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ABSTRACT

This paper examines the status of surface structure in transformational grammar, and the way that surface structure mediates the contacts between the phonological and semantic components of the grammar. Surface structure refers not to a single but to at least four distinct notions that do not necessarily define a homogeneous level of representation: output of the syntactic component, input to the phonological component, phonetic structure, and the level at which surface structure constraints are stated. Based on a survey of the literature, the conclusions include the necessity of direct links between deeper syntax and phonology, the influence of phonology on various syntactic operations, the need for phonetic information in certain semantic interpretation rules, and the lack of homogeneity among surface structure constraints. Finally, there is a recurrent influence of prosodic and morphological phenomena which motivate the revisions needed in the general organization of a grammar because they limit the types of interaction between the various grammatical domains. (Author)

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Surface structure and the centrality of syntax

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Abstract

This paper examines the status of surface structure in transformational grammar, and the way that surface structure mediates the contacts between the phonological and semantic components of the grammar.

Surface structure refers not to a single but to at least four distinct notions that do not necessarily define a homogeneous level of representation: output of the syntactic component, input to the phonological component, phonetic structure, and the level at which surface structure constraints are stated. Based on a survey of the literature, the conclusions include the necessity of direct links between deeper syntax and phonology, the influence of phonology on various syntactic operations, the need for phonetic information in certain semantic interpretation rules, and the lack of homogeneity among surface structure constraints. Finally, there is a recurrent influence of prosodic and morphological phenomena which motivate the revisions needed in the general organization of a grammar because they limit the types of interaction between the various grammatical domains.

0. Introduction.

The purpose of this paper is to investigate two interrelated questions concerning the general structure of a transformational generative grammar*:

- a) the autonomy of the syntactic component together with the way in which syntax interacts with the phonological domain of the grammar; and
- b) the notion of surface structure, since many of the aforementioned interactions between syntax and phonology have traditionally been mediated by this level.

We will advance the hypotheses (1) that a single level of surface structure cannot be empirically distinguished from other levels of representation, and (2) that more types of interactions than those of deep structure + semantics and surface structure + phonology permitted by the traditional theory are required to account for the facts of language in a principled way. The discussion of specific cases from a large variety of languages will lead to a reconsideration of the general organization of a grammar.

The cases are organized as follows:

1. Phonological information in syntax. This section summarizes areas where syntactic rules need to refer crucially to phonological information. The reference appears to be of two types. Either some phonological rule must be ordered before some syntactic rule because the former supplies information to which the transformation makes reference; or the structural description of the transformational rule contains rule-created phonological information.

2. Early syntactic information in phonology. A discussion of non-superficial material (material not found in surface structure) that is required for the operation of phonological rules.

3. Surface structure. This section will show that no homogeneous notion of this level has emerged, and that properties variously taken as coinciding and as defining a unique level of surface structure do not in fact define it.

4. Semantics and phonetics. Finally, we will show, based on a review of the literature, that there are connections between phonetics and semantics unmediated by syntax that require a reconsideration of the general organization of the grammar. A concluding section will speculate on these matters and on possible solutions.

1. Phonological information in syntax.

Standard generative approaches to the structure of a grammar require that all syntactic operations take place before the application of any phonological rules and that phonological considerations do not constrain transformations. Evidence has accumulated, however, to show that this is too strong a restriction on syntactic rules. Syntax utilizes information created by the rules of the phonological component. However, the kind of phonological material that the syntactic component requires appears to be 'prosodic' in nature, non-segmental in most cases: stress contours (1.1), syllable structure (1.2), and phonological identity (1.3). We will see in §2 below that phonological rules that require non-superficial syntactic information are also the prosodic ones.

1.1 Baker (1971) presents one example of a syntactic rule that requires information about prosodic countours¹, involving the auxiliary in English. Auxiliary Shift is a transformation that cannot be stated in its most general form unless it applies after the phonological rules which account for various levels of stress on auxiliaries. Auxiliary Shift positions the finite auxiliary at the lefthand side of the verb phrase, to the left of a variety of preverbal elements such as often and never in (1):

- (1) a. We have often heard those allegations.
- b. Murphy is never angry.

There are two situations in which the rule of Auxiliary Shift cannot apply:

- a) when the finite auxiliary is emphasized, as in (2);
- b) when the constituent following the auxiliary has been deleted, as in (3), or moved, as in (4):

- (2) a. We often HAVE heard those allegations.
- b. Murphy never IS angry.

- (3) a. John has taken more from you in the past two days
alone than Bill EVER has from you.
- b. *John has taken more from you in the past two days
alone than Bill has EVER from you.

- (4) a. I wonder where Gerald USUALLY is at this time
of day.
- b. *I wonder where Gerald is USUALLY at this time of day.

The common factor blocking movement in these cases is neither syntactic nor semantic, but phonological: the auxiliary has non-low stress. Auxiliary Shift applies only to those finite auxiliaries which are

no rules specifying
rule cannot apply

general rule. Consider the examples in (5):

- b. [si tó] 'he has lain down'
[si ká] 'it is lying there'

In Modern Israeli Hebrew, if a verb has two pronominal complements, both follow the verb like nominal complements. Whichever complement is shorter in terms of number of syllables will stand next to the verb and the order of pronouns will not depend on syntactic function.

- (6) a. hu lakax oto mimenu 'he took it-Acc (2 syllables)
from him (3 syllables)'
b. hu lakax mimxa otanu 'he took from you (2 syllables)
us-Acc. (3 syllables)'

As Hetzron (1972) notes, the movement rule that places pronoun complements after the verb seems to be conditioned by the number of syllables composing the pronoun.

Walbiri presents a comparable situation to the Hebrew case. Hale (1974) notes that in Walbiri, tense, mood, and markers for number, person, and case appear immediately dominated by the node Auxiliary in surface structure, and follow the first constituent of the sentence (kapi-na in (7a)). The auxiliary can sometimes appear in initial position, (7b):

- (7) a. wawiri kapi-na pura-mi
kangaroo future-I cook-nonpast } 'I am cooking the kangaroo'
b. kapi-na wawiri pura-mi

According to Hale, the auxiliary is basically initial and is moved into second position by a rule (Aux-Insertion) that comes late in the derivation because the notion 'second position' can only be defined after deletions and permutations. Aux-Insertion should follow all syntactic rules which have an effect on the ordering of non-auxiliary constituents, and it must make reference to phonological information. If an auxiliary base (kapi- in 7) is disyllabic or longer, then the Aux may remain in initial position,

as in (7b). If the base is monosyllabic or phonologically null (ka- or ϕ in 8), it must appear in second position:

- (8) a. wawiri ka-na pura-mi kangaroo present-I cook-nonpast
'I am cooking the kangaroo'
b. wawiri ϕ -na pura-tja kangaroo ϕ -I cook-past
'I cooked the kangaroo'

Aux-Insertion in Walbiri constitutes an example of a late movement rule in syntax that is sensitive to phonological information, or that mixes syntactic and phonological information in its structural description. One characteristic of this type of rule, in this and the previous cases, is its involvement with low-level syntax and morphological processes. For example, Aux-Insertion in Walbiri makes the Auxiliary enclitic to the first non-auxiliary constituent of the sentence. The output of the rule will influence processes of stress and intonation, and vowel assimilation. Clitization processes have led linguists to 'call into question the traditional division between morphology and syntax and [they] suggest that some of the same grammatical devices may account for both syntactic and morphological phenomena'. (Perlmutter 1971: 81)

We will return to this question below.

Less extensively discussed examples of the influence of syllable structure on syntax could also be cited in passing. Stevens (1971) points out that in Bikol (Southeast Luzon, Philippines), a number of enclitics are moved to a position following the first non-clitic word of their clause. When they are moved, one-syllable enclitics precede two-syllable enclitics.

Thus, the movement rule that places the clitics in second position must be sensitive to phonological information. It is also well known that the position of verb particles and indirect object pronouns in English is sensitive to, among other factors, the number of syllables in the verb and the length of the following NP (Bolinger 1971).

To deal with the above cases within a traditional framework, it could be argued that lexical representations contain the phonological specifications of the number of syllables in their underlying forms, and that such information would be available to condition the movement rules if lexical insertion had taken place in deep structure. Setting aside the controversy surrounding lexical insertion, this possibility is subject to two objections. First, many of the elements that condition the rules are not lexical items but inflectional morphemes, and given the various ways inflectional morphology is dealt with in TGG (see Bierwisch 1967), it is not clear that they are available at the point in the derivation where needed. Secondly, this position also presupposes that syllable structure will not be adjusted by phonological rules in the course of derivations, which is incorrect. Thus it would appear that the best alternative is to allow the phonological processes to apply before the syntactic movement rules.

1.3 A third type of phonological information that seems to condition syntactic operations involves phonological identity.

In German (Eisenberg 1973), some syntactic rules of deletion refer not only to structural, lexical, and referential identity, but also to phonological identity. Compare (9b) and (10b):

- (9) a. weil Franz das Haus kauft und ich den Garten kaufe
 'although Frank bought the house and I bought the garden'
- b. *weil Franz das Haus _____ und ich den Garten kaufe
 *'although Frank the house and I bought the garden'
- (10) a. weil Franz das Haus kaufen konnte und ich den Garten kaufen konnte
 'although Frank could by the house and I could buy the garden'
- b. weil Franz das Haus _____ und ich den Garten kaufen konnte
 'although Frank the house and I could buy the garden'

A transformation, Coordinate deletion, can refer under certain conditions to phonological identity of deleted elements in order to apply as in (10b), because the first kaufen konnte in (10a) is phonologically identical to the second. The rule blocks (10b), if phonological identity does not obtain: kauft-kaufe. The rule can overlook number, person, gender, and perhaps case; since these inflectional morphemes are often spelled out by readjustment rules and then undergo regular phonological processes, it must be quite late in the phonological derivations that the notion of phonological identity can be defined.

A similar case that involves the Respectively transformation occurs in French. The rule applies to certain structures only if the output contains phonologically different adjectives. Thus, (11a) is grammatical, while (11b) is not:

- (11) a. Jean et Marie sont respectivement

| | | |
|-------|----|---------|
| vieux | et | vieille |
| grand | | grande |
| gros | | grosse |
| petit | | petite |
- 'John and Mary are respectively

| | | |
|-------|-----|-------|
| old | and | old |
| tall | | tall |
| big | | big |
| small | | small |
- b. *Jean et Marie sont respectivement

| | | |
|-------|----|-------|
| jeune | et | jeune |
| joli | | jolie |
| brave | | brave |

The deletions effected by the Respectively transformation can only take place when the output will contain phonetically different adjectives. If the adjectives are identical in sound, the rule is blocked. Parallel to the German case, French shows that conditions of phonological identity, available only after the application of phonological rules, can influence the application of a transformation.

In conclusion, we have seen several ways in which underlying or rule-created phonological information constrains the operation of syntactic rules. These interactions between the two components contradict the restrictions placed on phonological-syntactic relationships in the standard theory, and show that the line between phonology and syntax is not as rigid as sometimes supposed. It is clear from the examples discussed, however, that there are restrictions on the way that syntactic and phonological levels interact. Thus, prosody, particularly stress and tone

(Section 1.1), appears to be one domain where it is wrong to exclude phonology from syntax. V . . . below, moreover, that the difficulties raised by ~~prosodic~~ questions go beyond the influence of prosodic information on syntactic operations. A second type of phonological conditioning in syntax also involves properties that are not directly involved in segmental phonology: the number of syllables in the phonetic output, or the need for conditions of phonetic identity in constraining the operation of syntactic rules (Sections 1.2-1.3). Both of these larger areas provide examples of two possibilities in phonological-syntactic interactions. In some cases, phonological rules must apply before syntactic operations; in others, phonological conditions must be placed on the applicability of syntactic rules themselves. These restricted types of interaction or 'mixing of levels' will recur in later sections as well, where we will see particularly that syllable structure and prosodic factors seem to be all-pervasive influences, not limited to a single grammatical domain. The fact that these conditions recur with such a wide distribution leads us to believe they constitute one important type of empirical restriction to be placed on the interactions between the components of a grammar, but that nonetheless, the inter-relationships are of a more complex and refined type than those presently envisaged.

2. Early Syntactic information in phonology.

In the preceding section we saw cases where syntactic rules required access to phonological information on syllable structure, prosodic contours, and identity. In this section we examine the converse situation: certain phonological rules require information that is not available to

them on the basis of surface structure, but which occurs at earlier stages of the syntactic derivation. The phonological rules are all prosodic in nature: intonation, tone, and stress assignment.

2.1 One of the first papers in this area is that of Zimmer (1969), who claims that certain Turkish structures provide a counter-example to the hypothesis that surface structure alone serves as the input to the phonology. In Turkish (as in many other languages) certain questions differ from the corresponding statements only in intonation:

(12) a. Ahmet Hasah'in ne okuduğunu söyledi

'What did Ahmet say Hasan is studying?'

b. Ahmet Hasah'in ne okuduğunu söyledi

'Ahmet said what Hasan is studying'

Zimmer proposes to refer to the Q-morpheme in deep structure in order to assign intonation contours. While other alternatives to this analysis can easily be imagined (the Q could be carried down to the surface structure, for example), the paper raises the problem of how to treat strings whose difference in meaning relates solely to intonation.

Pope (1971) pursues a similar question with respect to English. A syntactic deletion rule operating in answers to questions follows a phonological process assigning intonation. Consider the possible answers to question (13):

(13) Was the metal heavy?

a. Yes, surprisingly.

b. Yes, the metal was surprisingly heavy.

c. Yes, surprisingly.

d. Yes, surprisingly, the metal was heavy.

According to Pope, answer a. is related to b. by a syntactic process of deletion, while answer c. is related to d. in a similar fashion. It cannot be the case that the deletion rule in a. and c. precedes the phonological process of intonation assignment because the deletion rule destroys the conditions that differentiate between the two types of answers, as we can see in the following examples:

(14) When will he come?

- a. Probably soon.
- b. He will come probably soon.
- c. Probably soon.
- d. Probably he will come soon.

The intonation of probably in (14c-d) is that of absolute initial position, while that of (14a-b) is not. If the deletion rule were to apply to 14a and 14c before the assignment of intonation contours, the conditions that differentiate these two sentences would have disappeared. In other words, the phonological-phenomenon must precede the syntactic transformation, since the phonological rule requires information no longer present in surface structure.² It is not only intonation assignment that poses problems for the traditional approach to phonology-syntax interaction, but also rules of tone, as can be seen in Copala Trique and Sarcee.

2.2 Copala Trique, a Mixtecan language spoken in Oaxaca, uses reduplication to signal continuation, repetition, or intensification (Hollenbach 1974). For instance, verb roots, as in example (15), or the verbs as well as their subjects, as in (16):

(15) utu³⁵ utu³⁵ žini³

scratch scratch boy 'The boy scratches a lot'

(16) utu³⁵zini³ utu³⁵zini³

scratch boy scratch boy 'The boy scratches a lot.'

Reduplication can be considered as a syntactic rule a) copying only those elements present in surface structure: verb roots in (15), verbs and subjects in (16), b) copying verbs and subjects in all cases, or c) copying entire propositions. If solutions b) or c) are accepted, an optional co-referential noun phrase deletion, which is independently needed in Trique, would delete the reduplicated subject in (15). In both cases, reduplication must precede the syntactic rule of NP deletion.

Whichever hypothesis is selected, a syntactic rule appears to follow a clearly phonological rule: tone sandhi. Under solution a), reduplication follows tone sandhi, under solutions b) and c), NP deletion follows the tone rule. To see why this is so, aspects of tone assignment must be considered. Tone sandhi applies automatically to the word which precedes certain pronouns such as zo?⁵ 'thou' in (17). For example, a word final syllable that is open and bears tone 35 becomes 32:

(17) utu³⁵ + zo?⁵ → utu³² zo?⁵ 'You scratch'

scratch thou

Tone sandhi does not extend beyond the immediately preceding word (see 18)), with one exception: reduplicated forms. In these copied forms, tone sandhi

(18) a. *ni³² ni³² zo?⁵

b. ni³ ni³² zo?⁵

mother-of mother-of thou 'Your mother's mother'

applies to the sequence of identical words that precedes the sandhi causing pronoun, as in (19a) but not (19b):

- (19) a. utu³² utu³² zo?⁵
 b. *utu³⁵ utu³² zo?⁵ 'You scratch a lot'

The tone sandhi rule can be made global in the sense of being sensitive to the origin of the reduplicated forms, or else copied forms could be marked so that they are not deleted until tone sandhi has applied. In either approach, however, the result is to provide tone sandhi, a phonological rule with information that is not present in surface structure, but only at more abstract syntactic levels.

For a further case involving tone assignment, we return to Cook's work on Sarcee. Cook documents a case (1971b) where tone assignment must be made at the level of deep structure, since certain transformations delete information necessary to the operation of the tone rules. Sarcee contains three types of tone: tone inherent to certain (noun) stems, tone used as a signal of grammatical categories (i.e. aspect) in verbs, and a syntagmatic tone assigned by rule to prefixes in morphologically complex items. The syntagmatic tone is a terrace tone that gets lower as it moves left from the stem to preceding prefixes, dropping by one step for each prefix:

$$\begin{array}{ccc} \text{L} & \text{M} & \text{H} \\ \text{P}_2 & \text{-P}_1 & \text{-Stem} \end{array}$$

Thus we have ní - sí - s - rá 'I have grown up.' and í - ní - s - rás 'I will kick it.' However, the forms ní - rá 'He will grow up', and ní - rán - í 'The one who has grown up.' seem to contradict this, since the prefixe ní- bears low rather than mid tone in each case. Underlyingly, however, these items contain the perfective prefix si- between the stem and the ní-. This prefix takes the mid tone, thereby causing

ni- to have low tone, and is subsequently deleted by an independently motivated syntactic rule (Cook 1971b: 175). Many discrepancies in tone assignment in Sarcee are accounted for if the assignment of tone takes place before a syntactic rule deleting certain prefixes. We have, then, another case of a phonological rule requiring access to information - the presence of certain prefixes - that is not available at the surface level.

2.3 Rules of stress assignment have provided material for an on-going controversy as to the interaction of syntax and phonology. Another example of deep structure information in phonology involves the well-known paper on German accent by Bierwisch (1968). Bierwisch points out that it is not possible to derive the correct accent patterns in German if the phonological rules take into account only the final derived constituent structure of a sentence. In German, verbs with separable prefixes such as anschauen 'to look at', always receive their main stress on the prefix, even when the stem and the prefix are separated:

- (20) a. Peter sch³aut das Buch ¹an 'Peter looked at the book'
 b. Peter hat das B³uch ¹angeschaut 'Peter has looked at the book'

Other verbs, such as betrachten 'to bring', have their main stress on the stem:

- (21) a. Peter betr¹achtet das B³uch 'Peter brought the book'
 b. Peter hat das B³uch betr¹achtet 'Peter has brought the book'

In other words, the operation of the phonological rule of stress assignment depends on information, namely the unity of separable verbs, which is not present in surface structure, but only at earlier syntactic levels. As Bierwisch notes, the strict separation of syntactic and phonological rules is perhaps impossible.³

To conclude this section, we must examine two important and persistent controversies, dealing with stress assignment in English. The first involves the means of blocking certain contraction or movement rules, while the second is concerned with the stress assignment rules themselves.

King (1970) first noted that deleted or moved elements block the application of an otherwise regular contraction rule:

- (22) *There's less trouble this spring than there's
usually at this time.
Which ones are cooked? *Mine's on the bottom.
Who's hungry? *John's most of the time.
*You'll need some and I'll too.
*I wonder where Gerald's today.
*I can't get over how gentle they're with you.

Zwicky (1970) argued that the presence of the deletion site immediately following the Aux prevents the rule of auxiliary reduction from applying. Baker (1971), on the other hand, argues that the presence of a deletion site prevents stress lowering from applying (as well as the rule of Aux-movement discussed above), and the presence of stress prevents reduction. It is not necessary for our purposes to enter into the details of this controversy in order to show the influence of deep syntax on

phonology.⁴ Either the deletion site influences contraction or else it influences stress assignment. In both cases an underlying constituent has been moved, but the fact that the constituent occupied a particular position in deep structure must be retained in order to appropriately condition a phonological rule.

Finally, let us consider the nuclear stress rule. Bresnan (1971) proposed that nuclear stress is predictable in English if the nuclear stress rule is ordered after all the syntactic transformations on each transformational cycle. In other words, under Bresnan's proposal, the nuclear stress rule requires syntactic information that is not present in surface structure but which is available after each cycle.⁵ In his reply to Bresnan, Lakoff (1972b) proposes that the rule assigning nuclear stress applies to surface structure, not to earlier syntactic levels, but with a global environment that refers to logical, shallow, and surface structure. In his view, a phonological rule applying to surface structure but with a global environment is preferable to a NSR after each syntactic cycle because

When one has a rule apply in the syntactic cycle, one is claiming that the output of that rule could create an environment which another syntactic rule, either cyclic or post-cyclic, could require for correct application. If one has the rule apply after all syntactic rules, but with a global environment, one is making the claim that no syntactic rule ever crucially depends on the output of that rule for its correct application and moreover that NO SYNTACTIC

RULE COULD EVER CRUCIALLY DEPEND ON THE OUTPUT
OF THAT RULE.' (1972b: 301)

Thus, Lakoff is taking a conservative position in claiming that phonological rules do not mix with syntactic rules, but that there are global environments where syntactic and phonological levels mix. We can see, however, that the prediction that Lakoff makes is empirically wrong since, as we have indicated, there are a number of cases in which syntactic rules depend on the output of phonological rules, and under those conditions Lakoff admits that the global solution would not be as good. A global approach is, in our opinion, one possible way to formalize the mixing of phonological and syntactic information.

Berman and Szamosi (1972) argue that in certain cases surface structure is crucial for the assignment of nuclear stress, and that certain semantic principles appear to be at work. In her reply, Bresnan (1972) maintains her original hypothesis. We would like to emphasize that all the authors agree on the conclusion that the information present in surface structure is not sufficient for the assignment of nuclear stress in English. This conclusion is reinforced by Bolinger (1972), who, with his list of counter-examples, brings into perspective the complexity of the levels to which the rule assigning nuclear stress in English would have to refer. Bolinger's article, like other aspects of his recent work (see, for example, Bolinger 1971), points out that transformational grammar, or any model that separates levels in a rigid manner, is ill-equipped to deal with certain phenomena in natural language. It is enough for the limited purposes of this paper that the stress controversy,

as well as the other examples we have cited, have shown in a clear way that phonological rules must have access to information that is not necessarily present in the surface structure of sentences.

Conclusions about the common characteristics of the transformations that mix with phonological processes can only be tentative because a) a taxonomy of syntactic rules has not truly been developed in generative grammar and b) the grammar of many of the languages we have included in the previous discussion is largely unexplored. Most of the transformations that require phonological information in their structural description or that apply after a phonological rule, appear to be the kind of minor movement or deletion rules that have traditionally operated late in the syntactic derivation of sentences. Among the rules that have interspersed with phonology are those locating Auxiliaries in Walbiri and English, or verbal prefixes in German, those deleting verbal affixes in Sarcee, a number of movement rules for various clitic elements, and deletion rules under various kinds of identity conditions, some of them phonological as in German, some of them referential as in Copala Trique. Some of the transformations, especially those dealing with questions of cliticization (Walbiri) could be considered as two-faced rules in that they perform syntactic and morphophonological tasks at the same time, in that they have a syntactic input and a phonological output. Some of the syntactic rules that cross into the phonology put into question by their own nature the division between syntax and morphology.⁶

3. Surface Structure.

We have seen that the notion of surface structure plays a crucial role in linking syntax and phonology, and in constraining the interactions between different types of grammatical rules. However, compared to the discussion that deep structure has produced, surface structure seems to be taken for granted. It is normally considered to be the output of the syntactic component and at the same time the input to the phonology:

'the surface structure must meet two independent conditions: first, it must be appropriate for the rules of phonological interpretation; second, it must be "syntactically motivated", that is, it must result from the application of independently motivated syntactic rules. Thus we have two concepts of surface structure: input to the phonological component and output of the syntactic component. It is an empirical question whether these two components coincide.'

(Chomsky and Halle 1968: 7)

First, the two concepts do not seem to coincide, as the recent work on readjustment rules has shown. Second, given the extended standard theory, a third function of surface structure is apparent: input to certain rules of semantic interpretation. As we will see in the next section, this third surface structure coincides with neither of the first two. If it were the case that the output of the syntax, the input to the phonology, surface structure semantic interpretation rules, and surface structure constraints referred to the same object, it would constitute strong evidence about the existence of surface structure because we would

have a four-fold means of motivating a single independent and discrete level of representation: semantic, phonological, and two different types of syntactic material. However, the notion of surface structure identified by these different areas is not a homogeneous one. For example phonology and syntax do not meet at surface structure, but at times at a surface structure considerably modified by readjustment rules, and, as seen in §1 and §2 at different points of syntactic and phonological derivations.

As Perlmutter (1971: 32) pointed out, the addition of surface structure constraints to a generative grammar provided an independent theory of surface structure, while the previous view implied that surface structure was the automatic result of the application of transformations to deep structure. We will argue in this section, however, that surface structure constraints do not necessarily refer to one unique and homogeneous level. They refer instead to syntactic information that appears at several late points in the derivational history of sentences and that may not necessarily be present in surface structure. The homogeneity of surface structure is, therefore, even less apparent.

A number of constraints that were originally posited as output conditions or surface structure constraints appear under reanalysis to require information present at a more abstract level. We will concentrate on three specific cases, but as the bibliography indicates, there are additional examples in the literature pointing toward the same conclusions.

As a first example, consider the output condition on negation proposed for Spanish in Rivero (1970). The constraint states that each S-node can have only one particle no 'not' as a constituent in surface structure.

- (23) a. Lo hizo no con interés 'He did it not with
(= without) interest '
- b. Lo hizo sin interés 'He did it without interest '
- (24) a. *No lo hizo no con interés *'He did not do it not
with (= without) interest'
- b. No lo hizo sin interés 'He did not do it without
interest '

(24a) is ungrammatical because it has two no's under one S-node in surface structure. (24b), very similar in semantic content, has sin instead of no con and does not violate the constraint. Counterexamples to this proposal are provided by sentences such as (25b), presented in Rivero (1973):

- (25) a. *Juan dijo que no había no muchos niños
'*John said that there were not not many children '
- b. *No muchos niños, Juan dijo que no había
'*Not many children, John said that there were not '

Even though a movement rule has moved no muchos niños out of the subordinate clause in (25b), the sentence remains ungrammatical. For a similar situation in English, G. Lakoff (1971) proposed that the constraint be sensitive to shallow structure⁷ information, and not to surface structure. Under this hypothesis, both (25a) and (25b) would be ungrammatical because a S-node immediately dominates more than one no in shallow structure, and the movement transformation that applies later on to (25b) would not affect the degree of grammaticality.

A second example of a surface structure constraint that has been related to shallow structure is found in the grammar of English. Perlmutter

(1971) proposed that sentences with no superficial subjects are ungrammatical because they violate a surface structure constraint stating that all English sentences except imperatives must have subjects. Schmerling (1973) has pointed out that sentences such as the ones in (26) constitute counter-examples to Perlmutter's constraint:

- (26) a. Seems like the class always wakes up five minutes
before the bell rings.
b. Guess I should have been more careful.
c. Going to lunch?

She proposes that the so-called surface structure constraint applies before certain late deletion transformations which operate on matrices alone at the level of 'shallow structure', or at the output of the cyclic rules. In other words, the constraint no longer argues for surface structure, but it is preserved at a more abstract level.

The need for surface structure constraints in transformational grammar was motivated in Perlmutter (1971) by the behaviour of clitic pronouns in preverbal position in Spanish. He proposed that in surface structure, clitics never violate the condition se, II, I, III where the Roman numerals indicate second, first, and third person respectively, regardless of case, number, or gender. The clitic se can have several transformational sources: a) a third person reflexive, as in se lavó 'He washed himself.', b) the 'impersonal' clitic as in Se habla francés 'French is spoken.', or c) a third person dative, as in Juan se lo dió. 'John gave it to him' (literally 'John him it gave'). Under Perlmutter's proposal, (27a) is grammatical because it presents the order specified by the constraint (II, I), while (28a) is ungrammatical because it does not (*I, II):

(27) a. Tu te me escapaste

You yourself from me escaped.

b. Tu te escapaste de mí

'You escaped from me '

(28) a. *Yo me te escape

I myself from you escaped.

b. Yo me escape de tí

'I escaped from you '

Perlmutter took care to motivate the need for a static template independent of any specific transformation and requiring information that would be found at late points in the derivational history of sentences. He showed that the filter would take into account the output of several transformations taken together, and that very late transformations could create material relevant to the constraint (for instance, the se mentioned in (c) above).⁸ He therefore concluded that the constraint should apply at the level of surface structure by eliminating the possibilities that it be stated transformationally or that it refer to the phrase structure rules of the base component. Perlmutter did not rule out, however, the possibility that the constraint, even though independent of transformations and unrelated to deep structure, could be stated at some other level than surface structure.⁸ He also left open the possibility of transformations applying after surface structure constraints or being sensitive to them in certain ways (pp. 19, fn. 22; 35, fn. 35; 57; 85), as well as the possibility of having well-formedness conditions that apply at other stages of the derivation.

There are a number of proposals that modify Perlmutter's hypothesis concerning the Spanish clitics (see, for example, the bibliography cited in fn. 1 of Wanner (1974)). In our view, the variety of modifications

that have been proposed stems from the fact that the transformations of Spanish that copy clitics or move them into preverbal position have never been studied in a general way. Until such a study is undertaken, it appears difficult to specify the level of the constraint. The discussion which follows exemplifies in a preliminary manner the types of solutions which could be provided once the transformational history of clitics is considered systematically. Two cases which may require modifications of Perlmutter's proposal will now be examined.

Contreras and Rojas (1972) have advanced the hypothesis that sequences of se's should be dealt with transformationally, and not in terms of a surface structure constraint. They notice that Perlmutter's surface structure constraint filters out sequences of contiguous se's in a correct way (29), but is unable to deal with non-contiguous se's (30):

(29) *Se se arrepiente 'One repents.'

(30) a. *Se puede arrepentirse 'One may repent'

b. Se prohíbe bañarse 'Bathing is prohibited'

In their view, it is counter-intuitive to propose that (29) and (30a) are ungrammatical for different and unrelated reasons. They propose that the transformation that creates the impersonal se 'one' out of a [+pro] subject (that is, se-insertion, a last cyclical rule) blocks if another se (a reflexive, for instance) is already present in the same simplex clause at the point where se-insertion would apply. (29) has a simplex sentence as structure, and after reflexivation, which creates the second se, se-insertion can no longer apply. (30a) has been reduced to a simple S through pruning and since it has a reflexive se when se-insertion should

apply, the latter transformation blocks. In the case of (30b), the infinitive complement behaves not as a phrase but as a clause, and the second se is the reflexive of the subordinate, while the first se is the result of Se-insertion in the main clause. They reject a surface structure constraint that would say that within a simplex clause, a sequence of two or more (not necessarily contiguous) se's is ungrammatical, because they attribute the deviance of (29) and (30b) to the "unlawful insertion of 'impersonal' se." In conclusion, it is not the level of surface structure that is required to block certain deviant sequences of clitics, but instead the ungrammaticality results from the blocking of a transformation.

The second case we wish to discuss involves the first person clitics me 'me' and nos 'us', and the second person pronouns te and os, 'you' sing. and plu. respectively. Perlmutter noticed that examples such as (31) and (32) were ambiguous for certain speakers in the manner indicated by the English glosses:

(31) Te me presentaron 'They introduced me to you' or
'They introduced you to me'

(32) Te me recomendaron 'They recommended me to you' or
'They recommended you to me'

Perlmutter attributed the ambiguity to some peculiarity of the verbs presentar and recomendar. However, the double reading these sentences exhibit correlates with a very systematic ambiguity.¹⁰ Sentences with transitive verbs with a first or second person (human) direct object and a first or second person (human) indirect object in clitic form will consistently offer the double reading for the clitics, as in (33):

- (33) Te me transfirieron 'They transferred me to you '
or 'They transferred you to me '

There is a second source of ambiguity that provides two additional readings for sentences such as (31-33). One of the clitics can be interpreted as the direct object, while the other one is the so-called dative of interest, as in:

- (34) Te me entregaron al enemigo ll

'They delivered

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|-----|
| me |
| you |

 to the enemy on

| |
|-----|
| you |
| me |

If one of the clitics is interpreted as a dative of interest, (31-33) mean:

- (31) 'They introduced

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|-----|
| me |
| you |

 (to somebody else) on

| |
|-----|
| you |
| me |
- (32) 'They recommended

| |
|-----|
| me |
| you |

 (to somebody else) on

| |
|-----|
| you |
| me |
- (33) 'They transferred

| |
|-----|
| me |
| you |

 (to somebody else) on

| |
|-----|
| you |
| me |

Transitive verbs that take a direct or indirect human object (but not both) are systematically ambiguous in that either one of the clitics in the sequence me te can be interpreted as the direct or indirect object, while the other one is interpreted as the dative of interest:

- (35) Te me sobornaron 'They bribed you on me' or
'They bribed me on you'

Among verbs with this characteristic are aniquilar 'to annihilate', corromper 'to corrupt', entender 'to understand', escuchar 'to listen', destronar 'to destroy', limpiar 'to clean', responder 'to answer'.

This ambiguity is connected with first and second person clitics, and disappears when any other combination obtains. Me le presentaron means 'They introduced him to me ' and never 'They introduced me to him '.

Since *Le me presentaron is deviant, the only way to express the second reading is Me presentaron a él, without two clitics in a sequence. When this systematic ambiguity is considered, a number of solutions appear possible.

a) To locate Perlmutter's surface structure constraint on clitics at shallow rather than surface structure, and to mark sequences of *me te as ungrammatical in the same manner as *le me is marked:

(36) Ayer me le presentó María y antes de ayer *le me

presentó Juan 'Yesterday Mary introduced him to me,

and the day before yesterday *John introduced me to him'

However, there is an interesting distinction between *le me and *me te.

*le me is ungrammatical, me le is grammatical but never ambiguous; *me te is deviant, but its meaning is found in the sequence te me, which becomes multiply ambiguous. In other words, te precedes me regardless of its semantic role. In the order te me, any semantic value can be assigned to me or to te. In other cases, the surface structure constraint rules out certain sequences as impossible and implicitly rules out meanings too.

If we postulate a minor movement rule that applies to *I II sequences to transform them into II I grammatical sequences after the surface structure constraint has marked them as wrong, we would reflect the source of the ambiguity. This approach implies that one transformation applies after the output condition (it is the one taken by Hadlich (1971: 90), who did not consider the theoretical consequences).

b) A second solution involves the postulation of a constraint on clitics at the level of surface structure, while making the movement rule(s) that position clitics global in the sense of checking their output

against the surface structure condition. This solution would have to confront the problems mentioned by Perlmutter concerning the marking of sequences of clitics as ungrammatical through the blocking power of transformations. Certain sentences would block with no possible grammatical output in terms of clitics, while others would be generated via readjustment in their order through the global mechanism. In other words, me le, if treated like me te would imply ambiguities that do not exist. A general global rule, given *le me, would switch the order to me le implying an incorrect semantic prediction; but would switch te me with the correct prediction of ambiguity. Furthermore, even a transformation written to give the order te me in clitic position would have no generality, since it would be unable to predict that certain sequences of te me are ungrammatical (*Te me escapé).

c), A third solution would involve the use of surface structure interpretation rules, allowing for the generation of clitics in any order while rejecting some sequences as ungrammatical and interpreting others as ambiguous. Notice, however, that interpretation rules have not previously been postulated to account for direct-indirect object relations.

Considering these three solutions, the first seems to be the simplest, but it involves stating 'surface' structure constraints at a level that is no longer strictly that of surface structure.

We have concentrated in some detail on surface structure constraints in this section because it does not appear that these constraints combine to define a unique and homogeneous level of representation. We will see below that surface structure semantic interpretation rules must face the same criticism.

4. Semantic Interpretation of Surface Structure.

In his article 'Deep structure, surface structure, and semantic interpretation', Chomsky identifies the focus of a sentence as the phrase containing the intonation center in the surface structure, and correlates stress with certain cases of coreferentiality. According to the traditional approach to these matters within transformational grammar, intonation and stress are assigned by phonological rules, so that Chomsky is in fact speaking of phonologically interpreted surface as the input to semantic interpretation. Chomsky is of course aware that he is speaking of 'the structure determined by phonological interpretation of P_n [surface structure], with intonation center assigned' (p. 213). The theoretical consequences of this position are serious. Since Chomsky is using the notions of focus and co-reference as an example of a phenomenon that requires surface structure interpretation rules, it would appear that, just as in the case of surface structure constraints, there are at least two levels which the semantic interpretation rules must mention: 'syntactic surface structure', required for the interpretation of quantifiers and negation in terms of position, and 'phonetic surface structure', needed for focus and co-reference.¹² No homogeneous notion of surface structure is involved here either, as further examples will demonstrate.

A case very similar to the one presented by Chomsky involves anaphoric expressions that are semantically interpreted on the basis of their intonation and stress contours. Again the conclusion is that a semantic rule must apply to a phonologically interpreted string. For example, Akmajian and Jackendoff note (1970: 126) that contrastive stress on either a pronoun and a noun will prohibit co-reference. In their view,

the following examples, in which the underlined elements are stressed, can never have interpretations in which John and he are co-referential:

(37) After he woke up, John went to town.

(38) After he woke up, John went to town.

Schmerling (1974) deals with essentially the same problem in a paper on stress and semantic relations. She hypothesizes that certain sentence stress patterns are correlated with semantic relations, without recourse to syntactic information. She spells out, in other words, the implicit position of Jackendoff and Akmajian. Consider the following sentence:

(39) John_i insulted Mary_j, and then she_j insulted him_i.

The underlined elements must be heavily stressed. Schmerling proposed that it is the difference in the semantic relations of the two conjuncts that must be correlated with the stress pattern: John does the insulting in the first clause, and is insulted in the second, and vice versa for Mary. Consider the examples in (40):

(40) a. John hit Bill, and then George hit him. (him = Bill)

b. John hit Bill, and then George hit him. (him = John)

Bill is the one hit in both clauses of (40a); therefore, him is not stressed in (40a). The difference in the person being hit in (40b) determines the difference in stress pattern. Notice that with this explanation, Schmerling contradicts the claim advanced by Akmajian and Jackendoff that examples of the type (40) correlate stress with co-reference. For our purpose, however, it is important that both Schmerling (explicitly) and Jackendoff and Akmajian (implicitly) propose solutions that establish direct links between semantics and phonology, taking thereby positions inconsistent with the standard syntactically oriented theory (See also

Akmajian's 1974 proposals). Both attribute semantic consequences directly to phonological phenomena, and both involve a notion of surface structure requiring reference to phonetic properties.¹³

5. Conclusions.

We would now like to examine the implications of the preceding discussion for the general organization of a grammar. We have presented a large body of material requiring some fundamental reorganization of the interrelationship between syntax and phonology, and semantics and phonology. This material bears on the status of surface structure and the centrality and autonomy of the syntactic component.

The notion of 'surface structure', unlike that of 'deep structure', is practically taken for granted in contemporary theory, with unfortunate consequences. It has been clear at least since the appearance of The Sound Pattern of English, for example, that the output of the syntax, i.e. syntactic surface structure, was inadequate as a direct input to the phonology. Syntactic surface structures must be modified in several ad hoc (or sometimes partially motivated) ways to give an appropriate phonological representation. But the highly disparate functions of readjustment rules, encompassing everything from syntactic rebracketing to redundancy rules to segmentalization rules to subregularities in morphology to exceptions, masks a deeper problem. It is not clear that these different phenomena should all be handled at a single level in the same place. Given the heterogeneous nature of readjustment rules, it is still not clear that syntactic surface structure plus readjustment will give a single level. The difficulties are compounded, as Harris has noted, by 'the failure to

appreciate the distinction between phonological and morphological rules, which in turn stems from the lack of a theory of morphology in generative grammar." (1974: 272)¹⁴

The fact that surface structure does not correspond to a single homogeneous level of representation emerges again when we note that even though, traditionally, surface structure functions as the input to the phonology, recent discussions indicate the need for deeper syntactic information in the application of phonological rules (§2); in other words, the phonological well-formedness of sentences cannot be determined solely on surface structure grounds.

Surface structure has also been defined as the output of the syntactic component, that is, the result, in a given derivation, of the last applicable transformation. However, there are syntactic rules that require information created by the phonological component (§1) before they operate.

From the material discussed in §1 and §2, it follows that a grammar may not have an intermediate level of representation where all transformations have applied while none of the phonological rules have. In other words, there are cases where the syntactic and phonological information necessary for the determination of the well-formedness of sentences cannot be strictly separated at any one level. Since the question as to whether surface structure exists is an empirical one, it must be answered in a negative way if there is no level that fits the technical meaning of input to the phonology and output of the syntax associated with the notion of surface structure.

Surface structure has also been defined in a functional way by the kinds of rules it separates: syntactic transformations vs. morphological rules. However, the study of cliticization phenomena (pronouns in the Romance languages, auxiliaries in Walbiri) has led to the questioning of the traditional division between morphological and syntactic devices. It appears that certain rules may have both a syntactic and a morphological function. The mixing of non-superficial syntactic material and rule-created phonological information in the structural description of a number of rules discussed in §1 and §2 brings into question again the functional definition of surface structure.

Surface structure has also been defined as the level at which syntactic output conditions are stated. As we have indicated in §3, the fact that some of the proposed 'surface structure' constraints appear to require access to shallow information, while others should be generalized through the blocking power of the transformations, contradicts the claim that there is a unique level where such conditions can be stated.

In the extended standard theory, surface structure is the level interpreted by those semantic rules that do not apply to deep structure. As we have seen in §4, no unicity of level is required by 'surface structure' interpretation rules in that, in a number of cases, it is strings that have been phonetically interpreted that are the input to semantic rules. The conclusion is that certain phonological rules affect meaning.

In summary, in spite of the shared terminology, any attempts to define a single homogeneous level of surface structure are confronted

with serious difficulties. These results lead to a reconsideration of the centrality of syntax: a syntactic component which provides the structures which serve as input to the phonological and semantic components. This traditional syntax is autonomous in the sense that no semantic or phonetic information is relevant to the generation of syntactic structures, and it mediates between the other two components preventing a direct correlation between phonological and semantic phenomena? Needless to say, this concept of a central and autonomous syntax is under attack from various viewpoints,¹⁵ the most prominent being generative semantics. We have provided a new angle and additional evidence questioning an autonomous syntax by compiling many cases where syntactic rules need access to phonological information, phonological rules need access to non-surface structure syntactic information, and semantic rules mention phonological information. A theory that mixes these three types of information in its pairing of sound and meaning is not syntactically based. Those examples in which phonological information is required in syntactic rules constitute the most powerful case against the centrality of syntax because, unlike those cases in which the preservation of a syntactic trace can obviate the need for a phonological rule to refer to non-superficial information, a major theoretical change must be provided to include phonological information in syntax.

The nature of the interactions taking place between components seems very limited. In the 'phonological' component the areas that interact with syntax and semantics fall into two major categories: prosody and (for lack of a better term) morphology. The prosodic interactions involve stress, tone, focus and intonation, and often syllable structure.

The morphological aspects involve several types of readjustment rules, certain processes in the lexicon (notably word formation), and many of the phonological constraints on transformational rules (canonical form, constraints on low level movement or deletion rules, and so on). The syntactic rules that interact with the phonological component are 'minor' in nature, late rules that do not modify the structure of trees in radical ways. Some of them can be considered morphosyntactic in their effects. Unlike the 'minor' rules, the major transformational rules do not seem to be subject to the type of constraints we have enumerated. These various constraints and their syntactic effects, moreover, motivate a 'morphological component' from a syntactic point of view, just as many of the morphological conditions in phonology motivate such a component from a phonological point of view. It would appear, then, that in order to handle the problematic cases we have discussed, two additions should be made to the structure of a grammar. A prosodic component, having access to all parts of the grammar is needed to account for cases like focus, anaphora, and the various constraints on transformational rules. A morphological component, heterogeneous in function, is also required by the phenomena that we, and many others, have considered. By limiting the modifications in this way, the empirical constraints in the data are respected, but the theory is expanded to account for new types of phenomena, and is linked to a large body of traditionally oriented material that transformational grammar has overlooked until recently.

Footnotes

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¹This article forms part of an extended discussion in the literature to which we will return in more detail in section 2.

²Hetzron (1972) also notes that in Hungarian a rule accounting for intonation must precede a syntactic deletion rule.

³Anderson (1974a) has proposed that in Abkhaz, a Northwest Caucasian language, syntactic and phonological rules are mixed in their order of application. There are verbs in this language that require that an epenthetic vowel be inserted and stressed before the application of a syntactic rule of deletion that drops an agreement marker preceding the verb. In the absence of more detailed discussion by Anderson, we can only add this to a list of problem cases.

⁴This case has also been discussed by Lakoff (1970, 1972b) and Baker and Brame (1972) in relation to global rules vs. traces in generative grammar. We will consider the question at the end of this section.

⁵A similar proposal is presented by Maling (1971) for Old English: a cyclical rule of stress assignment is ordered after all syntactic transformations on each transformational cycle, with the single exception of the verb movement transformations that relocate the verb into pre-object or pre-subject position, moving it from its original final position.

⁶A controversy that has developed in connection with the correlation of non-adjacent steps in a derivation should be mentioned at this point.

As early as 1968, Bierwisch was considering, and rejecting, the possibility of having markers created or preserved by syntactic rules, for their interpretation by the phonological component. This approach has recently been used in phonology or across components (see, for example Selkirk 1972), and in syntax (for example Wasow 1972) under the theory of traces.

Lakoff (1970, 1971, 1972a, 1972b), among others, has provided a different formal device, global constraints, with the power to check non-adjacent points in the derivation.

There are still few attempts to place limitations on traces or global constraints, in particular in connection with non-adjacency across components. However, we would like to point out that global constraints can in principle deal with rule-created phonological information in syntax in the same manner as with non-superficial syntactic information in phonology. A theory of traces, on the other hand, is planned to deal with early syntactic material influencing phonology (§2) but not with phonological information in syntactic rules (§1). It appears as well that if traces are proposed for all cases where non-superficial syntactic information is needed in phonology, surface structure will become seriously encumbered by various types of abstract and unrealized markers whose main justification is the preservation of an autonomous syntax.

Shallow structure is a term that has received various definitions. Introduced by Postal, it has been used to refer to that point in a derivation 'having possibly such properties as being post-cyclical, post (most) lexical, pre-stylistic movement, appropriate for idiom definition.'

(Postal 1969: 231). More recently, the level has also referred to that preceding root transformations. Here we use it non-technically as a cover term for late points in the derivation close, but not equal to, surface structure.

⁸Postal (1972) has proposed that certain constraints mention levels which are not 'distinguished' (i.e. deep, surface structure).

⁹It has been suggested (Suñer 1974) that sentences such as (29) (30a) are ungrammatical because the se's are co-referential, and that (30b) is grammatical because the two se's are not. Counterexamples to this co-referentiality hypothesis are:

- a) Con un poco de previsión, se evita tener que arrepentirse más tarde
'With a little foresight, one avoids having to repent later on'
- b) Cuando se está por entregarse, hay que exigir garantías
'When one is on the point of surrendering, one must demand guarantees'
- c) En esta organización, se renuncia a casarse
'In this organization, one renounces marriage'

The complements of evitar, estar por, and renunciar meet the test for clauses and not phrases indicated by Contreras and Rojas.

¹⁰The examples in this section were tested with a small number of informants who speak what could be labelled, from an impressionistic point of view, 'Standard Castilian'. All the informants agreed on the ambiguity of the examples, confirming Rivero's intuitions as a member of the same dialectal group. Notice, however, that Perlmutter did not use Castilian informants, but he found the same type of ambiguity. Other

verbs with the same characteristics are comprar 'to buy', entregar 'to give', pedir 'ask for someone's hand', reclamar 'to recall', transferir 'to transfer', vender 'to sell', together with presentar and recomendar.

¹¹Sentence (34) can also mean 'They delivered the enemy to

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|-----|
| you |
| me |

 on

| |
|-----|
| me |
| you |

', in which enemy is the accusative, and me and te are the indirect object and dative of interest. We realize that the translations of several of the following examples are infelicitous. They are intended to reflect the dative of interest.

¹²Lakoff (1971) has discussed the relationship between quantifier order in surface structure and semantic interpretation in terms of global rules. He is referring to phonologically interpreted surface structure when he establishes a hierarchy of interpretation (244, ft. 2) in which the phonological has much heavier stress than mixes with such syntactic terms as commands and precedes.

In other words, both interpretive and global solutions to the contribution of surface structure to semantics sometimes involve phonological levels of representation.

A position that preserves the traditional separation of levels is that of Jackendoff (1971). Focus is a marker (F) introduced by rule in syntactic surface structure. If such a diacritic mark appears in the syntax, there is of course no semantic interpretation performed on phonological strings. Another possibility, as McCawley has pointed out, is to relate stress and intonation to underlying structure.

¹³Both Bolinger (1972) and Berman & Szamosi (1972) have also correlated stress directly with semantic factors.

¹⁴This gap is filling rapidly. Among the numerous studies on morphology in generative grammar starting to appear, we may cite Halle (1973), Keifer (1973) and Matthews (1972). Anderson (1974b) discusses a taxonomy of phonological and morphological rule types, and comes to the conclusion, parallel to ours, that the various types of rules cannot be rigidly separated.

¹⁵A set of facts appearing to falsify the centrality of syntax is furnished by phonetic symbolism. Consider a language with, for example, a productive diminutive, normal, and augmentative sound symbolism involving three distinct places of articulation (for details of such a case, see the discussion of Proto-Siouan by Matthews 1970). Here, the various semantic features of diminutive, normal, and augmentative condition the place of articulation of consonants, or, inversely, the place of articulation of a segment gives rise to the appropriate semantic interpretation, without any contribution from the syntax.

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