verb is tensed. Since the temporal interpretation of infinitive and modal verbs in indirect questions is usually controlled by the tense of the matrix sentence, this may also indicate that binding relations are relevant to extraction in two-part-tree cases.

15. We thank Polly Jacobson for pointing out the difficulties posed for us by sentences like (66).

5

Clitics and Phrase Structure

ALEC MARANTZ

Traditional phrase-structure (PS) rules describe the hierarchical arrangement and the left-right adjacency relations among constituents according to their syntactic categories. Recent work, however, has separated the hierarchical and ordering functions of PS rules. Hierarchical relations are constrained by general X-bar principles and, within a sentence, by some sort of Projection Principle that specifies how certain relations must be represented structurally. Linear order is constrained by principles regulating, for instance, the adjacency or direction of Government and Case-marking. Outside Government-Binding (GB) theory, similar assumptions are made about the nature of phrase structure. Hierarchical structure in Generalized Phrase Structure Grammar (and related theories) and Lexical-Functional Grammar determines or is determined by semantic and/or functional composition and feature percolation, while linear order is set independently, at least in principle, either by linear precedence statements or by stipulation within PS rules. What most contemporary syntactic theories assume is that (a) a residue of X-bar principles has some function in constraining constituent structure and (b) constraints on linear order have as their domain constituent structures obeying these X-bar principles.

This paper begins with the hypothesis that a slightly extended Projection Principle (Chomsky 1981) totally replaces any X-bar constraints on constituent structure. That is, the X-bar character of constituent structure, with the heads of phrases determining the category and features of these phrases, follows from the way that relations among constituents are projected into the syntax. Given this hypothesis, I argue that the distribution of clitics in constituent structure indicates that linear adjacency is a property of a level of syntactic analysis—call it surface structure, phonological structure, or PF—that does not obey X-bar constraints. Although the Projection Principle is obeyed at phonological structure, with its hierarchical structure projected from the relations that hold at this level of analysis, phonological structures do not conform to standard X-bar principles.

Consider first the problem that clitic constructions present for X-bar theory, or indeed any constrained system of phrase-structure rules or principles. Some representative clitic constructions are found in (1).

(1)

	SYNTACTIC STRUCTURE	SURFACE PHRASE STRUCTURE
a.	[$_{PP}$ *de* [$_{NP}$ *le garçon*] of the boy	[$_{PP}$ [$_{?}$ *du*][$_{?}$ *garçon*]] of-the boy (French)
b.	*Sa-sąąy Alchico* [$_{NP}$ *níí* AGR-give Alchico 3sgOBJ *Rospita*][$_{NP}$ *rà pą́ą*] Rospita InAnOBJ bread	*Sa+sąąy Alchico+níí Rospita+rà pą́ą* (Yagua)
c.	[$_{S'}$ *'o* [$_{S}$ [$_{V'}$ [$_{NEG}$ *pi*] *iam-hu cikpan*] *g* AUX NEG there work ART *Huan*]] John 'John is not working there'	[[[*pi+'o*] *iam-hu cikpan*] *g Huan*] (Papago)

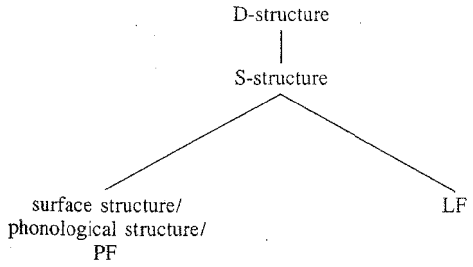
The French prepositional clitic *de* 'of' in (1a) prefixes to the first constituent of its NP object. It shows a special suppletive form *du* 'of the (masc. sg.)' when it combines with the article *le* 'the (masc. sg.).' In Yagua (Payne 1986), as exemplified in (1b), certain definite specifiers on object NPs appear before the NPs that they specify, but phonologically they suffix to the last word that happens to come before the specified NP in the sentence. Payne (1986) carefully shows that these specifiers are in fact syntactically part of the phrases on their right but phonologically part of the word on their left. This sort of NP marker, phonologically bracketed outside the NP to which it belongs syntactically, is also found in Kwakwatl (Klavans 1985). In Papago (Pranka 1983), when the verbal constituent V′ is the first major constituent of the sentence, the AUX clitic appears after the first element of V′, as shown in (1c). The particles within the V′ must occur in the order shown, and may be split up only by an AUX clitic in second position, as in the example. If some major constituent is topicalized or placed in sentence initial Comp position, then the AUX clitic remains in S-initial position, after the topic or Comp and thus in second position overall.

The essential disturbing feature of constructions containing clitics is that they do not directly obey any sort of X-bar constraints on syntax. It should be obvious that no directly motivated labeled bracketing of the strings in the right column of (1) will conform to the X-bar convention. For example, what sort of X-bar constituent is the combination of a preposition and a determiner such as French *du* in (1a)? Rather, clitic constructions in general conform to X-bar principles only with reference to some structure other than their surface phonological representation, some structure like

the structures in the left column of (1). That is, given the X-bar–consistent structures on the left, we might imagine generating the structures on the right by a cliticization movement rule, moving the clitics into their surface phonological positions. The question for X-bar theory is whether the left-hand structures are motivated as linearly ordered surface structures in the derivations of the structures at issue. That is, do the clitic constructions on the right in (1) come from a level of analysis showing both X-bar constituent structure and linear order? I will show that clitic structures like (1) are derived directly from the unordered S-structure representations via the regular principles that map from these S-structures to linearly ordered surface structure representations. Moreover, the crucial information relevant to deriving the clitic constructions is present at S-structure but not in phrase-structure representations like those on the left in (1). If this conclusion is correct, then X-bar principles are not true of any structure displaying left-right linear order in the grammar.

The key to a grammar lacking PS rules is some sort of Projection Principle. Chomsky (1981) writes his Projection Principle as a constraint on constituent structure trees at D-structure, S-structure, and logical form, allowing phonological or surface structure (PF) to deviate from these other structures. Given the structure of the grammar in (2), I will claim that the Projection Principle applies at surface structure as well, directly constraining the phonologically interpreted representation of a sentence.

(2)



The Extended Projection Principle needed to project phonological structures is given in (3).

(3) For all pairs of constituents (X, Y), a relation R(X, Y) at one level of representation of a sentence in the syntax must map onto a relation R'(X′, Y′) at any other level of representation of the sentence, where X′ and Y′ are the constituents "corresponding" to X and Y at the other representation in a sense of "corresponding" made explicit in the theory (see (5) below).

The Extended Projection Principle may apply to surface structure because it recognizes that the lexical—D-structure—properties of θ-role assignment and semantic argument–taking correspond at each level of syntactic analysis to relations relevant at that level. For example, a θ-role–assigning relation at D-structure might correspond to a linear adjacency relation at surface structure, or perhaps to a morphological case-marking or agreement relation, where linear adjacency, case-marking, and agreement are relations characteristic of surface structures. The levels and relations relevant at each level are shown in (4).

(4)

LEVEL OF ANALYSIS	RELATIONS AT THIS LEVEL
D-structure	argument structure, θ-assignment
↓ Mapping:	if Y bears a relation to X at D-structure, Y′ must bear a relation to X′ (or to a constituent headed by X′) at S-structure
S-structure	Government, Case-assignment
↓ Mapping:	if Y bears a relation to X at S-structure, Y′ must bear a relation to X′ at surface structure
PF	morphological case-marking and agreement, sisterhood in a surface PS tree (= structural government), linear (left- or right-)adjacency

In (4) I have also displayed the mapping principles that constrain the relationship between the levels of representation (see Marantz 1984 for detailed explanation of these mappings). The mapping principles in (4) connecting D- and S-structure and S- and surface structure realize the Extended Projection Principle (3). That is, to obey these mapping principles is to obey principle (3). These principles describe how relations at each level are to be connected—projected—to relations at neighboring levels.

In mapping from level to level, the D-structure relations of θ-assignment and semantic argument–taking—where to take an argument is often called "to subcategorize for"—must correspond at S-structure to relations of abstract Case assignment or syntactic Government. To extend the Projection Principle to surface structure, we require that the relations at S-structure map onto relations relevant to surface structure, notably the tree structure relations of left- or right-adjacency and structural government ("sisterhood") and the morphological relations of morphological case-marking and morphological agreement (if X morphologically case-marks Y, morphology determined by X appears on Y; if X morphologically agrees with Y, morphology determined by Y appears on X).

On the model of grammar in (4), a representation at each level consists of a set of constituents and relations, not a constituent structure tree. The constituents and relations of surface structure constrain the construction of a surface structure tree that will be phonologically interpreted, that is, serve as input to the phonological rules. Although the constituents and relations at each level may be represented by a tree at each level, the mapping between levels is defined over the list of constituents and relations, not over tree representations. In Marantz (1984) I discuss some of the implications of demanding that D- and S-structures be representable in trees.

Within the syntactic theory under consideration, X-bar principles reduce to principles of functional composition, as in a categorial grammar. Categories are defined according to their combinatorial potential. For example, argument-takers are functions from X to X′, modifiers take constituents of type X to constituents of type X, and so forth. This categorial approach to syntactic categories combines our understanding of the way relations are projected into constituent structure with our knowledge of the correspondence between syntactic and compositional-semantic categories. For example, we project a verb's arguments as its sisters at D-structure, and we know it combines semantically with these arguments to produce a constituent that may assign the subject θ-role. Although it is possible to define a VP or V′ independently within X-bar theory, I will claim that we should acknowledge that the VP is simply and essentially the combination of the verb and its arguments, with the V as the VP's functional and thus categorial head.

Although the categorial approach to constituent structure may appear foreign within canonical GB theory, it in fact accords with GB practice at D- and S-structure. That is, the projection of relations within GB theory conforms to the categorial interpretation of constituent labels. What is important to note about the theory in (4) and about GB practice is that there are not two distinct animals—relational constraints on argument-taking, θ-assignment, etc., on the one hand; and constituent structure constraints about hierarchical organization of head and complements, head and specifiers on the other. Rather, there is a single set of relational constraints, since relations are consistently mapped into constituent structures throughout the grammar by the Projection Principle.

The clitic constructions in (1) are directly analyzed within a grammar obeying the Extended Projection Principle. The S-structure of the constructions in (1) are mapped onto a set of relations satisfied by the surface structures on the right. No intermediate tree representations like those on the left in (1) are necessary to derive these structures. In explaining the distribution and behavior of clitics, it is necessary to appreciate their dual nature. As syntactic constituents, clitics are mapped by projection to bear

certain surface structure relations—they are positioned as if they were phonologically independent constituents. However, as affixes, clitics have left- or right-morphological subcategorization frames, demanding to be attached to the left or right of a stem; that is, they superimpose their own left/right adjacency requirements over their syntactic positioning. For example, as determiners, the Yagua clitics in (1b) are ordered before the NPs they specify. However, as morphological suffixes, they must attach to the right of something. These dual constraints are met if the clitics appear before their NP complements but suffix to the last word of whatever constituent is ordered before these NPs.

To understand how the mapping of S-structure to phonological structure relations determines a phonological structure or PF tree, we imagine that the mapping of S-structure to phonological relations yields a set of restrictions on adjacency, surface case marking, and surface agreement that must be simultaneously met by the phonological structure tree. These requirements might be met by various possible phonological structure trees; however, independent constraints on the structure of phonologically interpreted trees conspire to narrow down the possibilities to just those that are grammatical. Still, various word orders or hierarchical structures might correspond to a single S-structure in some language.

As indicated in the statement of the Projection Principle (3), the mapping between levels in the grammar depends on a concept of how a constituent at one level can correspond to a constituent at a neighboring level. In Marantz (1984) I anchor the mapping between constituents at different levels to lexical items, which map themselves from level to level. That is, each lexical entry includes not an unstructured list of features for a morpheme, but rather a mapping between features of the morpheme relevant at each level of representation. Let's name the function that gives us the constituent corresponding to X at the next level of analysis COR(X). The lexicon itself determines COR(X) for all X that are lexical items. This property of lexical items allows us to define COR(X) recursively, depending on the notion of "head of a phrase" or HEAD(XP) at each level of analysis.

(5) COR(X) a. for X a lexical item, COR(X) is determined by the lexical entry for X;
b. for X a phrase headed by Y, that is, Y = HEAD(X), COR(X) = phrase headed by COR(Y), i.e., HEAD(COR(X)) = COR(Y).

That is, COR(X) for X a phrase is the constituent at the next level of analysis whose head is the constituent corresponding to the head of X at the next level of analysis.

In the mapping between S-structure and PF, applying the COR function blindly would yield a structural isomorphism between the two levels, disallowing the sorts of "bracketing paradoxes" or rebracketings between the levels that the clitic constructions in (1) display. However, a general principle of grammar taken with a particular understanding of the notion of "head" at phonological structure yields the observed mismatch between S-structure and PF bracketing in clitic constructions. Sproat (1985) explains this sort of mismatch by invoking the "associativity" of the adjacency relation at PF. He applies this understanding of adjacency to account for the sorts of morphological bracketing paradoxes discussed in Pesetsky (1985). Here we will see that the associativity of adjacency follows from more general principles on the nature of relations.

To see how the associativity of adjacency is derived, consider the situation schematized in (6a)–(6c), in which an S-structure constituent X whose phonological structure counterpart COR(X) must be left-adjacent to COR(Y), where Y at S-structure consists of Z and W, and COR(Z) is right-adjacent to COR(W). A concrete example of this situation could be the French clitic construction in (1a), which is analyzed in (6) alongside the schematic example. In what follows we use the asterisk to indicate the adjacency relation although this notation masks the fact that the adjacency relation is asymmetric—in the mapping to PF, if X * Y, then either X has been positioned to the left of Y to correspond to some relation in which the S-structure counterpart to X is the operator, or Y has been positioned to the right of X to correspond to some relation in which the S-structure counterpart to Y is the operator.

(6) a.	$[_Y$ W Z], where Z = HEAD(Y)	Y = NP, Z = N, $[_{PP}$ *de* $[_{NP}$ *le garçon*]]
b.	COR(X) * COR(Y)	COR(*de*) * COR(NP)
c.	COR(W) * COR(Z)	COR(*le*) * COR(*garçon*)
d.	COR(X) * [COR(W) * COR(Z)]	COR(*de*) * [COR(*le*) * COR(*garçon*)]

Since, by the definition in (5), COR(Y) is the constituent headed by the COR(HEAD(Y)), that is, the constituent headed by COR(Z), COR(X) will be left-adjacent to the constituent headed by COR(Z), which will contain both COR(W) and COR(Z). We now appeal to the general principle that to govern a phrase is to govern the head of the phrase, where "govern" is taken in the general sense of "bear a relation to." Thus to be adjacent to a phrase at phonological structure is equivalent to being adjacent to the head of this phrase. But what is the head of a phrase at PF? For locating clitics and for describing generalizations about the direction of Case-marking and

about the location of S-structure heads in a PF phrase, a peripheral-head definition seems appropriate for PF. That is, the head of a phrase is the leftmost constituent if the grammar looks at it from the left, or the rightmost constituent if the grammar looks at it from the right. In a sense, then, phrases are two-headed at PF but show a single head for purposes of working out adjacency relations, since adjacency involves the left or right edges of phrases.

At the end of this paper, I return to how the peripheral-head notion at phonological structure helps capture the apparent directionality of θ- and Case-assignment. Here, I complete the demonstration that adjacency is generally associative on this notion. Given that COR(X) is left-adjacent to the constituent consisting of COR(W) and COR(Z), where COR(W) is left-adjacent to COR(Z), then the adjacency constraints in (6d) are equivalent to the constraints in (7a), which are satisfied by the structure in (7b).

(7) a. [COR(X) * COR(W)] * COR(Z) — [COR(*de*) * COR(*le*)] * COR(*garçon*)
b. [[X W] Z] — [[COR(*de*) COR(*le*)] *garçon*]

It should be clear that iterative applications to adjacency requirements of the principle "to govern a phrase is to govern its head" taken with the peripheral definition of head at PF will allow associative rebracketing of constituents within the formal statement of these adjacency requirements, like the statements in (6b)–(6d). Crucially, the rebracketings take place within the relations that constrain the surface-structure tree, not within the tree itself. Therefore, the associative rebracketings necessary to license clitic constructions do not involve manipulations of constituent structure but rather involve an interpretation of how to apply adjacency constraints to a constituent-structure tree.

In (8) I show the critical constraints on PF derived via the mapping from S-structure for the clitic constructions in (1). Informally, I indicate the adjacency requirements by using the asterisk notation to connect orthographic representations of the morphemes involved. So X * Y means that the phonological representation of X is left-adjacent to the phonological representation of Y, or Y is right-adjacent to X.

(8) a. *de* * [*garçon, le*]
le * *garçon, de-* is a prefix
b. *nii* * *Rospita, ra* * *paa*
[*Alchico*] * [*nii, Rospita*] * [*ra, paa*]
-nii, -ra are suffixes
c. *'o* * [[*g, Huan*], [*pi, iam-hu, cikpan*]]
g * *Huan, pi* * *iam-hu* * *cikpan*
-'o is a suffix

In (8a), for example, as we saw in (6) and (7), the preposition *de* must be left-adjacent to the NP containing [*le, garçon*]. It meets this requirement by being left-adjacent to the leftmost constituent in this NP, *le,* i.e. by being left-adjacent to the phonological head of the NP at PF and by affixing to this head.

The Yagua case in (8b) is also straightforward. Although as suffixes the clitics must attach toward their left and thus to the right of some stem, the clitics must remain, associatively, left-adjacent to their NP complements. Suffixed, as they are in (1b), to the phonological head—the rightmost constituent—of the phrase preceding their NP complements, the Yagua clitics meet all the required adjacency constraints.

To derive the Papago clitic construction in (1c) from the constraints in (8c) we need an additional principle. By the associativity of adjacency, the clitic may adjoin to the first member (the PF head) of the V′ constituent (itself the PF head of the S when V′ is S-initial), even though the clitic is related to the whole S containing the V′. However, to satisfy the adjacency requirement between the AUX and the sentence, the AUX clitic should be a prefix on this leftmost word—the left-head of the sentence—and thus be associatively left-adjacent to the sentence. The AUX should not appear as a suffix to the leftmost word, because as a suffix it is no longer even associatively left-adjacent to the sentence. What happens in Papago is that the adjacency relation between the clitic and the first constituent of the V′ is replaced by the affixation relation between these constituents, instantiating the principle of Morphological Merger given in (9).

(9) At any level of syntactic analysis, independent syntactic constituents X and Y standing in a relation at that level (or heading phrases standing in a relation) may merge into a single word, X + Y, projecting the relation between (the constituent headed by) X and (the constituent headed by) Y onto the affixation relation X + Y. In accordance with the Projection Principle, other relations involving X and Y (and constituents headed by X and Y) must continue to be projected in the usual way.

Marantz (1984) shows how Morphological Merger operates at every level of syntax, accounting, for example, for the syntax of derived causative constructions and applied verb constructions (see Marantz forthcoming b for a comparison of recent approaches to "syntactic affixation" like that involved in causative constructions). Crucially, Merger projects some

relation in syntax onto the affixation relation between morphemes, removing this syntactic relation from projection onto other relations, like adjacency or case-marking at PF. In the Papago example, the adjacency relation between the AUX and NEG particles is replaced by the affixation relation between these elements. But, as an affix, the AUX is a suffix and thus appears to the right of NEG. The derived word, NEG plus AUX, takes over the relations of the NEG particle. In particular, the adjacency relation between the NEG and the locative particle to its right within the V′ is satisfied by the adjacency of the NEG + AUX and this particle after Merger.

This analysis highlights an essential feature of Merger: only the relation between the merged constituents is projected onto the affixation relation in Merger; other relations borne by the merged constituents must still be met. For example, in the Papago case, the AUX could not suffix internal to the V′ if it were involved in an adjacency relation with respect to a constituent on its left. Attached to the right of the NEG particle within the V′, the AUX would not be adjacent to a constituent to the left of the V′. If we assume that the affix is always the head for determining features of derived words, the combination of NEG + AUX in Papago should take over the adjacency requirements of the AUX; thus, in principle, the derived NEG + AUX would meet the AUX's requirement to be to the right of the constituent to the left of V′. However, on such an analysis, the NEG particle would no longer be left-adjacent to the next particle in V′: the NEG + AUX constituent would take over the AUX's adjacency requirements and, with the AUX between NEG and the next constituent of V′, NEG would not even be associatively adjacent to this next constituent. If we assumed that the NEG + AUX constituent took over the adjacency requirements of NEG, then AUX would not meet its requirements with respect to the constituent to the left of NEG + AUX. As we shall see, when some constituent does appear to the left of AUX, in Topic or Comp position, then the AUX clitic may no longer appear internal to a phrase like V′.

Although for present purposes we need invoke Morphological Merger only in the analysis of the Papago AUX clitic, in Marantz (forthcoming a) I argue that Merger is always involved whenever a syntactically independent morpheme shows up as part of a word at surface structure, as in cliticization. Thus all clitic constructions involve the Merger of the clitic with the host word, replacing an adjacency relation between these constituents with the affixation of one to the other.

The present analysis of clitics, presented more fully in Marantz (forthcoming a), constrains the distribution of clitics to just that observed cross-linguistically (see Klavans 1985 for a survey of clitic positions and Marantz forthcoming a for a critique and explanation of Klavans's findings). In fact,

the analysis allows the conceptually minimal theory of clitics—clitics are syntactically independent constituents that have morphological subcategorization specifications about direction of attachment. That is, beyond giving a clitic the usual lexical information that determines its syntactic function in a sentence, the clitic need only be specified as a prefix or a suffix. Independently motivated general principles completely determine the proper location for clitics given this information.

For example, all we need to say about the Yagua specifier clitics is that they are suffixes. Functionally, they mark definiteness of objects, i.e., they are governed by the verb and do not appear with subjects or obliques. To satisfy their adjacency relation with respect to their NP complement, these clitics could appear where they actually do appear, as in (10a), or, like the Papago AUX clitic, they could appear suffixed to the first word of their NP complement, as shown schematically in (10b). However, if they were positioned internal to the NP, the government relation between them and the verb determining their object status could not project onto any surface-structure relation, for internal to an NP, they would not be in a position to be structurally governed by the V. Alternatively, we might suppose that the affixation of the clitic to the first constituent of the NP (A in (10b)) causes this constituent (A + Det) to take over all the relations of the clitic and thus allows the V to govern the clitic by governing the NP, thus the head (the leftmost constituent) of the NP, thus the clitic as head of the NP. In that case, the affixation would prevent A from meeting its adjacency requirements with respect to the constituent on its right (B in (10b)). With the clitics suffixed to the leftmost constituent in the NP and with the derived word A + Det taking over the relations of Det, A + Det is no longer even associatively adjacent to B.

(10) a. . . . A + Det][$_{NP}$ B . . .
b. . . .][$_{NP}$ A + Det B . . .

However, where the Yagua clitics actually show up, as the rightmost constituent of a phrase structurally governed by the V at PF as in (10a), they do stand in a surface-structure relation with respect to the verb. For the heads of a surface-structure phrase, as we have seen, are the left- and rightmost constituents in the phrase. And to govern a phrase is to govern its head. So, being the rightmost constituent of a phrase governed by the verb, the Yagua clitic is itself governed by the verb. Moreover, since the Yagua clitic attaches to the right of the last constituent in the host NP, this constituent remains associately adjacent to the constituent on its left, allowing it to maintain its PF relations after affixation of the clitic.

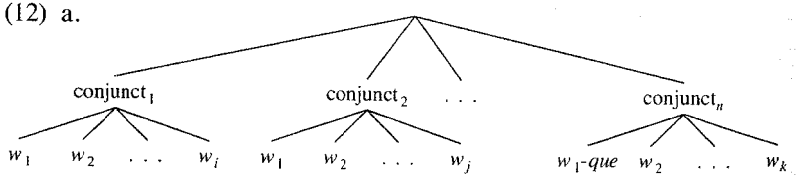
In Papago, the AUX clitic may be minimally specified as a suffix. In case

no constituent is topicalized to the left of AUX or moved via *wh*-movement to Comp to AUX's left, neutral word order will place the V′ constituent sentence-initial. As a suffix positioned left-adjacent to S, the AUX clitic must Merge with the first word in the sentence, i.e., the first morpheme in V′, which is the head of the sentence at PF, given the peripheral definition of head. However, if some constituent is ordered before the AUX for syntactic reasons—say in topicalizations or *wh*-questions—then the AUX will simply suffix to the last element of the fronted constituent. Thus we find the sorts of structures in (11a)–(11c), where the XP is a Topic or other fronted constituent. Pranka (1983) gives prosodic evidence for fronting in these cases—the prosodic structure here differs from that in sentences showing neutral word order with V′ as the initial constituent. Particularly interesting, and predicted by the present analysis, is the ungrammaticality of the structure in (11d). That is, even when the AUX finds itself adjacent to the V′ according to syntactic requirements, it may not cliticize to the first member of the V′ if there is some constituent to its left within the S′, that is, if it has a left-looking adjacency requirement that it must meet.

(11) a. XP+AUX V′ . . .
b. XP+AUX XP . . .
c. *wh*+AUX XP . . .
d. *XP [$_{V'}$ *pi* + AUX . . .

Latin apparently shows a second-position clitic that confirms our relational analysis of the constraints on clitic positions. According to Sadock (1985), the Latin conjunction *-que* appears after the first word of the last conjunct, as shown in (12a). An example from Sadock is shown in (12b).

(12) a.



b. [*boni pueri*][*bellae-que puellae*]
good boys beautiful-and girls

All the grammar need specify here is that the Latin conjunction is a suffix and that it marks the last conjunct at PF. The important relational point about conjunction is that it is a relation among the conjuncts or between a conjunctive operator and all the conjuncts, not a relation between a conjunction and the last conjunct. Languages tend to mark the conjunction relation with a morpheme on all the conjuncts or just the last conjunct. In

Latin and English, the conjunctive morpheme phonologically marks the last conjunct and should be seen as having only PF features. This morpheme must be left-adjacent to the last conjunct in the conjunction at PF. The adjacency requirements on a structure like (12b) would be as shown in (13a), with the first conjunct required to be related to the second conjunct, and the *-que* required to appear adjacent to the second conjunct. A parallel case from English, the translation of the Latin example, is shown in (13b). Given that *-que* is a suffix, the structure in (14a) is the only one possible that meets the adjacency requirements. In particular, the structure in (14b), with *-que* suffixed to the last element of the first conjunct, would not conform to the adjacency requirements in (13a).

(13) a. COR([*boni, pueri*]) * COR([*bellae, puellae*])
-que * COR([*bellae, puellae*])
b. COR([$_{NP}$ *good boys*]) * COR([$_{NP}$ *beautiful girls*])
and * COR([$_{NP}$ *beautiful girls*])

(14) a. [*boni pueri*][*bellae-que puellae*]
b. [*boni pueri-que*][*bellae puellae*]
c. [*good boys*][*and* [*beautiful girls*]]

In order to exploit the associativity of adjacency to allow for the structure in (14b), we would have to "unpack" the adjacency relation between the conjuncts in (13a) and find *-que* as the left head of the second conjunct adjacent to the right head of the first conjunct. But, since the positioning of *-que* is determined by an independent adjacency statement in (13a), the statement that places the conjunction before the last conjunct, no unpacking of the constituents and relations in (13a) will ever locate *-que* to the right of the first conjunct. Thus no computations over the adjacency requirements will allow the structure in (14b). Note that the English phonological structure in (14c), with *and* phonologically adjoined to the second conjunct, will satisfy the adjacency requirements in (13b) because the first conjunct will fall adjacent to COR([*beautiful girls*]) by being adjacent to the phrase [*and* [*beautiful girls*]]. The phonological phrase [*and* [*beautiful girls*]] is headed by COR(HEAD([*beautiful girls*])), as it must be according to the definition of COR in (5) because it is headed by COR([*beautiful girls*]) itself.

The Yagua and Latin examples discussed above are superficially identical. Both involve suffixal clitics that are positioned before the phrase to which they are related. However, the relational structures in which the clitics occur determine automatically that the Latin clitic will suffix to the first word of its relational dependent while the Yagua clitics suffix to the last word of the preceding constituent. Crucially, in Latin *-que*'s relational

dependent, the last conjunct, is directly related at surface structure to the preceding constituent, the preceding conjunct, while in Yagua, the NP complement to the specifier clitics is not directly related at surface structure to the preceding phrase. On the other hand, Latin *-que* need only satisfy one PF relation, while the Yagua clitics bear relations with respect to both their NP complements and the governing verb. These relational differences determine the difference in the location of the clitics.

The main argument of the paper is now complete. The surface structures of clitic constructions do not obey X-bar principles, yet they are derived in accordance with the generalized Projection Principle directly from S-structures that do not encode linear order information. Moreover, the information necessary to correctly predict the behavior of clitics is S-structure —relational—information as mapped onto PF relations, not information encoded in some conceivable precliticization, linearly ordered tree. Therefore, linear order is a property only of a level that does not obey X-bar restrictions. Principles about the direction of Case-marking or θ-assignment must be principles involved in the mapping from S-structure to PF, not ordering principles constraining an X-bar–consistent level of representation at D- or S-structure.

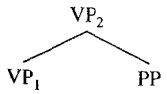
To drive home this point, consider a movement analysis of cliticization, one that would derive the right-hand structures in (1) from an X-bar–consistent, linearly ordered tree structure like the left-hand structures. First note that, whatever Clitic Movement is, it is not a good candidate for an instantiation of a general trace-leaving Move-α. In most cases, the traces left by Clitic Movement would not be c-commanded by the moved clitic. Moreover, constraints on Clitic Movement seem strictly to involve linear adjacency, which is not associated with constraints on Move-α.

Therefore, to generate clitic constructions from linearly ordered precliticization tree structures, we would need to develop a special Clitic Movement rule. The simplest possibility for such a rule would involve specifying only whether the clitic is a prefix or a suffix. If it is a suffix, it would attach to the right of the word to its left in the precliticization structure; if a prefix, it would attach to the left of the word on its right. However, this sort of movement would not be sufficient to account for movement into a phrase, as in the Latin and Papago examples. But any specification we give to a clitic beyond its syntactically determined position and its status as prefix or suffix would allow clitics in places that they do not occur. That is, a movement analysis that allows clitics to move inside phrases will allow too much. In Marantz (forthcoming a) I show how one analysis along these lines, that in Klavans (1985), predicts clitic positions that are not observed. However, the guaranteed restrictive failure of any movement analysis of

clitics should be clear from the analyses of this paper. I showed above that specifying a clitic's syntactic positioning and its status as a prefix or suffix is necessary and sufficient to predict its positioning at PF, but only given relational information not encoded in the dominance and precedence relations of a hypothetical pre-cliticization surface structure. Rather, the necessary relational information is available only in the S-structure and in the constraints on surface structure derived from S-structure via the Extended Projection Principle. A movement theory that is flexible enough to allow for the placement of the Latin conjunction could not prevent the Yagua clitics from appearing in a position within the NPs they modify, because the relational information that determines the actual positioning of these clitics is not represented at surface constituent structure.

Given that linear order is a property only of the surface-structure tree, all constraints on the linear positioning of syntactic heads and on the direction of syntactic relations such as Case-marking must involve the mapping from S-structure to adjacency constraints on PF. Our conclusion from the analysis of clitics that headedness at PF implicates the peripheral constituents in a PF phrase suggests the manner in which syntactically based linearity should be handled: heads at S-structure must correspond to heads at PF, as already indicated within the definition of "corresponding constituent" in (5). If Case-marking is to the right in a language, for example, then X^0 heads at S-structure must map onto left heads at PF. Ideally, we would like to fix a single linearity or "headedness" parameter for a language, stating whether S-structure heads correspond in general to either left or right heads at PF. However, there is an ambiguity in the notion of "head" at S-structure that suggests at least one more parameter for cross-linguistic variation. In an adjunction structure like (15), VP_1 is the categorial head of VP_2; however, if the PP in (15) is a modifier, taking VP_1 as its modifiee, PP is the relational head of VP_2.

(15)



In a language in which S-structure categorial heads are mapped onto left heads at PF, a verb would be followed by all it arguments and any VP adjuncts. However, in a language in which it is S-structure RELATIONAL heads that map onto PF left heads, modifier adjuncts, as relational operator heads, would appear before the V, which would be followed by its arguments.

Travis (1986) suggests the possibility of this split in location of arguments and adjuncts and illustrates it with examples from her research.

However, she also identifies languages whose arrangement of constituents seems to rely crucially on the distinction between direction of θ-assignment and direction of Case-assignment. On the model of grammar in (4), θ-assignment could not directly influence linear order, since θ-assignment is a D-structure relation and only S-structure relations are mapped onto linear adjacency. For languages that place all the Case-marked NPs on one side of the verb and all oblique arguments and adjuncts on the other, languages in which the direction of Case-assignment and θ-assignment seem dissociated, we might say that apparent oblique arguments of a verb actually involve the structure in (15), with the Case-assigner for the oblique argument acting as an S-structure operator to make oblique arguments relationally indistinguishable from adjuncts at S-structure. This possibility leads to the identification of a third parameter, that in (16c). The general directionality parameters for a grammar like that in (4) are summarized in (16).

(16) a. The DIRECTIONAL HEAD parameter: S-structure heads are {left, right} heads at PF
b. The SYNTACTIC HEAD parameter: for the mapping to PF, S-structure heads are {relational, categorial} heads
c. The OBLIQUE ARGUMENT parameter: oblique arguments are relational {operators, arguments} at S-structure

For the linear ordering of constituents, (16c) is only relevant if (16b) is set at "relational." A verb is always the categorial head of the VP regardless of the relational status of its arguments or of VP adjuncts.

Given the dependence of (16c) on (16b), there are only three typological possibilities for left-headed languages and three for right-headed languages. These are precisely the types of languages Travis (1986) claims are the only observed possibilities. Within a system that recognizes linear order at D- and S-structure, Travis is forced to ad hoc constraints on the independence of her ordering parameters to account for the limited range of variation in order she observed. On the other hand, the structure of the grammar in (4) yields Travis's typology without any special constraints on the independence of the parameters in (16). Given that linear order is a property only of a level of analysis, PF, at which X-bar principles do not hold, it is not surprising that theories in which linear order is explicitly represented at D- and S-structure must impose external constraints on ordering to limit the possibilities for ordering differences among the world's languages.

On the picture of grammar in (4), linearly ordered tree structures play a role only as input to the phonological rules. For the most part, what counts for the syntax on a model like (4) are the relations that are projected through

the syntax. The conclusions reached in this paper, then, approach the thinking represented in *Barriers* (Chomsky 1986) within a more traditional generative framework. Within the *Barriers* framework, the relations that project into configurational structures and not the configurational structures themselves are shown to be relevant for the operation of S-structure principles. Government in *Barriers* is shown to be connected to relations like θ-assignment, Case-assignment, and agreement, not strictly to geometrical dominance relations in a tree. When relations like θ-assignment are represented in tree structures, information relevant to the operation of grammatical principles may, in a sense, be lost. For example, two constituents that are structurally sisters may or may not stand in a θ-assignment relation; whether the θ-assignment relation holds is not determinable from the geometry of the tree alone but only through examination of constituents' lexical properties. However, the presence of a θ-assignment relation may be important for the evaluation of the subjacency constraint on movement, for example, as Chomsky (1986) explains. Thus geometry alone is insufficient for the correct application of syntactic principles; relational information that may be projected onto configurational structure is required.

The conclusions of this paper lead the study of phrase structure in a number of directions. First, the approach to phrase structure suggested here should motivate a renewed investigation into the semantic basis of syntactic categories. Within traditional X-bar theories, the compositional semantics of a category was only indirectly relevant to its phrase-structural distribution. The interesting work on compositional semantics of syntactic categories took place within categorial syntax and Montague Grammar, but this work was hampered by the assumption of linguists in these frameworks of a single level of syntactic description. The assumption of a single syntactic level of analysis leads to a proliferation of syntactic category types and a lifting of constraints on the notion "possible syntactic category." Within the grammatical framework of this paper, we are ready to explore the compositional semantics of syntactic categories under a constrained theory of category types.

Second, following the trajectory of *Barriers*, we are also ready to investigate the relational basis of the S-structure Government relations relevant to Binding and Bounding theories (the theories of locality constraints on anaphora and movement). We may now abandon the last vestiges of purely configurational thinking—get down from the trees, so to speak—in determining the correct relational formulation of S-structure principles.

Finally, this paper leads to a pure study of phrase structure itself, where phrase structure is now seen as the hierarchical phonological structure that serves as input to the rules of phonology. Since, given the associativity of

the adjacency relation, the projection of S-structure relations onto adjacency relations at PF is consistent with a variety of hierarchical structures, independent phonological constraints on constituent structure must constrain the possible PF realization of a set of S-structure relations. The present theory provides one account of what sort of constraints on PF the syntax—in particular, the Projection Principle—provides; we may now factor these constraints out in determining the contribution of autonomous PF constraints on constituent structure.

6

Individuation in and of Syntactic Structures

JAMES D. McCAWLEY

1. Horizontal Individuation

In this paper I examine a number of cases in which alternative analyses of the same phenomena differ with regard to individuation: with regard to whether the units and relations that a linguistic entity is taken to be composed of are treated as making up a single syntactic structure or as making up two or more separate structures; or with regard to whether parts into which a unit could in principle be decomposed (e.g. morphemes comprising a word) are allowed to participate in syntactic relations in addition to those that the larger unit participates in.

Parenthetical expressions and vocatives can be argued to enter into discontinuous constituent structures and indeed do not even clearly combine into a syntactic unit with the sentence that they interrupt. The following argument, parallel to one that I offered (in McCawley 1982a) to show that a parenthetical in the middle of a V′ is not a constituent of that V′, provides evidence that a vocative is likewise not a constituent of a V′ that it occurs in the middle of:

(1) *Tom: I think, my friend, that they're wrong.*
Dick: Well, I don't ∅. (∅ = *think that they're wrong,* ≠ *think, my friend, that they're wrong*)

The vocative cannot be interpreted as part of the antecedent of the zero V′. Under the assumption that any surface V′ is potentially an antecedent of a zero V′, this provides evidence for a surface structure such as that in (2), in which the vocative is not a constituent of the V′:

Alternative Conceptions of Phrase Structure

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