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CONFIGURATIONAL GRAMMAR

Jan Koster

1. From rules to representations

In this introductory section, I would like to give a brief characterization of the development of transformational grammar from a largely derivational paradigm to a theory of permissible antecedent-anaphor linkings. Then, in a second section, I will give an outline of "configurational grammar" as I see it, and I will conclude with some remarks on idealization and markedness.

In 1965, when Chomsky's *Aspects of the Theory of Syntax* appeared, transformational grammar was in its most typical manifestations a derivational paradigm. Attention was generally focused upon different types of rules with their various interactions, with the concept of the cycle as by far the most significant development. Now, fifteen years later, this type of transformational grammar seems just as remote as another development of the late sixties, Generative Semantics. Generative grammar has radically been transformed in the seventies and it is appropriate at this point to ask why and in what direction the change has taken place.

Transformational grammar in the original sense lost ground when it appeared that the theory of anaphora, or rather the theory of antecedent-anaphor configurations, could not be incorporated in the derivational paradigm. Shortly after *Aspects*, Dougherty, Jackendoff, and others, persuasively demonstrated that a transformational approach to anaphora led to unsummountable problems.¹ Nevertheless, the linking from antecedent to anaphor was still conceived - in full agreement with the derivational mode - as a rule, particularly as a coindexing rule. Coindexing has stood for "intended coreference" and the rules were thought to be constrained by conditions on these rules.

In other areas of grammar, the transformational paradigm was more or less maintained. Deletions were sometimes conceived as interpretation of null elements, but movement transformations have played a role up until the present day. In principle, the mini-revolution in the theory of anaphora could have led to an immediate similar shift in

the theory of deletion and movement phenomena. Especially after the introduction of traces in Chomsky (1973), the way seemed free for a "grand unification" in terms of the nontransformational theory of anaphora. If the theory of grammar allows base-generated null elements that are interpreted as anaphors, then it becomes possible to treat the gaps in deletions and movements as null anaphors. Such perspectives of the underlying unity of linguistic theory have always been among the major motivations for trace theory, and rightly so. Attempts at unification are the essence of scientific theorizing, and it is therefore regrettable that in this case the unification went less far than it could. Before discussing this failing unification in somewhat more detail, I would like to give a brief sketch of the further development of the theory of anaphora from a non-transformational but derivational theory to a completely non-derivational, configurational theory.

Since the classical papers of Lees and Klima (1963) and Langacker (1969), the theory of anaphora can be seen as being characterized by two dimensions, "Primacy" and "locality". Primacy notions are conceptions like "precede", "Command", and "superiority".² Locality principles come in two varieties, "domain principles" and "minimal distance principles".³ In the framework of Lees and Klima (1963), for instance, the distribution of reflexives is governed by a domain principle that Postal (1971) referred to as the Clause Mate Condition: reflexives must have their antecedent in the same simplex S. This domain principle was implemented as a condition on the reflexivization transformation. When the transformation was replaced by a coindexing rule, the Clause Mate Condition remained, or was replaced by other conditions on rules, like the Specified Subject Condition and the Tensed-S Condition in Chomsky (1973). The well-known format of such conditions is as follows:⁴

- (1) No rule involves X, Y, in:

$$\dots X \dots \underset{\alpha}{[\dots Y \dots]} \dots X \dots$$

- where (i) α is a tensed S (Tensed S Condition)
 (ii) α is an S and Y a reflexive (Clause Mate Condition)

This format leaves the exact nature of the rules (transformations, coindexing, etc.) unspecified, but explicitly presupposes the existence of rules in all cases. Since then the idea of filters came to prominence in Chomsky and Lasnik (1977). Filters do not refer to rules but to representations, and also conditions like (1) can be reformulated as conditions on representations. In the new format of conditions like in Chomsky (1978), (1) would be formulated as follows:⁵

- (2) A reflexive X cannot be free in:

$$\dots \underset{\alpha}{[\dots X \dots]} \dots$$

- where (i) α is a tensed S (Tensed S Condition)
 (ii) α is the minimal S containing X (Clause Mate Condition)

Conditions like (2) are not mere notational variants of conditions like (1), but reformulations with significant empirical consequences. This can be demonstrated with the following two sentences:

- (3) a. *They said [_S that themselves were happy]
 b. * [_S Themselves were happy]

Only (3a) is ruled out by (1), but both sentences are rejected by (2). A condition on rules like (1) cannot block an ill-formed structure like (3b) since there is no rule illegitimately connecting two positions (X and Y) involved in (3b).

With conditions on representations like (2), it is even the case that the coindexing rules themselves become dispensable. In his Pisa lectures, Chomsky proposed to replace coindexing rules by the non-derivational mechanism of free indexing of base-generated categories. Given this mechanism, a definition of binding and nonbinding configurations for the various NP types suffices.

Summarizing so far, we see that the non-transformational theory of anaphora has led to a completely non-derivational theory. There are no rules and conditions on rules, but representations and conditions on representations.⁶ Permissible representations are defined on freely indexed categories in terms of primacy and locality notions.

The standard version of the EST is a hybrid theory because it assumes a unification with the theory of anaphora along the dimension of primacy but not along the dimension of locality. The outputs of movement rules are configurationally checked in the sense that the moved category has to have anaphora-type primacy over its trace in terms of c-command. Together with other conditions, like Emonds' Structure Preserving Hypothesis, this primacy check on output representations has led to the remarkable reduction of the transformational component known as "move".⁷

The locality principle for movement, however, continued to be conceived as a derivational condition. Movement is supposed to be uniquely characterized by Subjacency, a condition on rules like (1) (but see Freidin 1978):

No rule involves X, Y in:

$$\dots X \dots [_{\beta} \dots [_{\alpha} \dots Y \dots] \dots] \dots X \dots$$

Thus, contrary to the development in the theory of anaphora, there was no shift in the conception of movement, neither in the direction of free indexing nor in the direction of domain principles formulated as conditions on representations. In other words, movement can be unified with the theory of anaphora insofar as both phenomena involve the configurational notion of c-command, but the locality principles are entirely different in the two cases. Given the logic of the situation, this hybrid theory of movement seems highly suspect. An optimal theory would

entail full unification in a non-derivational, configurational theory. Since the theory of movement already conforms to this ideal along the primacy dimension, it is natural to focus on (4): if (4) can be replaced by a condition like the locality principle for bound anaphora (2), full unification will be a fact. Comparison of (2) and (4) shows that (2) involves one bounding node (α), while (4) has two bounding nodes (α and β). So, unification would require that the two-node condition (4) were replaced by a one-node condition like (2). Under the assumption that the relevant principle must be a condition on anaphors like (2), incorporation of null elements like traces in (2) would yield immediate advantages (A reflexive or empty element X cannot be free in: etc. (see (2))):

- (5) a. *They_i said [_S that e_i were happy]
 b. * [_S e_j were happy]

By incorporating empty categories in conditions like (2), the explanation for the ungrammaticality of (5) becomes analogous to the ungrammaticality of (3), which seems a fortunate result. It should be noted that structures like (5) can be generated as a consequence of base-generating empty nodes, and that the Subjacency Condition does not block the sentences in (5). In other words, an extra principle like (2) would be needed anyway for empty nodes, even if the grammar contained the Subjacency Condition. Given the fact that the two-node character of Subjacency blocks unification, and given the fact that a one-node condition is needed anyway, it becomes a near certainty that something is wrong with Subjacency. The theory of grammar could be considerably improved if a one-node condition like (2) that explains data like (5), could also account for the standard Subjacency facts like the Subject Condition, the Complex NP Constraint, and the Wh-island Constraint. The improvement that is so clearly suggested by the logic of unification, is not only possible but also has considerable excess empirical content. That the standard facts of Subjacency follow from a condition like (2), will be clear from some examples (assuming that not only \bar{S} , but also NP is a bounding node):

- (6) a. Complex NP Constraint
 *Who_i do they believe [_{NP} the claim [_S e_i that [Bill saw e_i]]]]
 b. Subject Condition
 *I wonder [_S who_j [[_{NP} a picture of e_j] disturbed Bill]]
 c. Wh-island Constraint
 *Who_i do you know [_S which man_j [e_j saw e_i]]

All these cases are explained by a one-node condition like (2), and its excess empirical content lies in examples like (5), the explanation for

the local character of Gapping (cf. Koster 1978), and also in examples like:

- (7) a. The letter to John was thrown away by Mary
 b. *To John_i [_{NP} the letter e_i] was thrown away by Mary
- (8) a. Pottery from China is fine
 b. *From China_j [_{NP} pottery e_j] is fine

In fact, the empirical superiority of a one-node condition is so obvious that one becomes curious about the origins of the two-node thesis of Subjacency. The two-node thesis appears to rest on certain extra-position facts and facts like the following (cf. Chomsky 1973):

- (9) a. Who_i did you see [_{NP} a picture of e_i]
 b. *Who_j did you hear [_{NP} stories about [_{NP} pictures of e_j]]

These facts suggest that extraction from one NP is fine, but that the result is hopelessly ungrammatical with extraction from two NPs. The facts of English are misleading, since this language has a curious and ill-understood escape zone at the end of VP.⁸ This escape zone only occurs in English, and a few other languages, like the (Germanic) Scandinavian languages. In most languages, extraction from one NP is also impossible, and both Dutch equivalents of (9), for instance, are ungrammatical:

- (10) a. *Wie_i heb je [_{NP} een foto van e_i] gezien?
 b. *Wie_j heb je [_{NP} verhalen over [_{NP} foto's van e_j]] gehoord?

So, it appears that the empirical superiority of a one-node condition becomes even more obvious when other languages than English are studied. In English, a one-node condition is always sufficient outside the very narrow escape zone at the end of the VP (cf. (6b)).⁹

The fact that English has the curious - possibly marked - escape zone property throws an entirely new light on the bounding nature of other major phrase nodes like AP and PP. Van Riemsdijk (1978) has convincingly argued that the PP, for instance, is a bounding node. Sceptical reactions from students of English are erroneously based on examples like:

- (11) What_i did you talk [_{PP} about e_i]

The grammaticality of such examples is supposed to show that the PP is not a bounding node. Again, the example is irrelevant because the PP is in the escape zone. As in the case of NPs, PPs outside the escape zone are always islands in English:

- (12) a. John said that [_{pp} to him] it was obvious
 b. *Who_i did John say that [_{pp} to e_i] it was obvious

Again, the explanation (in terms of a one-node condition like (2) with PP among the bounding nodes) can be checked in other languages that miss the escape zone. The Dutch equivalent of (11) is rightly predicted to be ungrammatical:¹⁰

- (12) *Wat_i praatte je [_{pp} over e_i]

In conclusion we must say that a one-node condition like (2) (with NP and S as bounding nodes for all anaphors, and AP and PP only for null anaphors) has overwhelming empirical support. The result is that the theory of movement (insofar as it involves traces) can completely be unified with the non-derivational, configurational theory of anaphora, not only in terms of primacy (c-command) but also in terms of locality (one-node condition on representations like (2)). The two-node conception of Subjacency seems untenable, and there is not a single convincing piece of evidence that shows that there is a unique locality principle for movement.¹¹

There have been two other objections against the incorporation of movement in the non-transformational theory of configurations. The first objection is very interesting and has pointed in the direction of a crucial improvement of the theory of configurations. This objection concerns the fact that certain empty categories, like subjects of infinitives are sometimes not locally controlled (14a), or not controlled at all (14b):

- (14) a. John_i says [_S it is impossible [_S e_i to shave himself]]
 b. It is difficult [_S e to do such things]

The binding of the empty subject of the most deeply embedded clause in (14a) by John_i violates Subjacency. It has, therefore, often been concluded that control involves PRO-interpretation, that, contrary to trace interpretation, does not obey Subjacency. Thus, control facts could easily be construed as counterevidence against the identification of movement and other forms of coindexing of empty nodes with an antecedent. Similarly, both sentences in (14) are at first sight rejected by a condition like (2): in both (14a) and (14b) the empty category is not bound within its minimal S. This problem has been solved in a non-trivial way by stating domain conditions like (2) no longer in terms of bounding nodes, but in terms of governing categories. A governing category is a minimal domain, for instance an S, in which a node is governed. According to the definition of "government", to be given in the next section, the empty subjects in (14) are not governed, so that there is no governing category for them in (14). The concepts of government and governing categories were explored in earlier work by Vergnaud and Rouveret, and were further developed in Chomsky (1978) and subsequent work.¹² As will be demonstrated in the next section, these concepts form an essential improvement of the domain conditions in earlier theories.

Another objection against incorporation of movement in the theory of binding has been the fact that standard anaphoric constructions involve linking of two NPs with two independent thematic roles:

(15) Anaphora

- a. John hates himself
- b. Mary says that she knows where it is.
- c. John tries e to go.

(16) Movement

- a. John seems e to go
- b. Which book did she read e?

In all cases of anaphora, the antecedent has a thematic role that differs from the thematic role of the anaphor. In the movement cases, the antecedent shares its thematic role with the bound element (i.e. the trace). Sameness of thematic role is a necessary condition for "scattering" of idiomatic material in sentences like:

(17) Headway_i seems e_i to be made e_i

Idiomatic material, locally defined in the expression to make headway, can only appear in NP positions that have no thematic role of their own.

This objection becomes rather innocent as soon as one realizes that "scattering" of idiomatic material also occurs in clear cases of non-movement:¹³

(18) The headway_i [S e_i [they made e_i]] was not very impressive

It appears that transfer of thematic relations also occurs when a non-interrogative Wh-word, like a relative pronoun, is bound by a non-argument antecedent.¹⁴ This type of binding can not only be observed in relative clause constructions, but also in a number of other constructions that are known to involve some form of Wh-movement, like topicalized constructions (cf. Chomsky 1977):

(19) Den Mann_i den_i habe ich e_i gesehen

The German example is particularly interesting because it also shows overt transfer of case. In general, one must conclude, transfer of thematic roles is an interaction phenomenon. It occurs when the anaphor is of a certain type (either empty or Wh), and when the antecedent is a non-argument, i.e. when it has no thematic role of its own. Most non-argument positions are structurally defined: the Wh-position in COMP is a non-argument position, and so is the position of topicalized elements.¹⁵ Non-argument positions that are not structurally defined, like the subject position of verbs like seem, must be lexically marked as such. Binding of empty elements or Wh-pronouns by a non-argument can be incorporated in the configurational theory of binding by the concept of "dependent binding" (cf. Koster 1980): some but not all anaphors can

and must be bound by an antecedent with the same thematic index.¹⁶ Since this concept of dependent binding seems needed anyway for the binding of Wh-pronouns - a type of binding that definitely can not be treated as a case of movement - there is no reason at all to generate the movement cases by transformational means.

All in all, there is no single convincing argument that I know of against the full unification of all major transformation types (like deletion, pronominalization, and movement) in the non-derivational, configurational theory of binding. In the next section, I will give a brief summary of this theory.

2. The configurational theory of binding

The domain principles in the theory of binding are defined in terms of the notions "government" and "governing category". Currently, there is some variation in the exact definition of these notions, and they will no doubt be improved in the near future. Here, I will give my own version, based on "formal dependency" (cf. Koster 1979). A node is governed if it is formally dependent on a lexical category (N, V, P, A) or a complementizer.¹⁷ A direct object, for instance, is governed by a verb. In many languages, the formal dependency is expressed by case marking, and there is a close connection between case marking and government (for NPs). Subjects of tensed clauses are governed by "tense", which is presumably a feature of the complementizer. The formal dependency is often expressed by nominative case. There is no complete overlap, however, between case marking and government. The genitive case of possessives, like in *Mary's book*, is not dependent on a lexical category or a complementizer, which entails that the possessive phrase is case marked but not governed. Where case marking does not depend on a governing node we will speak of irregular case marking. I will also assume that finite verbs are governed by tense, in order to be able to incorporate Gapping in the configurational theory.¹⁸ Furthermore, I will assume that both case marking and government can be transferred from a bound node to its antecedent:

(20) Who(m)_i did you see e_i

In such cases, the Wh-phrase is case marked and governed by the fact that it binds a governed node, namely its trace.¹⁹

A governing category is the minimal major phrase node in which a category is governed. For all anaphors, NP and S are governing categories, while the more limited distribution of null anaphors is expressed by also subsuming AP and PP among the governing categories for empty categories.

Domain principles are given in terms of governing categories, and not in terms of bounding nodes. The following examples illustrate the difference:

- (20) a. *John_i says [_S that [e_i is sick]]
 b. John_j tries [_S e_j to go]

In both sentences, there is a free e in its minimal \bar{S} . So, if the condition would simply state that empty nodes should be bound in their minimal \bar{S} , both sentences would be ruled out. But if the domain is defined as a governing category, only (20a) is predicted to be ungrammatical. The reason is that in (20a) the embedded subject is governed by tense so that the minimal \bar{S} containing it is a minimal governing category. In (20b), the embedded subject is not governed at all so that there is no governing category containing it.

The theory of binding, as I see it, is based on an NP classification in terms of the notions "proximate", "local", and "dependent". Only proximates can be bound at all. Proximates are locally bound if they are bound within the minimal governing category containing them, and they are dependently bound if they are bound by an NP with the same thematic index. The following table shows how NPs are cross classified along the three dimensions:

(21)	Proximate	Local	Dependent
<u>John</u>	-		
<u>He</u>	±	-	-
<u>Himself</u>	+	+	-
[e]	+	+	+
[wh]	+	-	+

Empty categories are indicated by [e], while [wh] refers to noninterrogative Wh-pronouns, like relative pronouns. It appears that there is a pair of dependents and a pair of independents, that are each further subdivided in a local and a non-local. The distribution of the various NPs is defined by the following conditions:

- (22) a. Only proximates can be bound, and must be bound if they are case marked
- b. Only locals can (and must) be bound in their minimal governing category
- c. Only dependents can be bound by a dependent, and must be bound by a dependent in every governing category

Thus, the various NPs can be bound in their specific way, and must be bound in their specific way if they are governed. As it stands, (22) is not entirely satisfactory because obligatoriness is defined in terms of government in (22b) and (22c), and in terms of case-marking in (22a). In an optimal theory all three conditions would be given in terms of government. I suppose, therefore, that (22a) is a somewhat marked version of a universal condition based on government.

We will now consider some illustrative examples of the basic theory. According to (21), names like John cannot be bound at all:

- (23) a. *He_i saw John_i.
 b. *He_i said that John_i was sick.

Names are non-proximate or obviative, and are interpreted as disjoint in reference with the NPs that c-command them.

Personal pronouns like he are ambiguous in English. They are either proximate or obviative:²⁰

- (24) John_i says [_S that [he_{i/j} is sick]]

Proximate personal pronouns are non-local, i.e. they cannot be bound by an antecedent in the same governing category:

- (25) a. *John_i saw him_i.
 b. John_i saw himself_i.

In local environments, a reflexive is required as illustrated by (25b). The local/nonlocal distinction also accounts for major facts previously accounted for by the Specified Subject Condition:

(26) Specified Subject Condition

- a. John_i believes [_S himself_i to like Mary]
 b. *John_i believes [_S Mary to like himself_i]
 c. *John believes [_S him_i to like Mary]
 d. John_i believes [_S Mary to like him_i]

(27) Tensed S Condition

- *John_i thinks [_S that [himself_i is sick]]

Assuming that the embedded subjects in (26) are governed by the matrix verb believe, all facts are accounted for. The first sentence (26a) is grammatical, since himself has an antecedent in its minimal governing category, which is the matrix clause in this case. The second sentence is ungrammatical, because here the embedded clause is the minimal governing category (himself is governed by like); there is no antecedent for himself in this minimal governing category. With non-locals like him, we find the opposite pattern, as predicted (26c and d). Sentence (27) is predicted to be ungrammatical because himself is governed by tense in its minimal governing \bar{S} , in which there is no antecedent.

Empty nodes must have a dependent antecedent in their minimal governing category which explains the ungrammaticality of:

- (28) *John_i saw e_i

John has an independent thematic index, assigned by the verb saw.
 Only antecedents without an independent thematic status are allowed:²¹

- (29) a. What_i did Mary see e_i?
 b. Mary_j was seen e_j in Paris.

Similarly, almost all major Subjacency facts, and many other facts are explained by the condition that empty nodes must be bound in their minimal governing category, as was demonstrated in the first section of this paper. Facts that deserve special mentioning are the so-called COMP-to-COMP violations:²²

- (30) *Who_i [e_i decided [S e_i that [Bill saw e_i]]]

Although decide is a bridge verb, this sentence is ungrammatical because the dependent e_i's in the embedded clause are bound by the independent matrix subject, which is ruled out by (22c).

The dependent-independent distinction also accounts for the fact that independents (like him and himself) cannot be bound by a dependent antecedent:

- (31) a. *Who_i did John see himself_i?
 b. *Who_j did John think [S that [Mary saw him_j]]]

Just like independents, dependents come in two varieties: they are either local (empty categories), or non-local (Wh-pronouns). Wh-pronouns are always bound outside their minimal governing category.²³

In general, a theory based on (21) and (22) stipulates that proximates are in complementary distribution along two dimensions: the local/non-local dimension, and the dependent/independent dimension. The theory also predicts that the major distinctions can be released when anaphors are not governed, so that there is no governing category (recall that obligatoriness depends on government in (22)). This fact is particularly manifest if we consider the deviant binding properties of the ungoverned, caseless empty subjects of infinitives (PRO's). Empty nodes always have an antecedent, except when they are not governed (22a):

- (32) It is impossible [S e_? to do such things]

Thus, the obligatoriness of control in many cases is not stipulated by the binding theory, but depends on other factors, presumably on predication in the sense of Williams (1979). The local/non-local distinction is also neutralized for ungoverned nodes. If the ungoverned empty subjects of infinitives are bound, they are usually bound outside their minimal S (which is not a governing category):

- (33) John_i thinks [S that [it is difficult [S e_i to shave]]]

Similarly, the dependent/independent distinction can be released for the ungoverned infinitival subjects:

- (34) a. John_i seems [_S e_i to go]
 b. John_i tries [_S e_i to go]

In (34a), the embedded subject is bound by a dependent antecedent, while in (34b) the antecedent is independent. Governed empty nodes, however, are always bound by a dependent.

There are also some cases where the complementary distribution for lexical anaphors is released because there is no governing category. Recall that possessives have irregular case because they are not governed. Consequently, the complementary distribution of locals and non-locals can be neutralized in such positions:²⁴

- (35) a. They_i saw [_{NP} their_i mothers]
 b. They_j saw [_{NP} each other's_j mother]

The complementary distribution between the local reciprocals and the non-local personal pronouns is usually maintained in governed positions. If the minimal NP is not a governing category, as in (35b), the reciprocal can also be bound outside its minimal domain (see 22b). For similar reasons, the Tensed S Condition can be violated if the locals are in the ungoverned possessive position:²⁵

- (36) They_i do not think [_S that [each other's_i positions are plausible]]

In other words, the local/non-local distinction defined on governing categories does not only explain Clause Mate Conditions as far as they go, it also explains several violations of the Clause Mate Condition, like (26a) and (36).²⁶

Although many problems are not even mentioned here, I think it is fair to say that a mass of facts can be explained by a relatively simple theory based on three major distinctions that also occur in one form or another in most other current versions of the WST. The present theory is the only one that fully integrates the theory of movement and Subjacency in the binding theory. It is my belief that this integration completes the unification that Chomsky started by the introduction of trace theory. Since traces are treated as base-generated null anaphors in the present theory, there is no longer any need for a level of D-structure and a special mapping from D-structure to S-structure called "move". The level of S-structure, more abstract than traditional surface structure because it contains empty elements and abstracts away from stylistics, can be directly generated by context-free rewriting rules.²⁷ The resulting model has the following form:

- (37) PR ← S-structure → LF

The binding conditions are defined on S-structure and, apart from the ill-understood stylistic component, transformations do not play a role in this model.²⁸

3. On idealization and markedness

Up until recently, it was a self-evident truth that linguists study languages. The concept of "language" itself was almost never considered very problematic, and the introduction of transformational grammar hardly made a difference in the beginning. A language was supposed to be a set of sentences, and a grammar was conceived as a device that exactly generates this set. The underlying assumption was that the intuitive difference between sentences and non-sentences was sufficient to determine the domain of linguistic theory. It has never been very likely that this situation would continue to exist under a reasonably successful development of transformational grammar. One of the most typical features of a successful theory is that the domain of inquiry is dramatically changed in the course of the development of the theory. Such change is guided and stimulated by what one might call a data-independent culture of forms. This culture of forms determines what reasonable hypotheses look like and what direction research should take. Classical astronomy, for instance, did not simply become the exemplar for all exact science by its use of geometry in the description of nature. It became the model of physical science by its adoption of a very specific "ideal of natural order", the ideal of circular movement.²⁹ According to the classical paradigm, a description of moving heavenly bodies was successful to the extent that even apparently non-circular movements could be reduced to the circular ideal.³⁰ The adoption of ideals in one's theories always leads to empirical problems, since the common sense classification of nature does not neatly fit the mathematical ideas. If anything has contributed to the success of the natural sciences, it is the fact that scientists often took their ideals more seriously than what their eyes told them. An often cited example is Dirac's comments on Schrodinger's publication of his wave equation that, after the discovery of spin, turned out to be a premature sacrifice of beauty under supposed empirical pressures:³¹

I think there is a moral to this story, namely that it is more important to have beauty in one's equations than to have them fit experiment.... It seems that if one is working from the point of view of getting beauty in one's equations, and if one has a really sound insight, one is on a sure line of progress. If there is not complete agreement between the results of one's work and experiment, one should not allow oneself to be too discouraged, because the discrepancy may well be due to minor features that are not properly taken into account and that will get cleared up with further developments of the theory.

Taking ideals and aesthetic considerations seriously leads to the reinterpretation of problematic data ("refutations") and to a radical revision of the classifications of relevant domains by common sense or earlier theories.

I mention these things in somewhat detail, because it is my belief that the recent history of linguistics, including the new interest in markedness, can only be understood against the background of a growing awareness of ideals and aesthetic considerations in theory construction.

Early transformational grammar introduced powerful formal tools, but was relatively poor in formal ideals. Consequently, the field remained to a large extent purely descriptive and naive falsificationism often seemed appropriate from this point of view. In fact, the introduction of transformations often helped linguistics just as little as the mere introduction of geometry would have helped classical astronomy. The formal tools needed to be supplemented with certain "ideals of natural order". In my opinion, the relevant awareness of ideals grew out of the identification of two families of concepts that had guided research all along in certain areas. The concept families I have in mind are, of course, the primacy and locality principles that were mentioned several times before. In retrospect, we may formulate our ideal as a search for a unified theory in terms of a minimal number of primacy and locality principles. Chomsky's introduction of traces led to a very suggestive unification along the primacy dimension, and my own work of the last few years has been an attempt to complete the unification along the other dimension.

As in other areas, attempts to construct an optimal theory on the basis of formal ideals lead to inevitable discrepancies between the theory and the facts as we know them. To say that the facts falsify the theory in such cases is often premature, just like in other sciences. The scepticism, and even hostility, that theories which are not strictly descriptive meet, really shows that the idealizing and anticipating aspects of explanatory theories are misunderstood. It is simply the case that when theories are improved on purely formal - if one wants aesthetic - grounds, they often get out of phase with known reality for some time. As every natural scientist knows, much normal science is nothing else than a search for new ways to bridge the gap.

In our case, the attempts to develop some theory of markedness (in syntax) can be seen as a new way to bridge the gap between the optimal theory of core grammar and certain facts of language.³² This leads to a dual idealization with respect to the pre-systematic notion of "language". Grammar itself abstracts away from nonlinguistic psychological factors that contribute to the intuitive conception of language. The stricter notion of an optimal core grammar is a further idealization, and abstracts away from the more peripheral aspects of grammar. With such dual idealization it is never obvious whether facts based on the intuitive notion of language have a bearing on the correctness of theories of core grammar. To give a concrete example, consider again the possibility of extraction from a PP in English:

(38) What_i did you talk [_{pp} about e_i]

Under the new idealization, the mere possibility of extraction from PP is not sufficient to determine the bounding nature of PP. If a fact like (38) is caused by peripheral factors, it has no bearing on core

grammar. So, we need a wide range of facts to determine the status of (38). In this case, the evidence came from other languages and from PPs in other contexts in English. It appeared that extraction from phrase nodes (apart from \bar{S}) is only possible in a very limited "escape zone" in English. This escape possibility was called a marked option. A brief look at the literature shows that this case is typical for cases of markedness in syntax: facts that fall outside the domain of an optimal theory, but that are correct instances of language according to our intuitive conception of language. In fact, we hardly have a theory of markedness, but only a list of such cases. It seems appropriate to collect such cases and to try to find some pattern in these deviances from core grammar. But it is not at all certain whether such attempts will lead anywhere. It is very well possible that marked phenomena will remain idiosyncratic phenomena without theoretical significance. In the most interesting case, however, language grows over the borders of its core in a partially structured fashion. We can only speculate on this, but it seems to me that the bridge properties of certain languages are examples of partially structured extensions. Erteschik (1973) has shown that extraction of Wh-phrases from a clause is only possible over certain verbs described as "bridges". Thus, say is a bridge, while quip is not:

- (39) a. Who_i did he say [\bar{S} that [Mary saw e_i]]
 b. *Who_j did he quip [\bar{S} that [Mary saw e_j]]

Again, the irregularity points in the direction of a marked phenomenon, and again there are languages (like Russian) that do not allow extraction at all. There are also languages, like Italian, in which all verbs are bridges. In Italian, the Wh-island Constraint can be violated over exactly one other Wh-phrase (cf. Rizzi 1978). As soon as there are two Wh-phrases between a third Wh-phrase and its trace, the result is ungrammatical in Italian as well. Schematically, this fact has the following form:

- (40) [\bar{S}_3 Wh₃ [... [\bar{S}_2 Wh₂ [... [\bar{S}_1 Wh₁ [...e₃ ...]]]]]]]]

Empty nodes like e₃ are locals, and in the unmarked case they have to be bound in their minimal governing category. In the marked case, when the minimal governing category is in the environment of a bridge X, the empty node can also be bound outside its minimal governing category. The value of X differs from language to language, and can be seen as a parameter (cf. Koster 1980). Suppose now that this bridge parameter is supplemented with the following universal principle:

- (41) For each pair of bounding nodes, \bar{S}_i and \bar{S}_j , \bar{S}_i has to be bound in the minimal domain containing \bar{S}_j if \bar{S}_j is not bound in \bar{S}_i :

...[...[...[e]_i...]]...]

Together with the bridge parameter, this principle explains (40) (the Italian facts), and the "successive cyclicity" of the binding from a

Wh-phrase to its traces.³³ The simple cases of the Wh-island Constraint violations are already explained by the minimal domain principle (22b) (cf. 6c). The more complicated examples like (40) and (42) are explained by (41):

(42) *What_i do you know [_{S₂} who_j [_{S₁} [_{S₁} e_i [Mary saw e_i]]]]

The trace in the COMP of \bar{S}_1 (e_i) is governed and not bound in its minimal governing category. Both verbs (know and say) are bridge verbs, so e_i may be bound outside its minimal governing category. The sentence is ruled out, however, by (41) since e_i is not bound in the next domain up. Therefore, (41) not only explains certain facts of Italian (together with the bridge parameter), it also accounts for certain facts in English.

What is interesting about (41) is that it looks like a minimal extension of the standard bounding condition (22b). The local nature of the binding of governed empty nodes is preserved, be it that (41) slightly relaxes the standard locality principle. Principle (41) only applies in the marked case that the minimal governing category for an empty node is in the environment of a bridge. Whether (41) is empirically justified remains an open question, but it could be an example of a universal principle with interesting properties that only applies in marked cases. The theory of markedness is interesting to the extent that such universal principles can be found.

Whatever the future of theories of markedness, I think it is clear that a great deal of transformational grammar can successfully be unified in a more abstract theory of possible configurations, based on an extremely limited class of primacy and locality principles. As for the nature of these principles, the language learner seems to have very little choice.

Footnotes

*This paper summarizes, among other things, some of the conclusions of a more elaborated study (Koster 1980). I would like to thank the Netherlands Organization for the Advancement of Pure Research (Z.W.O.) for financial support.

¹cf. Dougherty (1969), Jackendoff (1972).

²For the notion superiority, see Chomsky (1973). For the notion c-command, see Reinhart (1976) (and Culicover (1976) for a related notion).

³Cf. Rosenbaum (1967), Wilkins (1977), and Koster (1978).

⁴The name Clause Mate Condition is from Postal (1971). The principle itself goes back to Lees and Klima (1963). Chomsky (1973) rejects the Clause Mate Condition.

⁵Again, only the format occurs in Chomsky (1978). This article does not contain a Clause Mate Condition, and the Tensed S Condition is replaced by the Nominative Island Condition.

⁶I abstract away from stylistic phenomena, that can, arbitrarily, be described in transformational terms.

⁷Cf. Chomsky (1978).

⁸This fact was first brought to my attention by Joseph Emonds (personal communication).

⁹Cf. Koster (1980) for some further examples.

¹⁰Dutch has another (very limited) escape possibility for so-called R-words. See Van Riemsdijk (1978) for discussion.

¹¹The NP Constraint, formulated by Bach and Horn (1976), is the only example to my knowledge of a one-node condition. For discussion of the issue, see Koster (1978) and (1980).

¹²Cf. Rouveret and Vergnaud (1978). See also Chomsky (forthcoming).

¹³For arguments against so-called promotion analyses (in the sense of Vergnaud (1974)), see Koster (1980).

¹⁴I suppose that this transfer is optional. See Koster (1980) for discussion.

¹⁵Cf. Chomsky (1977) and Koster (1978).

¹⁶For the notion of thematic indices, see Taraldsen (1980).

¹⁷This definition covers the complements of the lexical categories. A proper definition should make some provision for adverbials, that must also be governed.

¹⁸Cf. Koster (1978).

¹⁹With Chomsky (1978), I assume that all lexical NPs must be case marked, even if case is not expressed at the surface. Thus, both who and whom are case marked in this conception.

²⁰Several languages, like Yoruba, make a formal distinction in such cases. Cf. Faltz (1977).

²¹In both examples, the thematic status of the antecedent is inherited from the trace. As with case marking, I assume that such transfer of thematic indices is optional.

²²Cf. Chomsky (1973).

²³See Koster (1980) for illustrative examples.

²⁴I assume that reciprocals like each other are locals, like reflexives.

²⁵Cf. Postal (1974), 75.

²⁶There are also cases for which I see no interesting solution, like reflexives and reciprocals in picture noun complements.

²⁷Cf. Gazdar (1979). Note that limiting the class of possible languages to the class of context-free languages is irrelevant for considerations of learnability. What we are looking for is a finite, and possibly very small, class of grammars.

²⁸One might object that the transfer of thematic indices, mentioned above, is a transformation-like operation. It is not obvious at all, however, that thematic indices should be transferred. They can be freely generated, like referential indices, and filtered by statements of thematic relations connected with particular lexical items and by binding condition (22c).

²⁹For ideals of natural order, see Toulmin (1961). For "the spell of the circle", see Panofsky (1954). For a summary of the discussion following Panofsky's book, see Caspar (1962), p. 141 and 142 (Ed. note).

³⁰See for instance Kuhn (1957), especially ch. 2.

³¹Dirac (1963).

³²Markedness considerations can also enter core grammar itself. See Chomsky (1979) for discussion.

³³For successive cyclicity, see Chomsky (1973). For a more detailed discussion of the "Italian problem", see Koster (1980). I assume that the values of the bounding nodes in (41) are limited to NP and S.

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