Chapter 14

Clitics, Morphological Merger, and the Mapping to Phonological Structure

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Clitic constructions like those in (1) share essential features with two other types of structures familiar from the literature: classic morphological bracketing paradoxes of the sort discussed in Pesetsky (1985) and cases of what I call MORPHOLOGICAL MERGER, in which an independent syntactic constituent shows up phonologically as part of a derived word. The principles independently motivated to handle these other constructions jointly provide an explanatory theory of the major distributional properties of clitics, as described most carefully in Klavans (1985). This chapter demonstrates the explanatory power of basic principles governing the affixation of morphemes within the syntax and the mapping from syntactic to phonological structures. In particular, I show that the principles rule out logically possible but actually unattested clitic positions, positions predicted to be possible by other theories.

(1) Semantic/Syntactic structure   Phonological structure
    a. [[*I*] [*will* [*go to Milwaukee*]]]   [[*I'll*] [*go to Milwaukee*]]
    b. [[*the porcupine over there*]'s] *cage*   [*the porcupine over* [*there's*]]*cage*
    c. *le porcupine* [PP *de* [NP *le garçon*]]*le porcupine* [? [? *du*] [? *garçon*]]
                     of   the boy
    d. [*o*[S[V' *pi*   *iam-hu cikpan*] *g*   *Huan*]][[[*pi* + *o*] *iam-hu cikpan*] *g Huan*]
        AUX NEG there work ART John   NEG + AUX
        'John is not working there.'

   To begin the investigation of clitic constructions, note that clitics involve a mismatch between the bracketing or structure motivated on semantic and syntactic grounds and the bracketing or structure motivated on phonological

grounds. On the left in (1) are the semantic/syntactic bracketings, on the right the phonological bracketings. For example, the English auxiliary clitic *'ll* is syntactically and semantically related to a following VP; however, it affixes phonologically as part of the last word of the subject NP as in (1a). Similarly, the English possessive *'s* is semantically and syntactically associated with the whole possessor NP but shows up phonologically affixed to the last constituent in the NP, as in (1b). In (1c) we find a French preposition *de* 'of,' which semantically and syntactically takes a full NP as its object, surfacing in a suppletive form *du*, which phonologically represents a combination of *de* and the article *le* 'the' from the object NP. Finally, (1d) shows a Papago example from Pranka (1983) in which an AUX element with sentential scope syntactically shows up affixed to the right of a particle within the first phrase of the sentence.

The bracketing mismatches implicated by clitic constructions resemble morphological bracketing paradoxes, examples of which are found in (2).

(2)   Semantic/syntactic Structure   Phonological Structure
   a.   [[*un happy*] *er*]   [*un* [*happy er*]]
   b.   [N [ADJ *un* [ADJ *grammatical*] *ity*]]   [*un* [*grammaticality*]]

Here again semantic, syntactic, and morphological considerations motivated one bracketing while phonological considerations motivate another. In (2a) *unhappier* has the semantic and grammtical bracketing on the left—It means *more* [*not happy*], not *not* [*more happy*]. If Elmer is unhappier than Hortense he must be more unhappy than she is; he cannot be as unhappy, thus not more happy. However, phonologically, *un-* atttaches outside *-er*. The phonological bracketing cannot be that in (2a) because *-er* does not attach to trisyllabic adjectives: *redundanter*, from *redundant*, is bad.

Similarly, in (2b) *ungrammaticality* is semantically the state of being ungrammatical; thus the semantic structure on the left is motivated. Moreover, *un-* generally attaches to adjectives like *grammatical* and not to nouns like *grammaticality*, supporting the left structure as a syntactic analysis. However, since *-ity* is a stress-shifting stem-level affix, and *un-* is a stress-neutral word-level affix, the phonological bracketing on the right is called for.

In addition to bracketing paradoxes like (2), clitic constructions like (1) also resemble structures such as derived causative constructions in which a syntactically independent constituent ends up phonologically as part of a derived word. In (1a), for example, the syntactically independent *will* is phonologically part of *I'll*. A derived causative construction is illustrated in (3a). Here, in a Chi-Mwi:ni example, a semantically and grammatically independent morpheme, the causative affix *-ish-* , becomes part of a derived causative verb (Chi-Mwi:ni data from Abasheikh, 1979).

(3)   a.   *Mi   ni-m-big-ish-ize   mwa:na   ru:hu-y-e.*
         I   sp-op-hit-cause-t/a   child   self
         'I made the child hit himself.'
         (sp, subject prefix; op, object prefix; t/a, tense/aspect)

   b.   Semantic/syntactic structure   c.   Phonological structure
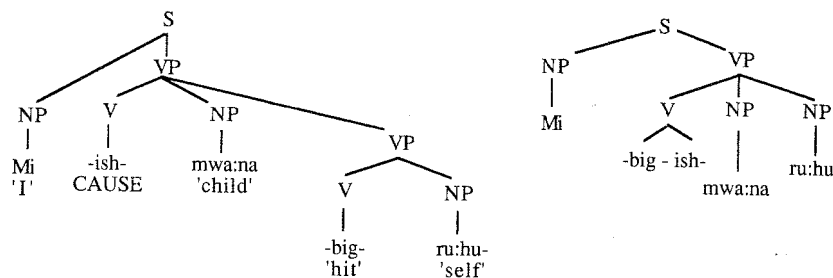
   d.   **Mi   ni-m-big-ish-iz-e   Ali   ru:hu-y-a.*
         I   sp-op-hit-cause-t/a   Ali   self
         *'I made Ali hit myself.'

The Chi-Mwi:ni sentence in (3a) has the same biclausal semantic structure as its English gloss: *I made* [*the child hit himself*]. (Technically, the causative verb *-ish-* within the VP that it heads acts like an INFL within an S with respect to its VP complement. Like INFL, it takes a VP argument, which in turn takes a subject NP and thus establishes a second clause within the matrix VP; therefore, the governing category for any constituent governed within the embedded VP will be the matrix VP since this VP contains the subject of the embedded VP). In particular, an adverb may have scope over either the embedded or matrix semantic clause. The Chi-Mwi:ni equivalent of 'I made the child hit himself slowly' containing the same derived causative verb *-big-ish-* as (3a) would mean either 'I made him do it and I was slow about it' or 'I made him do it and be slow in doing it.' In addition, the reflexive data in (3a,d) show that the causative has a biclausal syntactic structure, again just like its English gloss (recall that since the subject of the lower VP in (3b) is within the matrix VP, the matrix VP acts as a sentence with respect to binding theory). Note in (3d) that, as in English, one cannot say 'I made Ali hit myself' in Chi-Mwi:ni because the connection between reflexive and antecedent is clause bound in Chi-Mwi:ni, as in English, and 'I' and 'myself' are in different syntactic clauses in (3d)—see (3b)—even though there is only one phonological sentence (3c). Also, the Chi-Mwi:ni reflexive must find a syntactic subject as its antecedent. In (3a), the antecedent, 'the child,' is a subject only in the biclausal syntactic structure (3b), not the monoclausal phonological structure (3c).

The clitics in (1) show properties of both the structures in (2) and (3), displaying both bracketing paradoxes and syntactic affixation. In (1a) the English auxiliary *will* syntactically associates with the verb phrase on its right but phonologically affixes to the last word of the phrase, regardless of this word's syntactic category. The French example in (1c) is a mirror image of (1b): The preposition *de* is syntactically and semantically related to the whole NP to its right, its object, yet it phonologically affixes to the initial determiner of this NP. The combination of *de* + *le* has the special suppletive form *du*. The French example highlights a general problem with clitics: The bracketings they force in the phonological structure make it impossible to assign regular syntactic category labels to some phonological constituents. What is the category of *du* in (1c)? What is the category of the NP lacking a determiner?

The Papago auxiliary clitic in (1d) is a typical second-position sentential clitic. It has syntactic and semantic scope over the whole sentence, but it (generally) appears after the first word in the sentence. Word order in Papago is fairly free with two notable exceptions. First, the order of constituents within the phrase labeled V' in (1d) is fixed. For example, the NEG morpheme, the word meaning 'there,' and the verb must appear in that order. Second, the AUX element must appear in second position, after some phrase or word. When the V' appears in initial position, as in (1d), then the AUX suffixes to the first morpheme within the V' phrase.

This chapter shows that the principles that allow for the mismatch between syntactic/semantic structures and phonological structures in (2) and (3) are jointly necessary and sufficient to explain the behavior of clitics. The principle at work in (2) is simply the principle that constrains the mapping between hierarchical syntactic structures and linearly ordered phonological structures. The principle implicated by (3) defines the situation in which an independent syntactic constituent may become part of a derived word. These two very general principles automatically describe correctly the semantic, syntactic, and phonological properties of clitics and explain their restricted distribution.
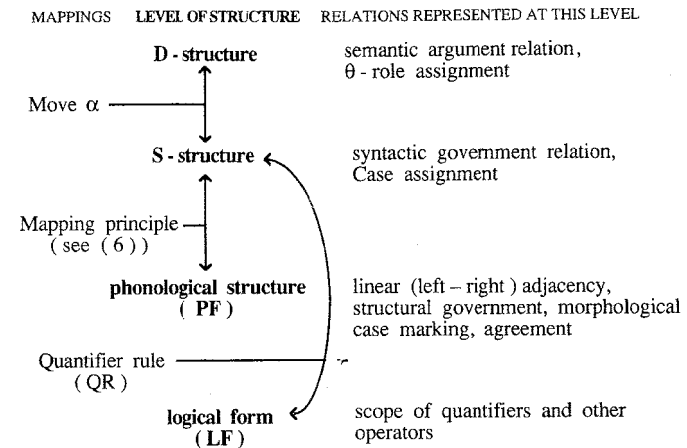
To present the two principles, I assume the terminology of the government and binding theory, although some of my assumptions are not consistent with this theory. The general structure of the grammar is diagrammed in (4).

The level of D-structure encodes semantic argument-taking relations and θ-role assignment. These relations are represented in tree structures by sisterhood—regular sisterhood for the θ-role assignment relation and asymmetric sisterhood for the argument relation. For asymmetric sisterhood, if B is an argument of A, then A and B will be sisters in a phrase headed by A. Note, then, that the order of constituents in a D-structure tree is uninterpreted; any left–right order with the correct sister relations will do.

The S-structure represents grammatical relations including what are generally called "abstract case assignment" and "government." Move α is

usually assumed to map between D- and S-structures, although I argue for a different sort of mapping principle in Marantz (1984). Again, the two sorts

(4)   Model of the grammar

MAPPINGS	LEVEL OF STRUCTURE	RELATIONS REPRESENTED AT THIS LEVEL
	D - structure	semantic argument relation, θ - role assignment
Move α		
	S - structure	syntactic government relation, Case assignment
Mapping principle (see (6))		
	phonological structure (PF)	linear (left – right) adjacency, structural government, morphological case marking, agreement
Quantifier rule (QR)		
	logical form (LF)	scope of quantifiers and other operators

of relations at S-structure are represented in the S-structure tree by sisterhood—case assignment by straight sisterhood and grammatical government by asymmetric sisterhood. As with D-structure, the constituents of S-structure are essentially unordered.

First–last phonological order, graphically left–right linear order, is a property of phonological structures. The principle mapping between S-structure and phonological structure constrains the left–right ordering of constituents according to their grammatical relations. Before discussing this mapping principle, I emphasize that the mapping involved does not relate the S-structure tree and the phonological structure tree but rather maps between the relations represented by the S-structure tree and the relations represented by the phonological structure tree. This point is illustrated in (5). Each level of representation consists,

(5)

S - structure constituents and relations	←—————→	S - structure tree
↑⎵—— Mapping principle		
phonological structure constituents and relations	←—————→	phonological structure tree
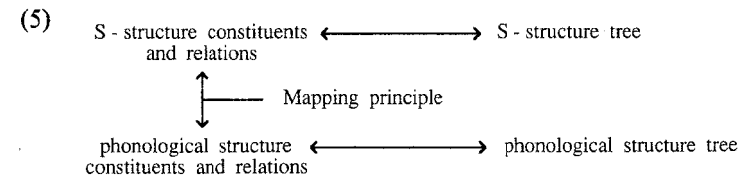
Other Constraints
General ordering constraints: head first / last, case assigner first / last
Requirements of individual lexical items
General prosodic structure constraints

essentially, of a list of constituents and relations, with a corresponding tree-structure representation of the constituents and relations (for further discussion of the nature of syntactic representations, see Marantz 1984).

The relations at each level are represented in the trees; we do not determine the relations from the trees. The mapping principle in (6) maps between S-structure and phonological structure relations.

(6)   THE MAPPING PRINCIPLE. An S-structure relation borne by B with respect to A corresponds to one or more of the following phonological relations: A structurally governs B (asymmetric sisterhood in the phonological structure tree), A is linearly adjacent to B (left/right adjacency), A morphologically casemarks B (morphology determined by A appears on B or the head of B), A agrees with B (morphology determined by B appears on A or the head of A).

One may see (6) as taking an S-structure and yielding a set of constraints on the construction of phonological structure. The language will impose other constraints on phonological structure as indicated in (5). For example, the language might require that heads of phrases appear either first or last in the phrase, or that Case assigners appear to the left or to the right of the constituents to which they assign Case. Second, individual lexical items might demand particular locations, as encoded in subcategorization features. Third, universal or language-particular principles determining the unmarked branching direction in prosodic trees may impose structure on the phonological structure of words and sentences.

Thus the mapping from S-structure and the other constraints listed in (5) determine a set of conditions that the phonological structure must meet—a set of simultaneous equations that must be solved by the phonological structure. To the extent that relations at S-structure are mapped onto case marking and agreement relations, not adjacency relations, and to the extent that individual lexical items make few demands on their ordering, a number of different phonological structures showing different orders of constituents will meet all the constraints on phonological structures, giving the appearance of freedom of word order observed in some languages. English generally imposes sufficient constraints on phonological structure to fix the order of constituents.

The internal structure of a word as well as the internal structure of a sentence is represented at every level of syntactic analysis. Morphemes determine their relative ordering within a word by morphological subcategorization features; affixes stipulate that they appear to the left or to the right of a stem of a certain type. Thus relations between morphemes are mapped onto left/right adjacency relations at phonological structure, and the order of morphemes within a word is generally fixed.

The crucial property of the left/right adjacency relation that allows for the bracketing paradoxes in (2) is that the relation is associative (Marantz,

1984; Sproat, 1985). The meaning for the grammar of the associativity of the adjacency relation is illustrated in (7). Say the S-structure relation between X and Y is mapped onto an adjacency relation with X to the left of Y. Furthermore, the constituents within Y are ordered by mapping such that Z ends up leftmost in the phrase. With the adjacency relation written as an asterisk, (7a) represents those constraints that the mapping to phonological structure places on the phonological structure. (Note that X * Y should be read, "X is left adjacent to Y" not simply, "X and Y are adjacent.") However, because adjacency is associative, the phonological structure in (7b) meets the constraints of (7a).

(7)   a. $X * [_Y Z * W * \ldots$
       b. $[[X \ Z] \ W \ldots$

Thus the associativity of the adjacency relation allows for a sort of rebracketing in the mapping from S-structure to phonological structure—a discrepancy in the bracketing between S-structure and phonological structure is allowed to the extent that the rebracketing does not cause the phonological structure to violate any of the constraints imposed on it by the mapping principle (6) or the other constraints in (5).

With the mapping principle, the associativity of adjacency, and the assumption that the internal structure of words is represented at every level of structure, we are ready to explain the bracketing paradoxes in (2). The semantic and syntactic structures of the words in (2) are displayed in (8a). Recall that the order of constituents in these structures is uninterpreted.

(8)   a.   Semantic/S-structure
             [er [un [happy]]]
             [_NP ity [_ADJ un [grammatical]]]
       b.   Constraints on phonological structure
             un * happy, [un, happy] * er
             un * grammatical, [grammatical,un] * ity
       c.   Phonological structure trees
             [un [happy [er]]]
             [un [grammatical [ity]]]

The relations between the constituents in the words at the S-structures in (8a) are mapped onto the adjacency relations shown in (8b), where the left/right order is determined by the lexical properties that *un-* is a prefix while *er* and *-ity* are suffixes. Given the associativity of adjacency, the constraints in (8b) are compatible with the actual phonological structure trees in (8c), where the bracketing in (8c) is determined by the lexical properties of the affixes that *un-* is a word-level affix, *-ity* is a stem-level affix, and *-er* may attach to a stem of at most two syllables.

The analysis provided for the cases in (2) would seem to extend automatically to the clitics in (1a–c), as shown in (9).

(9) Constraints on phonological structure   Phonological structure trees
  a. [I * [*will* * [*go to Milwaukee*]]]   [[*I'll*] [*go to Milwaukee*]]
  b. [[*the* * *porcupine* * [*over* * *there*]] * *'s*] * *brother*   [[*the porcupine* [*over* [*there's*]]] *brother*]
  c. *le porcupine* * [*de* * [*le* * *garçon*]]   *le porcupine* [[*du*] *garçon*]]

On the left in (9) I have summarized the adjacency requirements imposed on phonological structure by the mapping from S-structure in each case. Given the associativity of adjacency, the bracketings in the phonological structures on the right are consistent with these requirements. Note that the clitics are meeting both their left and right adjacency requirements. For example, in (9a), *will* must appear not only to the right of *I* but also to the left of the phrase *go to Milwaukee*. Note also in (9c) that the combination of clitic *de* affixed to *le* has a special suppletive form, *du*. Suppletion is not uncommon with clitics. Note finally that there is no problem in assigning syntactic category labels to the constituents produced in the phonological structures, for example, to the constituents labeled *?* in (1c). Syntactic categories are just that, syntactic, that is, relevant to the distribution and behavior of constituents in the syntax. Such categories are irrelevant to the geometry of phonological structure trees per se, coming into play only in the mapping between S-structure and phonological structure. To the extent that syntactic category labels play a role in the operation of phonological rules, we may suppose the combination of a clitic and its phonological host takes on the category label of the host (acknowledging the adjunction nature of the affixation). Since the category labels of words do not determine the tree structures at phonological structure, this assumption causes no structural anomalies.

A major difference between the bracketing paradoxes in (2) and the clitic constructions in (1) concerns the determination of the linear position of the clitics. While the leftness or rightness of adjacency relations involving affixes like *un-* is determined by their status as prefixes or suffixes, the linear position of the clitics follows from their syntactic role in a sentence. For example, the leftness of the *un-* is fixed by its prefix status. On the other hand, the positioning of *will* in (9a) derives from *will*'s function as an auxiliary verb of a certain sort. Crucially, the position of *will* in front of the verb phrase serving as its argument is independent of *will*'s status as a suffixal clitic. On the other hand, *un-*'s position in front of the stem over which it has semantic scope is totally fixed by *un-*'s prefixal status. This positioning of clitics according to their syntax allows a clitic like *will* to have scope to the right while leaning phonologically to the left.

Given this account of the clitics in (1a–c), it should be clear that the Papago

AUX clitic in (1d) will not yield to the same solution. Rather than appearing on the periphery of the phrase to which it is semantically and syntactically related, that is, on the periphery of the whole sentence, the AUX appears inside the sentence—in fact, inside a phrase that itself is inside the sentence. The principle that accounts for the placement of the Papago AUX also licenses the causative construction in (3a) and allows the Chi-Mwi:ni causative morpheme to pass from its status as an independent argument-taking verb to its suffixal status. This is the principle of morphological merger, given in (10) and heavily discussed and motivated in Marantz (1984).

(10)   MORPHOLOGICAL MERGER. At any level of syntactic analysis (D-structure, S-structure, phonological structure), a relation between X and Y may be replaced by (expressed by) the affixation of the lexical head of X to the lexical head of Y.

The causative construction in (3) shows how morphological merger works. In the S-structure to the left in (3), the causative morpheme *-ish-* takes as its argument a VP headed by the verb *-big-* 'to hit.' According to the merger principle, this relation between *-ish-* and the lower VP may be replaced at S-structure by the affixation of *-ish-* to *-big*, the head of the VP. This merger yields an S-structure isomorphic to the phonological structure shown to the right in (3), except that order holds no significance at S-structure, of course. The S-structure on the right in (3) is entirely determined by the theory, as I show in Marantz (1984), where I discuss the full range of causative constructions and other constructions involving merger.

For the purpose of the analysis of merger at phonological structure involving clitics, the interpretation and consequences of (10) are entirely straightforward. In all cases under consideration, two morphemes X and Y will merge at phonological structure only if, by the associativity of adjacency, they may be bracketed alone together in a phrase and bear the adjacency relation with respect to one another. Merger allows clitics to cross the word boundary to take on affixal status. Since crossing the word boundary has consequences in the grammar—in particular it makes the clitics subject to certain word-internal phonological rules—we should say the merger is always involved in clitic constructions, even when the positioning and bracketing of the clitics are completely determined by principle (6) as they were for the clitics in (1a–c). Since the principle of morphological merger describes the only way in which a syntactically independent morpheme (or X⁰) may cease to project its syntactic relations and become part of another word morphologically, clitic constructions necessarily implicate merger.

Returning to the Papago AUX clitic, we may propose the merger analysis illustrated in (11).

(11)   S-structure for (1d):
    [s *o* [s [v' *pi   iam-hu cikpan*] [g *Huan*]]]
       AUX   NEG there work   ART John
    'John is not working there.'
    Adjacency constraints:
    [*o* * [[*pi* * *iam-hu* * *cikpan*], [g * *Huan*]]]
    Phonological structure relations consistent with the constraints:
    [[[*o* * *pi*] * *iam-hu* * *cikpan*] * [g * *Huan*]]
    Phonological structure after merger:
    [[[*pi* + *o*] * *iam-hu* * *cikpan*] * [g * *Huan*]]

The S-structure in (11) maps onto the set of adjacency requirements shown. Recall that the order of major constituents within the S is rather free in Papago, but that the order of constituents within the phrase labeled V' is fixed. Thus, as shown in (11), the mapping to phonological structure does not put any constraints on the relative order of the V' constituent and the subject NP. Next in (11) is a premerger phonological structure consistent with the adjacency requirements. We have chosen to place the V' first in the sentence, allowing the bracketing of the AUX with the first constituent within the V'. Now merger will replace the adjacency relation between the AUX and the negative particle *pi* with an affixation relation between AUX and *pi*. The AUX clitic is a suffix and thus appears to the right of *pi*. Note that the positioning of the AUX clitic at the beginning of the sentence was determined by its syntactic status as an AUX, while its positioning after the negative particle once merger occurred was determined by its suffixal status. The key to understanding the distribution of clitics is acknowledging these dual constraints on their location.

It might be suggested that the Papago AUX clitic derives its second-position status through the movement of some other constituent to the front of the sentence: Perhaps AUX moves to COMP and another constituent moves to SPEC of COMP position. This analysis would be appropriate when the AUX appears after a topicalized XP or fronted *wh-* phrase. However, when the AUX appears within the initial phrase, as in the example cited above, the fronting analysis of the first position constituent will not work. The initial subconstituent of the V' cannot move away from the V' and thus may not be analyzed as moving into initial position to the left of AUX. It is for these and other similar reasons that Pranka (1983) suggests both a leftward movement rule to front XPs to the left of AUX and a rightward rule to move the AUX into the initial phrase if no constituent has been fronted.

About the analysis in (11) one might ask why the suffixation of the AUX to the NEG particle does not disturb the adjacency relation between the NEG particle and the adverbial morpheme 'there' to its right within the V'. To understand why this change of linear order is allowed, consider the internal

structure of the word derived by affixing AUX to the NEG particle, as shown in (12).

(12)
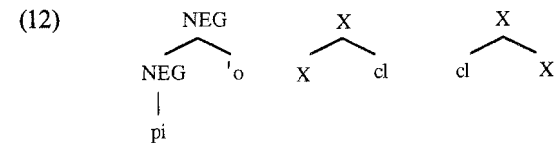
The clitic is (Chomsky-)adjoined to the word to which it attaches, creating a word with the root, rather than the affix, as head; the derived word is taking on the position of the root. (Although I have indicated the headedness of the derived word by giving it the same category label as the head, as I explained above, the syntactic category labels may not be relevant at phonological structure. What counts here is which constituent is head and thus which constituent has its relations taken on by the entire word; the category label is not relevant.) Thus any adjacency relations borne by the root word will be satisfied by adjacency relations of the whole derived word. In the case under discussion, the adjacency relation between the NEG particle and the following 'there' adverbial is satisfied by the adjacency of the combined NEG plus AUX and the adverbial. On the other hand, if the AUX element bore an adjacency relation with respect to some constituent on its left, adjacency of the derived NEG plus AUX word with this constituent would not satisfy this relation. So it is a good thing, and no accident, that the Papago AUX element has nothing to its left in the premerger phonological structure. We now can explain why, if an XP is fronted to the left of the Papago AUX, the AUX will not cliticize within a V' to its right: Such a cliticization would disrupt the adjacency relation between the AUX and the fronted constituent.

At this point we are ready to examine the full range of the distribution of clitics allowed by merger and the mapping principle. The theory allows all and only the clitic positions listed in (13).

(13)   HEAD CLITICS. By merging with the head of their syntactic dependents at D- or S-structure, a clitic may appear suffixed or prefixed to the head of the phrase to which it is semantically or syntactically related.

PERIPHERAL CLITICS

	Suffixes		Prefixes
Adjacency requirements	/Phonological structure	Adjacency requirements	/Phonological structure
a. ...[...Y * X] * cl...	/ ...[...Y X + cl]...	...cl * [X * Y...]...	/ ...[cl + X Y...]...
b. ...Y * X] * [cl * [Z...	/ ...Y X + cl] [Z...	...Z] * cl] * [X * Y...	/ ...Z] [cl + X Y...
c. cl * [X * Y...	/ [X + cl Y...	...Y * X] * cl	/ ...Y cl + X]

I have broken down the full set of clitics into head clitics and peripheral clitics. Although we have not discussed head clitics here, merger of a clitic

at D- or S-structure permits a clitic to appear on the head of the phrase to which it is semantically or syntactically related. For example, the English sentential negation clitic *not/n't* as in *clitics shouldn't do that* seems to appear on the head of the sentence that it negates. The analysis of head clitics parallels the account given to the Chi-Mwi:ni causative suffix in (3), which might well be called a head clitic. Using commonly accepted terminology, we call the Chi-Mwi:ni causative a derivational suffix because the term "clitic" has been reserved for morphemes on the periphery of words. On the present theory of the distribution of clitics, any syntactically independent constituent that merges with another morpheme at some level of analysis qualifies as a clitic and should conform to (13).

In (13) I have separated the peripheral clitics into prefixes and suffixes and the pairs in (13a–c) are mirror image cases. The English possessive *'s* is a (13a) suffix; the French prepositional clitic *de* a (13a) prefix. (13b) suffixes include the English auxiliary *'ll*. Finally, the Papago AUX suffix exemplifies (13c). I have recently looked briefly at two cases that might be analyzed as (13c) prefixes. In the Hebrew "construct state," noun–noun compounds, with the head noun on the left, show the definite article prefix *ha-* on the second noun of the compound to express the definiteness of the compound as a whole. Given the head-first character of Hebrew NPs, one might analyze the definite article as a clitic syntactically positioned after the N (possibly consisting of a construct state) that it modifies. It merges with the last root of the N and prefixes to it (I thank Joel Hoffman for bringing this possibility to my attention). In Rama, a Central American SOV language, subject pronouns apparently show up prefixed to the V when they express the running topic of conversation (Ken Hale, personal communication). One might suppose that these pronouns have been topicalized to the right in the syntax, then merged with and prefixed to the adjacent V at phonological structure.

I have not encountered any good examples of (13b) prefixes. I would speculate that the general cross-linguistic preference for (productive) suffixes over prefixes might account for this gap. Bracketing paradoxes like those in (13a,c) may need the motivation, within a language, of a strong preference for suffixing phonologically reduced material.

Within the range of clitic positions allowed by the present theory, the reader may be most disturbed by the cases schematized in (13b). In (13a and c) the clitic attaches within a phrase to which it bears some syntactic relation, while in (13b) it attaches away from such a phrase. Although the English example of (13b), auxiliary *I'll*, may yield to alternate analyses, much stronger examples of this situation are found in Kwakwatal (discussed in Klavans, 1985) and Yagua (see Payne, 1986).

Among the interesting potential clitic positions ruled out by the present

theory we find (14), (15), and (18). (14) shows a case related to both the English auxiliary *'ll* and the Papago AUX examples. Like the English *'ll*, this clitic is trying to attach phonologically in a different direction from that in which it leans syntactically. Like the Papago AUX, the clitic has moved inside another constituent. This case is ruled out because the clitic must remain adjacent to the constituent containing X. By appearing to the right of Y in (14), the clitic may not meet this adjacency requirement; it is no longer right-adjacent to X. Recall that in a configuration like (14), the word consisting of cl affixed to Y will take on the adjacency requirements of Y and thus Y will still count as being adjacent to Z after merger. Since a word may only have one relational head, this word may not also take on the adjacency requirements of the clitic.
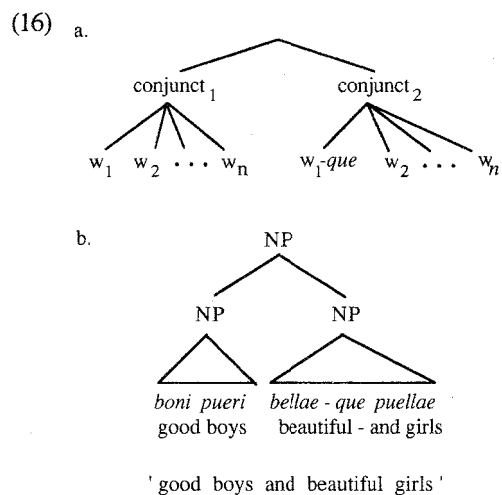
(14)   Adjacency requirements: ...X] * cl] [Y * Z...]

Phonological structure not meeting the requirements:

...X] [Y + cl Z...]⊦

Similarly, even cases almost identical to the Papago example are ruled out if the clitic must meet more than one adjacency requirement, as shown in (15).

(15)   Adjacency requirements: ...X] * [cl * [Y * Z...

Phonological structure not meeting the requirements:

...X] [Y + cl Z...

In (15) a clitic may not appear suffixed to Y, the first word in its syntactic dependent, because it must satisfy an adjacency relation with respect to the phrase ending in X. The theory thus predicts that second-position clitics like the Papago AUX should generally be limited to sentence-initial positions. It is in general only in sentence-initial position that a clitic is not required to meet any left-adjacency requirements because there is nothing on the left to be adjacent to. (15) represents the ungrammatical situation described above in which the Papago AUX clitic tries to cliticize into second position of the V' after some constituent XP has been syntactically moved into initial position to AUX's left. Again, in such situations, the AUX cliticizes to the left onto the initial XP; it may not cliticize within the V'.

An often-cited example of a second-position clitic that seems to exemplify (15) turns out to support rather than contradict the claims of the present theory. Sadock (1985) describes the case of the Latin conjunctive *-que* 'and' clitic that appears after the first word of the second conjunct. The behavior of *-que* is summarized in (16), with the example in (16b) from Sadock (1985, p. 423).

(16)   a.

b.


```
boni pueri   bellae - que puellae
good boys    beautiful - and girls
```

' good boys and beautiful girls '

Latin *-que* does not create an example of (15) precisely because conjunction is a relation among the conjuncts, not between the conjuncts and the conjunction. Thus the conjunction might best be seen as a morpheme that appears only in phonological structure, adjoined to the last conjunct as a marker of the relation among the conjuncts, as shown in (17a) (which matches the structure assumed by Sadock for conjunction; it is also possible that the conjunction should be analyzed semantically and syntactically as an *n*-place operator on *n* conjuncts). Note in (17a) that the relation between the conjuncts maps onto an adjacency relation between their phonological structure counterparts, while the conjunction itself must be adjacent to the last conjunct if, as we assume, it marks the last conjunct at phonological structure.

(17)   a.   [[*boni pueri*] * [*bellae puellae*]], [*-que* * [*bellae puellae*]]
       b.   [[*boni pueri*] [*bellae puellae*]], [[*-que* * *bellae*] * [*puellae*]
       c.   [[*boni pueri*] [[*bellae* + *que*] *puellae*]]

(17b) shows the premerger phonological structure consistent with (17a) while (17c) shows the final phonological structure tree after the suffix *-que* has merged with the first word of the second conjunct. When the *-que* appears to the right of the first word of the second conjunct, as in (17c), the adjacency relation between the first and second conjuncts is preserved. In short, it is the special nature of the relations involved in conjunction that allows for a second-position clitic that seemingly instantiates (15); in fact, (17a) does not conform to the disallowed (15) since *-que* is not constrained to fall to the right of any constituent.

    Last among the interesting clitic positions ruled out by the theory, situations like (18) are prohibited.

(18)   Adjacency requirements: . . .Y * X] * cl. . .
         Phonological structure not meeting the requirements:
           . . .[Y + cl] X]. . .

The suffixal clitic in (18) presents a case whose left–right ordering of morphemes is identical to that of the prefixal clitic case in (13c). The difference between them is that the clitic in (18) suffixes to the second word from the end of the phrase while the prefixal clitic in (13c) prefixes to the last word in the phrase. (18) is ruled out because the suffixation of the clitic to Y requires the bracketing of the clitic together with Y. However, such a bracketing would not satisfy the adjacency requirements of (18). Adjacency is only associative, not commutative. A clitic can move inside a phrase to which it is syntactically related only by affixing to the first or last element in the phrase.

    Recent work by Klavans helps confirm the predictions of the present theory (Klavans, 1985, reports on work originally described by Klavans, 1982). After surveying the literature on clitics, Klavans concludes that the distribution of clitics may be exhaustively covered by providing each clitic with a value for each of the three parameters listed in (19).

(19)   a.   Initial vs. final: Is the clitic initial or final with respect to a reference phrase?
       b.   Before vs. after: Does the clitic appear before or after the first (if initial) or last (if final) constituent of this phrase?
       c.   Proclitic vs. enclitic: Is the clitic a prefix or a suffix?

To translate Klavans's terminology into the language we have been using in this chapter: Initial vs. final indicates whether the clitic occurs at the beginning or at the end of the phrase with respect to which it bears a syntactic relation. Before vs. after indicates whether the clitic appears before or after the leftmost, if initial, or the rightmost, if final, word in this phrase. Proclitic vs. enclitic indicates whether the clitic is a prefix on the constituent found to its right after meeting the requirements of the first two parameters or is a suffix on the constituent found to its left after meeting these parameters. Klavans's parameters classify the clitics we examined in (1) as shown in (20).

(20)   English *'ll*: initial, before, enclitic
         English *'s*: final, after, enclitic
         French *de*: initial, before, proclitic
         Papago *'o*: initial, after, enclitic

    Although it severely restricts the distribution of clitics, Klavans's typology still allows several locations for clitics ruled out by the analysis of this chapter. In particular, Klavans allows the cases in (15) and (18), as well as their mirror images. For Klavans, the case in (15) is indistinguishable from the Papago AUX clitic—simply another initial, after, enclitic. (18) is a straightforward

final, before, enclitic. In her entire survey of clitics, Klavans suggests only one example of a clitic of a sort that is allowed by her typology but ruled out under the present analysis. This is the Nganhcara dative clitic, which Klavans considers a final, either after or before, enclitic. Representative Nganhcara sentences from Klavans (1985) are (21). All of the sentences mean 'The man gave the dog to the child.'

(21) a. *Nhila   pama-ng nhingu pukpe-wu ku?a wa:+ngu.*
          he.nom man-erg him.dat child-dat dog give+dat.3sg

      b. *Nhila pama-ng nhingu pukpe-wu ku?a+ngu wa:.*

      c. *Nhila pama-ng ku?a nhingu pukpe-wu+ngu wa:.*

The data represented in (21) may be summarized as follows: The dative clitic, agreeing with the indirect object, must appear either before or after the verb, which, ignoring this clitic, always appears in sentence-final position. The clitic always suffixes to the constituent on its left. Because, except for the verb, the major constituents of a Nganhcara clause may appear in any order, the dative clitic may end up attached to almost any sort of word, depending on what word finds itself in penultimate position. For example, (21a) has the clitic last, suffixed to the verb. (21b,c) show the clitic before the verb, suffixed to the penultimate word. When the clitic appears before the verb, as in (21b), the geometry of the situation looks like the case schematized in (18), which the present theory prohibits.

However, (21b) would only be correctly schematized by (18) if the dative clitic were a sentential clitic, and there is no reason to believe that this clitic takes the whole sentence as its syntactic dependent. Rather, the dative is either an indirect object agreement marker, with the verb as its domain, or a pronominal argument of the verb, which may "double" a full dative NP argument in the sentence in the familiar situation of clitic doubling. In either case, assuming that the clitic is a constituent of the verb phrase, any account of the data in (21) will implicate a structure distinct from (18). For example, suppose the clitic is an indirect object agreement marker contained in a V' phrase with the verb. The V' phrase is constrained to appear last in the sentence and the agreement clitic must appear adjacent to the verb, but the relative order of V and agreement clitic within the V' is not fixed. If the clitic shows up after the V, it merges with and cliticizes to the V at phonological structure. If it shows up adjacent to but in front of the V, it will bracket and merge with the last word in the sentence before the V'.

Since they allow for just the clitic positions observed in the world's languages, the mapping principle and morphological merger correctly predict the possible distribution of clitics cross-linguistically and seem jointly necessary and sufficient as a theory of clitics. One might ask whether any other current theory would do as well. We have seen that Klavans's account

of clitics is inadequate. Even though she constructs an ad hoc, clitic-specific set of parameters to deal with clitics, her system still predicts several types of clitics that are not found in the world's languages. What about other accounts of the sort of bracketing paradoxes that clitics exemplify?

Pesetsky (1985) also proposes to handle bracketing paradoxes like those in (2) by mapping between two levels of structure. However, he takes the right-hand structures in (2), which I have labeled the phonological structures, as the S-structures for these cases and suggests using Move α to create the left-hand structures, which he equates with logical forms. For example, Move α would move *un-* out of the word in the right-hand structure, creating the structure on the left as a logical form. That is, Pesetsky claims that the bracketing paradoxes involve a mapping between S-structures and logical forms in the diagram (4), not between S-structures and phonological structures.

Many objections have been raised to Pesetsky's proposal as a solution to bracketing paradoxes; see, for example, Sproat (1985). However, for present purposes we should just note that his idea does not extend to the clitic sort of bracketing paradoxes in (1). For Pesetsky, what we have been considering the phonological structures of sentences and words must be S-structures that serve as input to the mapping to logical forms. But, as we have seen, the phonological structures for sentences containing clitics cannot be generated as syntactic structures since they involve words and phrases of no determinable syntactic category or function. Consider again the French example in (1c). How could the phonological structure on the right be generated in the syntax? To describe the syntactic properties of the word *du* would be impossible on any reasonable assumptions about the creation of S-structures. Since Pesetsky would need something like morphological merger and the mapping principle to handle clitics anyway, and since these principles automatically cover the other cases of bracketing paradoxes, Pesetsky's theory is superfluous.

Sadock (1985) introduces the notion of autolexical syntax, which involves a mapping between syntactic structure and morphological structure similar in spirit and intent to the proposed mapping between S-structure and phonological structure. Since Sadock is concerned with the appearance of syntactically independent morphemes as bound affixes inside derived words, we might think of his autolexical syntax as a theory of merger.

Sadock works inductively, examining cases that he is familiar with and trying to generalize from them to principles that would allow just those sorts of cases and no others. Sadock lists a number of ad hoc principles governing the mapping between his two structures (his Principles IV-VIII), principles that he adjusts at will to deal with further data beyond that used initially to formulate the principles. Because it is not entirely clear what governs the construction of Sadock's two levels of analysis and because the principles are not completely transparent in interpretation (consider Principle VI, p. 409, "Elements of morphological structure must be associated one-for-one with

corresponding elements of syntactic structure *to the maximum extent possible*" (emphasis mine)), I do not know exactly what distribution of clitics Sadock would predict, nor does he explicitly make such a prediction. However, the descriptive success or failure of Sadock's inductive account is of no general interest; if counterexamples to his principles are discovered, he can again add a new principle or again modify an existing one.

In conclusion, let me emphasize that the present theory of clitics employs no clitic-specific constraints or principles, nor does it treat cliticization in any of its observed forms as a marked or special phenomenon. Rather, two general principles essential to the operation of the grammar as a whole—the mapping principle and morphological merger—account immediately for the observed behavior of clitics without allowing for logically possible but actually unobserved cases.

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Chapter 15

The Autolexical Classification of Lexemes

Jerrold M. Sadock

1. A Sketch of Autolexical Syntax

1.1 Autonomous Components

Suppose we take a grammar to be a set of subgrammars called MODULES. Suppose further that each of these modules is a grammar of an independent level of linguistic representation (i.e., the "tactics" of that level in the terminology of stratificational grammar). I assume that for natural languages at least three such modules are required, namely syntax, semantics, and morphology. The syntax specifies the surface constituent structures that the language allows, the semantics gives us the set of well-formed meaning structures in the language, and the morphology the set of well-formed words. Finally let us suppose that, unlike what is assumed in stratificational theory, transformational grammar, and so on, these modules are not hierarchically related to one another. A module need not wait for the output of another to do its work, but has the power to generate an infinite set of representations quite independently of what is going on in any of the other components.

On this conception of grammar, an expression must satisfy the independent requirements of each of the modules in order to count as a sentence. Each module, in other words, acts as a filter on all of the others. An expression that is syntactically well formed may fail to qualify as a sentence because it does not have a well-formed semantic parsing, or because there is no morphologically correct clustering of morphemes corresponding to it, or for both reasons. Similarly, an expression which is generable vis-à-vis the semantics may

Theoretical Morphology

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