumstances, the adverbs *at no time, at no place*, and *under no circumstances* entail that the event in question did not occur. Thus

-At no time did I move the piano

entails

-I didn't move the piano.

while

-With no help, I moved the piano

entails

-I did move the piano.

A lack of help does not entail the nonoccurrence of the event; hence the semantic condition for inversion is not met.

One might think that it the lexical choice of prepositions and head nouns that determines invertability, rather than the character of the entailment. But that is not so. For example, if "amount of" is added to the negative *with*-phrase and the modal is changed to "could", then the entailment changes, and so does invertability.

-With no amount of help could I move the piano.
-*With no amount of help, I could move the piano.

Here it is entailed that I couldn't move the piano, and correspondingly inversion is required.

Though *with*-phrases are by far the most common of the non-inverting negative adverbials, other prepositions can head negative adverbials of this type, again under the condition that they entail the truth of the main proposition:

-In no time he left the building.

-*In no time did he leave the building.

(cf: At no time did he leave the building.)

-After virtually no discussion, the bill was passed.

-*After virtually no discussion was the bill passed.

As a final case to show that it is conceptual interpretation, not form, that triggers the inversion, consider the effect of reason adverbials. Take the expression *for no reason*. This expression is compatible either with a reasonless action or with the negation of an action-for-a-reason. If *for no reason* designates a reasonless action, we get sentences like:

-For no reason, Harry would beat his wife.

where it is entailed that wife-beating does occur. But if *for no reason* is taken as the negation of an action-for-a-reason, then we get sentences like

-For no reason would Harry beat his wife.

where it is entailed that wife-beating does not occur. That is, if we are only talking about actions-for-a-reason and we say there are no such reasons, that entails that there are no such actions. As before, inversion is correlated with the polarity of the proposition: If is it negative, there is inversion. If it is positive, there is no inversion. The next minimal pair provides a similar example:

-For no money would she dance naked. (She wouldn't)

-For no money, she would dance naked. (She would)

These examples suggest that inversion occurs with preposed adverbials when the nonoccurence of the main clause event is entailed.

Not surprisingly, the situation is somewhat more complex: the triggers of inversion look more like negative polarity triggers than elements that entail negatives. For instance, inversion is also triggered by adverbs like *rarely, barely, only sometimes, only in some places, only under special circumstances*, and so on:

-Rarely did he accept an invitation to dinner.

-Barely had I fallen asleep when the phone rang.

Though these adverbials entail the occurrence of the event in question, they function like negatives because they are defined relative to a cognitive model in which the nonoccurrence of the event predominates. Whatever the notional basis for the class of negative polarity triggers is is what determines the class of adverbials triggering inversion.

Only can affect the interpretation of the adverbial so that it entails a negative proposition and can thus trigger the inversion:

-Only occasionally did he leave a large tip.

-Only under very special circumstances would he wear a tie.

Thus, the generalization is something like the following:

Inversion marks the absence of a fully positive proposition.

Although we have motivated this condition only for preposed adverbials, it also holds for questions and hypotheticals as well. So what was thought to be a purely formal syntactic condition on inversion is in fact triggered by cognitive semantic conditions.

Anaphora

Since Langacker and Ross's original formulations of command constraints, it has been assumed by a large population of syntactic theorists that constraints on coreference are purely syntactic in nature. The various contemporary proposals to account for anaphora via c-command constraints of some sort are of the same basic character: they are constraints on syntactic form, not constraints on meaning. All such constraints have the property that they must hold whenever their syntactic conditions are met. This entails that a purely formal syntactic constraint must continue to apply as long as its syntactic conditions are met, no matter how the meaning of the sentence is changed due to changes in its content.

At this point we would like to present evidence that certain coreference constraints are not purely formal syntactic constraints. We will show that these coreference constraints disappear under certain conditions where the relevant syntactic structure is preserved, but the meaning of the sentence is changed.

The anaphora constraints we will discuss are among what might be called the 'weak' anaphora constraints. We define the strong anaphora constraint as follows:

The strong constraint: Coreference is blocked when the pronoun is the subject of a predicate P and the antecedent either is, or is part of, another argument of P.

Weak constraints are whatever constraints block coreference in any other structural configuration.

Sentences ruled out by the strong constraint include:

-He$_i$ thinks that John$_i$ is handsome.

-She$_i$ thinks nobody likes Sue$_i$.

-He$_i$ thinks everybody$_i$ is well-liked.

-She$_i$ likes the man who wants to marry Sue$_i$.

-His$_i$ belief that Bob$_i$ would win astonished me.

To our knowledge this constraint is not affected by sentence semantics of the kind we consider shortly, and we will not discuss such sentences further.

This constraint does not account for sentences like the following, which are ruled out by weak constraints:
(We make the usual caveat about judgments varying from speaker to speaker. We would, however, be surprised if anyone would find any of these sentences completely grammatical and unmarked.)

-*I convinced her$_i$ that Sue$_i$ needed a lawyer.

-*He$_i$ would be arrested if the mayor$_i$ got caught speeding.

-*Under those circumstances, her$_i$ husband beats Louise$_i$.

-*Occasionally we saw her$_i$ after Louise$_i$ got married.

-*Mary hit him$_i$ just before John$_i$ managed to get up.

-*In one of Louise$_i$'s apartments, she$_i$ keeps her$_i$ pet tarantula.

-*John managed to get himself to tell her$_i$ that the lawyer Louise$_i$ hired is a shyster.

-*Nobody ought to tell her$_i$ that Louise$_i$ should get a better lawyer.

-*Every teacher wanted him$_i$ in class who had Dan$_i$'s brother as a student.

-*John gave her$_i$ a gift that Louise$_i$ really liked.

-?*Her$_i$ husband thought of beating Louise$_i$.

These weak constraints disappear when the semantic polarity of the sentence is changed from positive to negative, while the relevant syntactic structure is preserved. Let us begin by considering the interaction of weak constraints with the cases discussed above, cases with preposed adverbs with inverted auxiliaries.
(Incidentally, some speakers report that that the constraints weaken instead of disappearing completely. For such speakers, the unstarred sentences below will be better than the starred ones, even if they are not perfect.)

-*Under those circumstances, he$_i$ would be arrested if the mayor$_i$ got caught speeding.
-Under no circumstances would he$_i$ be arrested if the mayor$_i$ got caught speeding.

-*Occasionally we saw her$_i$ after Louise$_i$ got married.
-Rarely did we see her$_i$ after Louise$_i$ got married.

-*With no help, I convinced her$_i$ that Sue$_i$ needed a lawyer.
-Under no circumstances could I convince her$_i$ that Sue$_i$ needed a lawyer.

-*In one of Louise$_i$'s apartments, she$_i$ keeps a pet tarantula.
-In none of Louise$_i$'s apartments, does she$_i$ keep a pet tarantula.

-?*On that occasion, her$_i$ husband thought of beating Louise$_i$.

-On no occasion did her$_i$ husband think of beating Louise$_i$.

In these cases, the only syntactic difference is the inverted auxiliary, which should be irrelevant to syntactic constraints involving such notions as c-command. The significant difference is a shift from positive to negative semantic polarity: either to cases where it is entailed that the event did not occur or to cases like the one with 'rarely' which is understood only relative to predominantly negative background.

Of course, one might attempt to redefine c-command to make crucial reference to the inverted auxiliary. But such a move, besides being ad hoc, would be pointless, since there are many examples of the same coreference phenomena in sentences with no auxiliary inversion. Again, in each of the following pairs, the weak constraint holds in the first sentence, which has positive polarity, and disappears in the second sentence, when the polarity changes to negative.

-*Every teacher wanted him$_i$ in class who had had Dan$_i$'s sister as a student.
-No teacher wanted him$_i$ in class who had had Dan$_i$'s sister as a student.

-*John recently gave her$_i$ a gift that Louise$_i$ really wanted.
-Nobody ever gave her$_i$ a gift that Louise$_i$ really wanted.

-*Mary hit him$_i$ just before John$_i$ could manage to get up. (He did get up.)
-Mary hit him$_i$ before John$_i$ could manage to get up. (He didn't get up.)

-*John forced himself to tell her$_i$ that the lawyer Louise$_i$ hired
was a shyster.
-No one could bring himself to tell her$_i$ that the lawyer Louise$_i$ hired
was a shyster.

-*Nobody ought to tell her$_i$ that Louise$_i$ should get a better lawyer.
-Nobody could tell her$_i$ that Louise$_i$ should get a better lawyer.

These examples show that weak coreference constraints disappear when the semantic polarity of the sentence is changed from positive to negative, even though the relevant syntactic structure is preserved. It follows that weak coreference constraints are not a matter of pure syntactic form. Thus, any attempt to characterize them in terms of some form of c-command conditions, or any other purely syntactic conditions must fail.

It is important to bear in mind the structure of this argument. This is *not* a case where syntactically well-formed sentences get ruled out because they are semantically ill-formed. This is a situation where there is a putative syntactic constraint, a constraint that makes sentences syntactically ill-formed. Within any theory of formal syntax, no syntactically ill-formed sentence can be made well-formed by semantics alone. According to those assumptions, then, in cases like the ones we have just discussed, the constraint could not have been syntactic at

all.

Why is this important? The reason is that practitioners of autonomous formal syntax justify their endeavor by claiming that there are purely formal syntactic constraints. One class of such putative syntactic constraints has just disappeared, and it is just one of several results that do the same. For instance, Last year, Lakoff (1986) demonstrated that the coordinate structure constraint does not exist as a syntactic conditon. That removed another of the main motivations for an autonomous formal syntax. As such constraints disappear and turn out to be consequences of semantics, the empirical basis for doing autonomous formal syntax at all disappears with them.

References

Lakoff, George. 1986. Frame Semantic Control of the Coordinate Structure Constraint. Proceedings of the Chicago Linguistic Society.