ON THE SYNTACTIC LEVEL OF BINDING CONDITIONS

FOR ANAPHORA

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THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF ARTS

Department of Languages and Linguistics

THE UNIVERSITY OF TEXAS AT EL PASO

December 1991

Acknowledgments

I would like to take this opportunity to thank several people who have been instrumental in my graduate studies. First, I wish to thank Dr. Patricia Stanley, who dragged me into linguistics. She showed me a world of intellectual thought that I continually find exciting and challenging. I will be forever in her debt for recognizing my abilities and encouraging me to develop them. Also, I wish to thank Dr. Jon Amastae, who taught me to never set limits on the possibilities for solving a problem. He taught me to go beyond the possible, to question what others consider improbable or even impossible.

The members of my committee were especially helpful. I want to thank Dr. Douglas Meyers for his encouragement and enthusiasm and Dr. Marianne Phinney for her technical expertise. Most of all, I want to thank Dr. Grant Goodall, the chairman of my committee, who taught me not only argumentation, but perseverance as well. His knowledge, guidance, and encouragement have made writing this thesis a most valuable experience.

While working on this thesis, I had the opportunity to discuss my work with professors and students from other universities. I appreciate the time and interest shown, in particular, by Mario Montabetti, Joseph Aoun, Barry Schein,

and Hajime Hoji. Their help in clarifying and focusing my thoughts was invaluable.

Finally, I wish to thank my family, who suffered through this with me.

July 10, 1991

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Chapter 1

Introduction

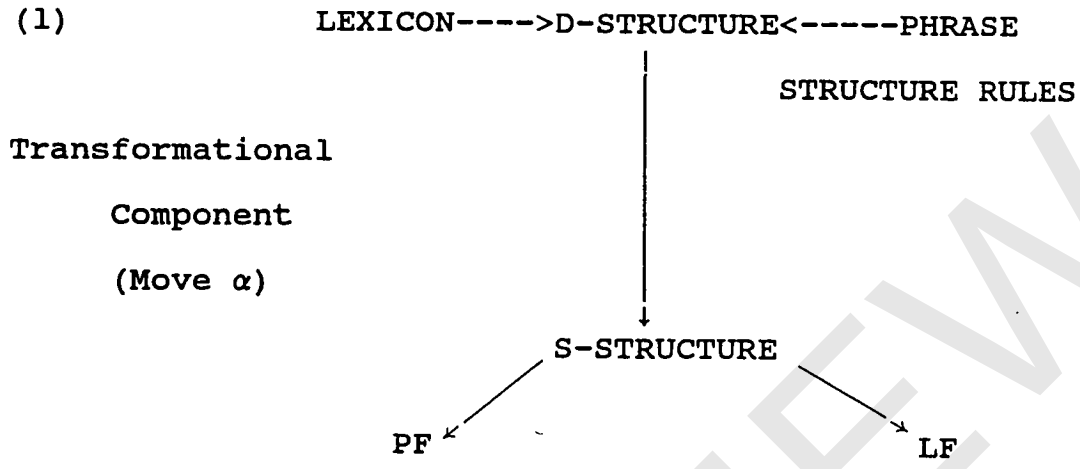
1.1 Structure

A sentence is not an unstructured string of sounds. The sounds in a sentence group together to form words and these words group together to form phrases. Generative grammar, as originally proposed by Chomsky (1957, 1965), incorporated a system of phrase structure rules to generate all the sentences in a language. Building on this foundation, all current generative theories recognize constituent structure. In Syntactic Structures, Chomsky shows that these phrase structure rules are not sufficient to explain certain relationships between parts of a sentence. He argued that to account for these relationships, a transformational component must be included in the grammar.

Combining a lexicon that includes the morphophonological structure of an item with the phrase structure rules, a deep structure (D-structure) is generated. This D-structure is mapped onto S-structure by the transformational element. This S-structure is then mapped onto the two interpretive components: PF (phonological form) and LF (logical form). The PF level links the structure with its acoustic form, while the LF

provides an interpretation of semantic scope. This early version of Government-Binding theory of grammar (henceforth GB) can be illustrated as in (1).

(1)



At this point the specifics are not important; what matters is that there are distinct levels of syntactic representation.

In Chapter 2, several theoretical concepts in current theory will be discussed. These concepts interact to constrain the rules acting on the structures to avoid generating ill-formed and uninterpretable constructs.

1.2 Nominal Expressions

One area of syntax that has received considerable attention in the literature involves nominal expressions. Lexical nominals can be divided into three categories as shown in (2).

(2) a. anaphors such as reflexives (himself) and reciprocals (each other)

b. pronominals such as he, they

c. referential expressions such as John

Problems arise regarding the relationships of each of these nominal expressions to a possible antecedent in a sentence. Generally, referential expressions cannot have a pronoun as a possible antecedent, as shown in (3b). Coreference is indicated by coindexing.

(3) a. $John_i$ said he_i was late

b. *He_i said $John_i$ was late

Pronominals appear not to be able to have an antecedent in the same clause as shown in (4b).

(4) a. $They_i$ kissed $each\ other_i$

b. *$They_i$ kissed $them_i$

Finally, anaphors apparently need an antecedent within the same clause as shown in (5b).

(5) a. $They_i$ gave $each\ other_i$ a kiss

b. *$They_i$ said Peter gave $each\ other_i$ a kiss

Chomsky (1980, 1981) proposes certain conditions or principles to determine possible antecedents for nominal expressions. It is his Binding Theory that provides the framework for this thesis. Binding Theory will be discussed in more detail in Chapter 2. Alternative theories have been proposed by Aoun (1985 and 1989), Huang (1982), Higginbotham (1983), and others.

1.3 The Problem

This thesis is concerned with only one type of nominal expression, anaphors. Binding Theory requires that anaphors be bound in the domain in which the necessary structural relationship must exist. However, the question arises as to the level at which the principle is applied. Chomsky originally proposes that Binding Theory applies at LF, but later he cites evidence supporting an S-structure application. In looking at evidence from Italian, Belletti and Rizzi (1986) claim the binding conditions for anaphors can apply anywhere, so long as they are met at some level.

The Italian data as well as data from other languages are concerned with anaphor/antecedent relations that appear to violate Binding Theory, but are nevertheless well-formed. Maling's (1984) work on Icelandic and Hellans' (1983) work on Norwegian show similar apparent violations. The relevant data are found in English, as well, as shown in (6).

(6) a. *each others'$_i$ students fear the professors$_i$

b. each others'$_i$ students frighten the professors$_i$ (Grimshaw 1990)

In (6a) the sentence is ill-formed as predicted by Binding Theory, since the structural conditions for binding are not satisfied. The necessary structural relationship between the antecedent, the professors, and the antecedent, each other, does not exist. However, (6b) is grammatical, despite the fact that it also appears not to satisfy the

binding conditions. To account for the grammaticality of examples like (6b), numerous theories have been proposed. Several of the most prominent ones, involving syntactic, semantic or pragmatic approaches, will be discussed in Chapter 3.

1.4 A Proposed Solution

In Chapter 4, I will propose that the data can be accounted for by having the binding conditions on anaphors (Principle A) apply at D-structure. It will also be shown that D-structure is more closely determined by argument structure than previously thought, in the spirit of Belletti and Rizzi (1986) and Grimshaw (1990). Argument structure is the lexical representation of the grammatical information pertaining to a verb. It is this influence on D-structure by argument structure that is reflected in the syntactic structure to which Principle A is applied.

Finally, in Chapter 5, I will discuss the implications of a D-structure analysis. The similarity between Baker's Uniformity of Theta Assignment Hypothesis (UTAH) and a D-structure analysis will be shown.

Chapter 2

Binding Theory

2.1 Introduction

Any discussion of grammar must be placed within a theoretical framework. The framework for this particular paper is that of the Government-Binding theory (GB) proposed by Chomsky (1981, 1982, 1986). In this chapter, I will be presenting some of the basic concepts of current theory that will bear on the subsequent discussion of anaphora. These concepts will provide the basis for analyzing the binding condition on anaphors as a D-structure principle. It is through the interaction of these concepts/theories that the distribution of anaphors generated under a system of rules can be constrained.

2.1.1 X-Bar Theory

X-Bar theory restricts the set of phrase markers allowed in a structure. The theory applies at D-structure, where it determines the way lexical items are formed into phrases. The basic lexical categories are N (noun), V (verb), A (adjective) and P (preposition).

The complexity of these phrasal categories with their complements and adjuncts led to the development of X-Bar theory to formally represent the expansion of phrasal categories. Within this framework there may be more than

one expansion for any lexical category X. Beginning with X, which is the lexical category, the expansion can progress to X′, X", etc.

An important feature of X-Bar theory allows for an intermediate category between the lexical category and the phrasal category. Evidence supporting this expansion of phrase structure comes from coordination and antecedents for one as shown in (1).

(1) a. John is a good student and good friend

b. I like this red book more than that one.

(where one = red book)

Both coordination facts and antecedents for one involve only constituents.

2.1.2 C-Command

There are two important relations in the nodes of a tree. One relation is that of precedence, where one node is located to the left of another node in any tree. The other relation is one of dominance, where one node is located higher on the tree than another.

Reinhart (1976) expands this basic notion of dominance to a more complex structural relation, referred to as c-command (or constituent command), defined in (2).

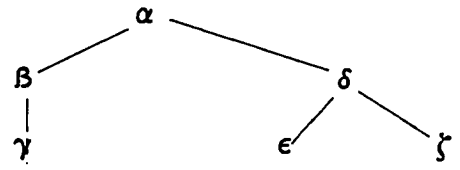
(2) C-Command:

node A c-commands node B if and only if the first branching node α dominating A either dominates B or is immediately dominated by a node α2 which

dominates B α2 and is of the same category type as α (Reinhart 1976).

This relationship is illustrated in (3), where ß and γ c-command δ and all nodes dominated by δ, ϵ c-commands ζ. ß does not c-command γ and ϵ does not c-command ß or γ.

(3)



The idea of c-command is crucial to both movement and anaphoric relations, as we shall see below.

2.1.3 Movement

The phrase structure generated under the X-Bar system is referred to as the D-structure. To generate the S-structure, it may be necessary to move elements. There appear to be various kinds of movement involved in this transformational component of a grammar, but all of these movement rules have certain properties in common. Generalizing these movement rules, movement is reduced to one rule--move α, as stated in (4).

(4) Move α

Move α (where α is a category variable)

A moved element leaves behind a trace[1] that is coindexed with the element moved. Move α provides for moving any element anywhere and left unrestrained would clearly

generate ungrammatical structures. Some of the conditions that restrain move α will be seen below.

2.1.4 Case Theory

NP movement is motivated by case-assignment. According to abstract case theory, all lexical NPs must have abstract case. However, only certain positions are case-marked. That is, there are particular syntactic environments where case is assigned. This case-assignment can take place only when there is a structural relationship between the case-assigner and the NP receiving case. This relationship is one of government.[2] Tense, V and P are case-assigners. An NP governed by Tense, V or P will then be assigned case. If it is not governed by one of these case-assigners, then the NP must move to a position where it can be assigned case.

2.1.5 Theta-Theory

θ-theory is concerned with the argument structure of a verb. θ-theory determines the conditions under which an NP can be an argument of a verb, assigning to each NP a thematic role selected by the lexical verb. Each argument of a verb is assigned a thematic or semantic role. These thematic roles include AGENT, the instigator of an action, EXPERIENCER, the entity experiencing some psychological state, and THEME, the entity undergoing the effect of an action (Radford 1988). These are illustrated in (5), where the underlined NP has the thematic role noted.

(5) a. John hit the ball. AGENT

b. John was sad. EXPERIENCER

c. John hit the ball. THEME

Assuming a verb has a given number of arguments, there must be an NP for each argument in a given sentence and each NP must have one and only one θ-role.[3] These θ-roles hold at all levels.[4]

2.1.6 Anaphors

Anaphoric relations involve the relationship between an anaphor and its antecedent. An anaphor is an expression that does not have an independent reference as in (6).

(6) *himself was hurt

In (6) himself does not have an independent reference and the resulting structure is ill-formed. Since an anaphor must have a reference from something else in the sentence, it needs an antecedent, as in (7).

(7) John hurt himself

In (7) John is the antecedent for the anaphor, himself. Lexical anaphors include reflexives (such as myself, themselves) and reciprocals (each other).

We are now going to examine some of the crucial ideas that led up to the binding theory that I am assuming, with particular reference to the level of application, which is my main concern here.

2.2 The OB-Framework

Assuming that reflexives and reciprocals are base-generated without a referential index, there must exist some rule of semantic interpretation that will assign them an antecedent. Chomsky (1980) (henceforth OB) proposes conditions on this semantic interpretation involving a system of indexing. Every NP in a sentence is assigned an index. However, if these indexes are randomly assigned, they will allow the overgeneration of uninterpretable sentences, as shown in (8).

(8) a. * John$_i$ likes himself$_j$

b. * John$_i$ shaved him$_i$

c. * John$_i$ kissed Mary$_i$

Indexing applies to the entire sentence, moving "from top to bottom." In effect, then, an index is assigned to an NP after all the NPs above it have been indexed. A referential index is an integer. An index for a nonanaphor is a pair (r, A), where r is a referential index and A is an anaphoric index. If an index has been assigned to a nonanaphoric NP α by movement, that index is its referential index; on the other hand, if it has not been assigned an index, it is assigned one. The anaphoric index A of α is $(a_1,\ldots,a_n)$, where a_j is the referential index of some NP c-commanding α. This will produce the indexing shown in (9).

(9) $John_2$ told $Bill_{(3,\{2\})}$ about $him_{(4,\{2,3\})}$

(Chomsky 1980)

In (9) the anaphoric index of him is interpreted as being disjoint in reference from each of the other NPs with a referential index of a_i.

There must then be a constraint on this indexation that will rule out the uninterpretable sentences in (8). He proposes that anaphors and pronouns cannot be free(i) as defined in (10) in an opaque domain.

(10) Suppose that α has the designated index j and i is an integer such that i=j or i ϵ j. Then α is free(i) in ß if there is no γ in ß with i that c-commands α (Chomsky 1980).

The index i is referential, such that i=j is an anaphor and i ϵ j is a pronoun. Binding conditions are, then, rules modifying the indexes assigned. In the case of pronouns, the binding conditions delete certain indices from the anaphoric index, thereby blocking certain cases of disjoint reference. Chomsky, then, restates the binding conditions as rules modifying the designated index, as stated in (11).

(11) Suppose that α has the designated index j and is free(i) in ß (ß = NP or S)
where (a) α is nominative
or (b) α is in the domain of the subject of ß, ß minimal.

Then j--->0 if j is an integer, and j--->(j-{i}) if j is a set (Chomsky 1980).

These domains in (11a) and (b) correspond to NIC (Nominative Island Constraint) in (12) and SSC (Specified Subject Constraint) in (13). NIC involves the subject of a tensed sentence and SSC involves the c-command domain of the subject of an NP or S.

(12) Nominative Island Constraint (NIC):
a nominative anaphor must be bound[5] in its clause (Chomsky 1980)

(13) Specified Subject Constraint (SSC):
if α is an anaphor in the domain of the tense of the subject of ß, ß is minimal[6], then α cannot be free in ß, where ß = NP or S (Chomsky 1980).

Under both SSC and NIC, anaphors must be bound. These constraints would rule out the ungrammatical structures (14a) and (b).

(14) a. * they said that each other would go
b. * Mary$_i$ considers John to have left herself$_i$

NIC would rule out (14a) since <u>each other</u> cannot be bound by <u>they</u>. SSC would rule out (14b) since <u>Mary</u> cannot bind <u>herself</u>, leaving <u>herself</u> free in its domain.

When α is a pronoun, α must be free in the same domain in which the anaphor must be bound. Thus, if a pronoun is

substituted in the ungrammatical structures in (14), the resulting structures are grammatical as seen in (15).

(15) a. They said that they would go.

b. Mary considers John to have left her.

In both examples the pronoun is unbound or free in its domain. These two conditions would then account for (8a) and (b) repeated here as (16).

(16) a. *John$_i$ likes himself$_j$

b. *John$_i$ shaved him$_i$

In (16a) himself must be bound by John, so they cannot be disjoint in reference. In (16b), him cannot be bound by John, so that it must be disjoint in reference.

The final condition on binding involves R-expressions (i.e. names and variables). These R-expressions must be free everywhere. They cannot be bound in any domain, as in (8c) repeated here as (17).

(17) * John$_i$ kissed Mary$_i$

Mary in (17) would be bound by John, thus violating the binding conditions on R-expressions.

To summarize briefly, Chomsky posits in the OB-framework three conditions on binding stated in (18).

(18) Binding Conditions

a. an anaphor must be bound in the smallest domain of a subject in which it occurs

b. a pronoun must be free in the smallest domain of a subject in which it occurs

c. an R-expression must be free

Chomsky assumes in the OB-framework that binding conditions apply at LF. LF or Logical Form is the level of syntax, which represents the structural meaning of a sentence.[7]

The structural meaning expressed at LF involves the scope of operators and quantifiers, conditions on variables and predicate argument structure. LF is derived from S-structure by a series of rules including construal rules that relate syntactic argument positions to other syntatic argument positions. Binding conditions are considered well-formedness conditions on LF in the OB-framework. Following the OB-framework, Binding Theory acts as a semantic filter on indexing as well as a constraint on syntactic movement rules.

2.2.1 Problems with the OB-framework

While the OB-framework has much to offer as well as considerable empirical support, there exist a number of conceptual problems. Chomsky (1981), in reevaluating his work on binding, notes several problems. First is the problem of redundancies between case theory and binding theory. Both these theories involve the position of subject of an infinitive. Case theory shows that subject of an infinitive is a noncase-marked position, while binding theory shows this position to be the one transparent domain.

He suggests the possibility of reducing opacity to case theory.

Second, the OB-framework does not explain the opacity conditions. There is no explanation of why the subject of a tensed sentence (NIC) and the c-command domain of a subject (SSC) are the opaque domains. These two domains appear to be unrelated.

There is also a breakdown in the correspondence between the theory of movement and the theory of binding. This can be seen in apparent asymmetries between NIC and SSC as well as apparent violations of NIC. Rizzi (1978) observes that in Italian SSC does not hold for wh-movement. Chomsky handles these by assigning them to RES(NIC), the residue of NIC, shown in (19).

(19) RES(NIC):

[NP e] np must be locally coindexed with a c-commanding NP (van Riemsdijk and Williams 1981)

The indexing procedures present another problematic area. The system is complicated and could possibly be simplified. Chomsky questions the possibility of eliminating the concept of anaphoric index entirely. Finally, this problem with the indexing results from the ideas of coreference for anaphors, but disjoint reference for pronouns.