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Lingua 136 (2013) 125–144

Lingua

www.elsevier.com/locate/lingua

The role of linear order in the computation of referential dependencies

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Received 14 June 2011; received in revised form 26 March 2013; accepted 19 July 2013
Available online 27 August 2013

Abstract

I consider several types of referential dependencies: those between bound pronouns and their antecedents, e.g. weak crossover and the classical binding conditions. Constraints on such dependencies have typically been formulated in linguistic theory in terms of conditions on the syntactic structures in which these elements are arrayed. I suggest that a relevant factor in determining the well-formedness of such dependencies is the linear order in which the elements appear. On this view, computation of a referential dependency is sensitive to the extent to which the antecedent is accessible in discourse at the point in the string where the dependent element is processed in the course of interpretation. The evidence suggests that the interaction between linear order and discourse structure provides a more satisfactory account of certain well-known effects than do constraints formulated in terms of syntactic structure.

Keywords: Binding; Anaphora; Weak crossover; Linear order; Discourse representation; Accessibility

1. The linear order hypothesis

A prominent view in classical syntactic theory has been that linear order is an artifact or byproduct of configuration. This view is articulated most clearly by Kayne (1994), who writes: ''the human language faculty is in fact rigidly inflexible when it comes to the relation between hierarchical structure and linear order'' (xiii) and ''phrase structure in fact always completely determines linear order'' (3).

I argue here that, to the contrary, linear order plays a central role in determining the acceptability of an array of grammatical phenomena that have previously been accounted for in terms of syntactic configuration, at least in the mainstream literature. I use the term 'acceptability' here because the shift to linear order suggests that the correct account does not have to do with grammatical well-formedness *per se*. Rather, it concerns the complexity of sentence processing and the dynamical construction of discourse representations as this processing proceeds. Specifically, I suggest that as sentence processing proceeds in time, a discourse representation is built whose content and structure are determined by the available syntactic and semantic evidence at each point in the process. The state of the discourse structure at the point at which a pronoun or other dependent expression is encountered plays a role in determining the extent to which the dependent expression can have a particular discourse entity as its antecedent, or how easy it is to identify a particular discourse entity as the antecedent.

The facts to be discussed here suggest that linear order is central to the correct approach for phenomena such as weak crossover, reconstruction and anaphor binding. While the general perspective that I propose is by no means novel

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http://dx.doi.org/10.1016/j.lingua.2013.07.013

(see for example Shan and Barker, 2006; Sag et al., 2007), it has not to my knowledge been applied to the analysis of pronominal dependency.[1]

To set the stage, it is useful to first note briefly some key points in the history of the weak crossover phenomenon (WCO), as exemplified in (1a). The asterisk here represents the standard judgment of generative grammarians that (1a) is not possible on the reading where *who* and *his* corefer. Although I use this notation to indicate here that a particular coindexing is unacceptable, I explicitly am not presuming that the unacceptability is a matter of grammar *per se*. Subscripts are used to mark intended referential dependency, while *t* marks the extraction site of the wh-phrase.

(1) a. *Who$_i$ did his$_i$ mother offend t_i?
b. Who$_i$ offended his$_i$ mother?

The term 'crossover' was introduced by Postal (1971). 'Weak' crossover (1a) was distinguished by Wasow (1972) from 'strong' crossover (2a), which is significantly less acceptable on the reading where the wh-phrase and the pronoun are intended to corefer.

(2) a. *Who$_i$ did he$_i$ say Sandy likes t_i best?
b. Who$_i$ said he$_i$ likes Sandy best?

The primary empirical basis for the judgments discussed in this paper is the forty-year literature on crossover phenomena, beginning with Postal (1971) and Wasow (1972). While the precise degree of acceptability of individual examples can and should be systematically investigated, if possible, the broad differences in acceptability between cases of strong crossover, weak crossover and fully acceptable non-crossover appear to be robust and consistent.

On the familiar configurational approach, the unacceptability of (1a) is taken to be a matter of grammaticality. The explanation is typically couched in terms of the syntactic binding relation between the clause-initial wh-phrase, the pronoun, and the gap associated with the canonical position of the wh-phrase, marked here as the trace t_i. Binding is conventionally determined by the syntactic relation c-command.

(3) a. A constituent c-commands its sister(s) and everything dominated by its sister(s).
b. A constituent α binds a constituent β if and only if α and β are coindexed, and α c-commands β.

In (1), assuming the syntactic structure in (4), *who* c-commands and is coindexed with its trace t_i and the pronoun *his$_i$* in both the WCO example and the well-formed example.

(4) a. [$_S$ who$_i$ did [$_S$ [$_{NP}$ his$_i$ mother] [$_{VP}$ offend t_i]]]
b. [$_S$ who$_i$ [$_{VP}$ offended [$_{NP}$ his$_i$ mother]]]

Weak crossover has thus been formulated in the mainstream syntax literature as a constraint against the simultaneous (syntactic) binding of a pronoun and a trace, where the trace does not itself c-command the pronoun, as in (5).[2]

(5) Who$_i$ (did you say) t_i offended his$_i$ mother.

Such a formulation is the Bijection Principle of Koopman and Sportiche (1982): ''An operator can bind at most one variable.''

From this formulation it is a simple step to conclude that in all examples that show a similar binding violation, there is a similar configuration in which the antecedent c-commands the pronoun and a trace.[3] This is the mainstream explanation for sentences such as (6), where the quantifier phrase follows the pronoun in the observed constituent order.

(6) *His$_i$ mother offended no boy$_i$.

[1] Kempson and Meyer-Viol (2002) propose, as best as I can tell, an approach to grammar in which the grammar itself is incremental. My focus here is on the dynamics of the interpretative mechanisms, and I make no claims about the architecture of the grammar itself.

[2] If we assume that the structure of (1b), is

(i) [$_S$ who [$_S$ t_i [$_{VP}$ offended [$_{NP}$ his mother]]]]

as many generative grammarians do, the formulation of the constraint must be adjusted so that the wh-phrase can c-command a pronoun and a trace only if the trace c-commands the pronoun.

[3] Such a generalization step is an instance of a methodology that is referred to as Uniformity in Culicover and Jackendoff (2005). As pointed out there, it is a methodological approach that is justified only as long as the consequences are valid. Culicover and Jackendoff argue that in many, if not most cases, it is not.