WORK IN PROGRESS – COMMENTS WELCOME! [October 2, 2003]

Natural Relations

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In this squib, I provide a theory of phrase structure which derives both the fact that phrases must have at most one specifier and the requirement that adjunction, though potentially unlimited in number, is restricted to base-generation. This restrictive understanding of phrase structure dictates, then, that movement (viz. Move qua Copy plus Merge) cannot adjoin a phrase to some projection XP; it can only be merged to X' and thus form [Spec,XP], and this operation can only take place once per projection. These restrictions follow once we inspect more closely a suggestion by Chomsky (1998) on certain structural relations that come "for free" with the operation Merge and employ a more accurate consideration of its consequences. I call the revised relations that define phrase structure *Natural Relations*. I then spell out what constitutes appropriate checking configurations and argue that these follow from the Natural Relations introduced earlier. Though largely conceptually motivated, the results achieved here conform to fairly traditional objectives of phrase structural relations, which can be empirically backed up. I also sketch some consequences for a theory of displacement in general, most importantly the conclusion that this theory unambiguously prefers an implementation in terms of Move, rather than Attract.

1 Phrase Structure

Consider the relevant X'-structural relations I will argue for in this squib in (1):

(1) a. [XP ZP [X' X^0 YP]] b. [XP AP [XP BP XP]] c. [X^0 Y^0 X^0]

These are the traditional head-specifier and head-complement relations (1a), phrasal adjunction (1b), and head-adjunction (1c), respectively. The line of thought pursued here suggests that these are the only viable structural configurations that can possibly arise in the course of the derivation. In other words, adjunction of a phrase targets the maximal projection, and may do so iteratively, a head has a unique complement and a unique specifier, and head movement adjoins one head to another.[1]

In (1), YP is the complement of the head X^0 and ZP its unique specifier; Y^0 is adjoined to X^0, and AP and BP are adjuncts of XP. I want to argue that phrase-structural relations must be defined in such a way as to allow Y^0, YP and ZP, and only these, to enter into a checking relation with X^0. As a consequence of the mechanics, we can derive the requirement that AP and BP can only be base-generated in the positions indicated; that is, all adjuncts must be the result of Pure Merge only. If adjunction could result from movement (understood as Copy plus Merge), we would expect adjuncts to enter into a checking relation with the head, on the assumption that movement is driven by the need of licensing grammatical properties ("feature-checking") and that at least one participant is a head (the "feature-checker," according to the Minimalist Program outlined in Chomsky 1995b). This expectation just does not seem to fit with current assumptions: adjunct clauses, adverbial modifiers and the like are commonly not taken to move around for checking purposes, at least not within TP or VP; displacement into CP is another matter, arguably an instance of topicalization or focalization. Moreover, we cannot uphold this expectation if the sketch of X'-relations presented here is on the right track. These are the desiderata.

In the original formulation of Bare Phrase Structure (Chomsky 1994, 1995a), the intermediate projection (not fully projected X' or, as this projection level is used here, XP) was taken to be different from the element originally merged to (X^0) and the final projected phrase (XP) only in being neither minimal nor maximal, i.e. $X^{[-min,-max]}$. As such it was stipulated to be invisible to interpretation, as only $X^{[+min,-max]}$ (the terminal element X^0) and $X^{[-min,+max]}$ (the fully projected phrase XP) are interpretable objects—which Chomsky (1995b:242f.) argues is the result of bare output conditions.

Building on Muysken 1982, minimal and maximal projections are identified by relational properties of categories only (i.e. complement, specifier and adjunct, depending on the relation between these elements and the head or its projections). These relations, and only these, basically yield the configurations in (1)—without, though, giving X' any interpretive status. This allowed the original minimalist framework (and its extensions in Chomsky 1998, 1999) to rule in multiple specifiers.[2] It distinguished between adjunction (of heads or phrases) and substitution (specifiers) in that the former creates a two-segment category and the latter a new category.

Consider first the proclaimed "invisibility" of intermediate, not fully projected elements, here taken to be a unique X' and all XPs dominated by the highest, fully projected XP. If we could remove the stipulation that these elements are invisible, we could easily enforce unique specifiers by stipulating in turn that a specifier must merge with X', and that there is only one X' per projection. More recently, Chomsky (1999:32) notes that "[t]he conceptual and empirical arguments for X' [here, XP] invisibility are slight." In effect, then, "invisibility" is simply not an issue anymore, which means that X' can indeed be thought of to play an integral role in structural relations.

2 Natural Relations

If phrase structure should be expressed in terms of "relational properties of categories, not properties inherent to them" (Chomsky 1995b:242), recourse to invisibility of some objects in the phrase marker need not be an issue at all—regardless of whether this invisibility is real. We can define these objects, and as such the structure of a projection, with *natural relations*. As it happens, Chomsky (1998) suggests something very similar himself, which I am going to explore further.

As one of the conditions of "good design" of language, Chomsky (1998:27) lists "[r]elations that enter into C_{HL} either (i) are imposed by legibility conditions, or (ii) fall out in some natural way from the computational process." Regarding (ii), he suggests that Merge yields two relations for "free," *Sister* and *Immediately Contain* (Chomsky 1998:31). For the purpose of discussion, let us assume that this is so.

If these two relations come for free, they are arguably the most natural relations to express phrase structure. Chomsky suggests that by merging the objects α and β, forming the new object K(α, β), we can understand Sister to hold of (α, β) as well as (β, α) and Immediately Contain of (K, α) and (K, β).[3]

(2) K
3
α β

If Sister and Immediately Contain are the most natural relations—"most natural" because they are the direct result of merging two objects and as such come "for free" (as I interpret Chomsky)—it might also be natural to assume that they should play an elementary role in defining certain relations relevant for grammatical computation. One such type of relation is *structural*, holding among the objects of a given phrase (or even phrase-marker). Another type of relation to be addressed is *operational*, say, to establish relevant checking configurations to license grammatical properties.

Suppose this is indeed so, and suppose that one way of extending these most natural or free (‘primitive’) relations is by applying the “elementary operation of composition of relations,” as Chomsky (1998:31) does. Such an application, “in all possible ways,” as he continues, yields three additional relations: *Contain*, as the transitive closure of Immediately Contain; *Identity*, the result of the function (sister(sister)); and *C-Command*, by applying (sister(contain)). It should be apparent that Contain and C-Command are structural relations with a very wide scope (everything contained by one or c-commanded by the other element in question) and hence cannot play a role for local evaluation, as envisioned in Checking Theory (Chomsky 1995b), while Identity does not seem to serve any obvious grammatical function, so that we can safely discard it (as well as a number of other superfluous relations that arise from a consequent application of composition—as would be expected, given that it would result in a vast array of structural relations).

I want to employ the two primitive relations to yield operational relations, namely those that are indeed relevant for local evaluation of grammatical properties, i.e. the possible checking configurations in the course of the derivation. The most natural extension of the two primitive relations is arguably the single application of composition to these two relations only. The only additional relation that arises is the result of the function (immediately-contain(sister)), which I call *Extended Sister*. Thus, if B is the head of β from (2), Extended Sister generates an additional relation between α and B:

(3) K
3
α β
3
B …

To establish a relation between α and B in (3), we first compute Sister of α, or (sister(α)), returning β, then apply Immediately Contain, (immediately-contain(β)), which returns B. The single composition of these two relations is Extended Sister and we now have a natural relation holding of α and B. It can be trivially observed that this relation is also know as the relation between a specifier and a head of the same projection. In the remainder of this squib, I will define checking configurations by building on the natural relations now established and illustrate appropriately.

To express my interests in metaphorical terms,[4] a simple algebra for natural numbers consists of the basic element '1' and the adding operation '+'. Closing the set {1} under '+' yields the (infinite) set containing all of the natural numbers. With the composition of relations, we can count and easily add 3 and 5, for example, to yield 8. I am not so much interested in an algebra for all natural numbers. Rather, my interest lies in the theory of counting, so to speak, as the operation that adds 1. Applied to language, of the set of all possible relations (such as phrase structure relations, c-command, and many irrelevant ones), I am interested in finding and defining a specific subset of grammatically relevant relations, which I here take to be checking configurations. We have two basic relations, the primitive relations Sister and Immediately Contain. An extension of the aforementioned theory of counting would allow the single composition of relations, to yield a total of three relevant relations: Sister, Immediately Contain, and Extended Sister.

3 Checking Configurations

By assumption, features are checked in very local relationships, and all evidence so far suggests that we want to include head-complement, specifier-head and head-head configurations to be admissible, but no other (Chomsky 1995a).[5] Chomsky (1993) suggests a checking domain which derives the desired results. However, it also allows more than one specifier to be within the checking domain of a relevant head as well as adjuncts (which would not check a feature simply by stipulation). In the present system neither one is desired, not even acceptable (see Grohmann 2000 for empirical coverage). So let us consider a way of replacing the checking domain with an alternative way of capturing these checking configurations in purely relational terms.

I first propose to define feature-checking with a Checking Condition:

(4) *Checking Condition*

An object O in the phrase marker endowed with a feature F can enter into a checking relation with a head H containing matching F if and only if O stands in a Natural Relation to H.

(5) *Natural Relation*

Let a Natural Relation be

i. any of the primitive relations provided by Merging two objects O, O' and

ii. the single application of composition of these primitive relations.

We are thus dealing with three *Natural Relations* (where α merges with β, K is the new label, and L is subsequently merged with K):

(6) a. Sister: (α, β), (β, α)
b. Immediately Contain: (K, α), (K, β)
c. Extended Sister: (L, κ), where $\kappa = \alpha$ or β (head of K)

Returning to (1), repeated slightly more elaborate as (7), we can now ensure that the three desired configurations head-head, head-complement, (unique) specifier-head, and only those, are permissible checking configurations:

(7) XP
3
AP XP
3
BP XP
3
ZP X'
3
X^0 YP
2 #
Y^0 X^0 … WP…
2
W^0 Y^0

According to (4), X^0, Y^0, and W^0 are heads which bear features that require checking under the familiar umbrella of Full Interpretation, Greed, and Economy, i.e. if no features are checked, movement should not occur. YP is the complement of X^0 and hence must enter into a checking relation with X^0 (certainly, but not necessarily, if Merge is costly; see fn. 6 below). ZP is in the specifier of X^0 and must also enter into a checking relation with X^0, for either one of the above reasons.

Turning to the other side of X^0 (i.e. κ from (6c)), if AP is a specifier, it too must check a feature on X^0; if it is an adjunct (as assumed here), it cannot. (The same goes for BP or any other object in the phrase-marker relevant for XP above ZP.) Let us run through the desired as well as undesired checking relations, and the predictions of applying the Checking Condition from (4).

The most straightforward is presumably head-complement, as the Natural Relation Sister is an immediate fall-out from the application Merge. Given that X^0 and YP above should enter into a checking relation, if we take (at least one understanding of) “selection” to be expressed this way,[6] and that X^0 is Sister to YP, this is the first desired result: head-complement checking is licensed by Sister.

Once X^0 and YP are licensed, (the complex head) Y^0 may move to X^0, assumed to be an instance of head-to-head adjunction. There are two possibilities: either Y^0 and its sister X^0 ($X^{[+min,-max]}$) enter into a checking relation (by Sister) or Y^0 and its mother X^0 ($X^{[-min,-max]}$) do (by Immediately Contain). I will assume the former.[7] So head-head checking is licensed by Sister.

Merging ZP with X’, the label of the object (X^0, YP), should ideally result in licit specifier-head licensing. It does: ZP is Sister to X’ which, in turn, Immediately Contains X^0, thus X^0 is the Extended Sister of ZP, one of the Natural Relations. Specifier-head checking is now legitimized by Extended Sister.

If we then merge AP and XP—which is the label of (ZP, X’), or more precisely, XP is the ordered set {(X^0, (ZP, (X^0, (X^0, YP)))}, regardless of the label of the intermediate level of projection—we should be able to find a Natural Relation between AP and X^0 if the two are to enter into a checking relation.

Alas, we do not find such a relation. The function (sister(AP)) returns XP, (immediately-contain(AP)) gives nothing relevant, and (extended-sister(AP)) churns out X’, not a head. We thus take AP to be unable to check a feature. This is correctly predicted by the Checking Condition (4) and the definition of Natural Relations (5).

In other words, licensing of AP must be of a different nature than licensing of ZP. If ZP is indeed a specifier, we recreate the specifier-head configuration and exclude multiple specifiers trivially: no element merged to any position above (ZP, X’) can enter into a Natural Relation with X^0 and hence cannot check off a feature with X^0. It follows that AP is a phrasal adjunct, and that phrasal adjuncts do not enter checking configurations with heads.

As for the undesired configurations, we can ignore the fact that X’ Immediately Contains X or that XP Immediately Contains X’, as both are projections of X^0 and checking is not needed. Likewise, we can glance over the fact that XP Immediately Contains ZP, as neither is a head and as such does not need to check features either. As far as I can see, we can ignore all other hypothetical relations also on the same grounds, in particular a potential Extended Sister relation between ZP and YP, computed over the other element Immediately Contained by X’.

4 Some Consequences

Let me first note that Immediately Contain is an asymmetric relation. This means that a specifier can enter into a Natural Relation with a head of the same projection, but not vice versa: there is no Natural Relation that could hold between X^0 and ZP in (7), for example. An obvious consequence from this state of affairs is that Chomsky's (1993) original minimalistification of Move α was on the right track: it is a property of the moving element that motivates displacement, not of an "attracting" head. While a head H (containing F) can "see" F on a relevant object O by virtue of c-commanding it, H itself cannot check the feature on O in a specifier-head—but O can check the feature on H. This suggests that the grammar makes available Move as an operation (understood to be the combination of Copy and Merge; see Hornstein 2000 for further discussion), but not Attract. In light of what Nunes (1995, 2001) identifies as *sideward movement*, I take this to be a welcome result (see also Bobaljik & Brown's 1997 notion of "interarboreal movement").[8]

Note also that the fact that Sister in head-complement and head-head configurations can be derived from either (α, β) or (β, α) allows us to locate the checker on either side. Thus, in a typical head-complement relation, such as the one between a verb and a direct object to its right in English, we can continue that line of reasoning and designate the object as the element bearing F, which it wants to check against F on the verb—in other words, Sister understood as (β, α) licenses checking. In a typical instance of head movement, on the other hand, the checker is the moving head, left-adjoining to the checkee—resulting in (α, β) as the relevant order.

A third (potential) consequence I would like to mention regards adjunction. As we have seen above, adjunction is ruled out as the outcome of a movement operation, simply because it could never lead to a Natural Relation with a head, hence never license a checking configuration. However, the system as presented here leaves open whether adjunction is cyclic or takes place post-syntactically (cf. Lebeaux 1988 and much subsequent work); the latter timing could adjoin an adjunct to X', for example. Since a specifier has already checked its relevant feature on the head, nothing would rule out its being excluded from a Natural Relation with the head after checking.

Finally, I want to draw attention to the fact that under this theory, the analysis of a number of constructions that have been analysed by either employing multiple specifiers or adjunction-movement, require a thorough revisit. Arguably the most cited examples of these concern scrambling (including both short scrambling as in German or long scrambling as in Japanese), multiple subject constructions (as they occur in Japanese, for example), and multiple Wh-questions (of the Slavic type).[9]

To sum up, in this squib I first argued for the existence of “natural relations,” by picking up a suggestion from Chomsky 1998 that the operation Merge gives us two relations for free, Sister and Immediately Contain. Applying the single application of composition to these two relations, we yield a total of three “Natural Relations”: Sister, Immediately Contain, and Extended Sister.

I then considered what role Natural Relations play in the computational system of language. It turns out that they can be exhaustively employed to license checking relations. In reference to the checking domain of early minimalism, I suggested a definition of checking configurations, making solely use of Natural Relations.

Some questions remain. One concerns the introduction of a checking configuration; as the notion of checking domain in Chomsky (1995b) has subsequently been dropped from investigations, it is not clear that a slightly revamped reintroduction is desired. However, defining checking configurations is trivial, once the notion of Natural Relations is accepted—and as these come basically for free, the conjecture that they also do some work does not seem far-fetched. In this sense, the notion of checking configuration should not be seen as a reintroduction of a checking domain, but as a simple, straightforward approach to come to grips with licensing relations in the phrase-marker, just as further application of composition of relations yields other desirable structural relations, such as c-command. If this can be upheld, the result is a system that assigns different structural licensing environments to all desired configurations, head-complement, head-head and specifier-head.

It might be the case that this modification of the original discussion of Chomsky (1994, viz. 1995b:241-249) does not amount to much more than fancy words expressing that “a specifier is the object merged with X’ which immediately dominates X, an adjunct is an object merged with an intermediate projection of X which does not immediately dominate X.” But if the current train of thought is appealing, this lead-footed intuition can be formalized and multiple specifiers cannot exist, contrary to current wide-spread assumptions.

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Notes

[1] An interesting recent development is the attempt to shift head movement from the syntax to PF (Chomsky 1999, 2001, Boeckx & Stjepanović 2001). I do not take a stand on this issue, but for purposes of presentation outline a framework which can easily be applied to syntactic head movement, that is adjoining one head to another.

[2] One might hold that in bare phrase structure, nothing has to be said on "ruling in" multiple specifiers, which were ruled out in GB by stipulation. As Chomsky (1999:39, note 66) puts it, "[i]t is sometimes supposed that [the possibility of multiple specifiers] is a stipulation, but that is to mistake history for logic." An ancillary goal of this squib is to rule out multiple specifiers not by stipulation, but by logic.

[3] The arising relations are slightly different from Chomsky's exposition. Chomsky assumes that Immediately Contain is reflexive, so that (K, K) also holds, an assumption that does not seem relevant for current purposes. One reviewer points out that Sister should also yield (β, α), not listed by Chomsky, a point to which I return.

[4] I am grateful to one anonymous reviewer to help me sharpen the formalism of composition and especially to Horst Lohnstein for discussing the relevant compositional combinatorics with me and for suggesting this metaphor.

[5] See below for an elaboration on the desired checking relation between heads and complements. Note that I leave aside further consideration of the long-distance Agree operation in the phase-based framework laid out in Chomsky 1998, 1999, 2001, just as I leave aside any mention of how, or whether, the system presented here could be made compatible with phase-based approaches to syntactic computation. For an implementation of the present system to an alternative minimalist approach that also makes use of derivational sub-domains, see Grohmann 2000, to appear.

[6] Another way is to think of Merge as costly, just as Move is (cf. Bobaljik 1995, Lasnik 1995). One consequence would be that initial merger of a predicate and an argument must be driven by feature-checking (see e.g. Bošković 1994, Bošković and Takahashi 1998, Grohmann 2000, Hornstein 2000 on theta-roles as features).

[7] In Grohmann (2000) I chose the latter. However, given the Checking Condition in (4), this assumption is not feasible anymore. One problem that immediately arises from that assumption is, however, the notion of "percolation." By Sister, no percolation of features from one projection level to the next is needed. Illustrating with a hypothetical complex case of multiple head adjunction in which X

bears the features $[F_1]$ and $[F_2]$, Y $[F_1]$ and $[F_3]$, Z $[F_3]$, and A $[F_2]$, we get the following configuration, where all features are checked under sisterhood:

(i) X^0
3
A^0 X^0
$\cancel{[F_2]}$ $\cancel{[F_2]}$
3
Y^0 X^0
$\cancel{[F_1]}$ $\cancel{[F_1]}$
3
Z^0 Y^0
$\cancel{[F_3]}$ $\cancel{[F_3]}$

(Multiple) cliticization and verb movement in Romance languages offer real-language analogues to (i), disregarding direction of attachment (cf. Uriagereka 1995).

[8] If this perspective on the checker-checkee relation is correct, another potential configuration is ruled out to fall under the Checking Condition, namely the relation between a head and the specifier of its complement. Technically, the two are related by Extended Sister, but in practice this constellation—such as witnessed in GB-accounts of "exceptional Case-marking" (ECM)—faces the same problem as the regular Spec-Head configuration from an Attract-perspective: just as the head cannot reach its specifier via Extended Sister in the latter, the specifier cannot reach the next higher head in the former case. Again, I take this as a welcome result, given the "standard" minimalist take on ECM, which posits a specifier-head configuration within the same projection (cf. Lasnik 1999 and references).

[9] As pointed out by one anonymous reviewer, an adequate treatment of any of these would be beyond the scope of this squib, so I leave the details to be worked out in future work (but see e.g. Zwart 1997, Grohmann 2000:ch. 5, Sabel 2002 for pointers on some of these phenomena).