

SYNTACTIC CONDITIONS ON PHONOLOGICAL RULES

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0. Languages appear to have phonological rules subject to syntactic conditions; the best examples from the generative literature are French as studied in Selkirk (1972, 1974) and Ewe as studied in Clements (1977).

The relevant rules of French include a rule deleting an obstruent at the end of a word, blocked if another word follows beginning with a vowel, as in (1):

- (1) $[-\text{son}] \rightarrow \emptyset / __]$ unless
 $__] [V$

The relevant rules of Ewe are tone rules, as in (2), M standing for mid tone, H for high tone and R for extra-high tone:

- (2)a. $M \rightarrow R / H __ H$
 b. $H \rightarrow R / R __ , __ R$
 c. $R \rightarrow H / R __]$

All of these rules appear to apply under certain syntactic conditions; what these conditions are is what this note is concerned with.

1. Depending upon the syntax, the blocking of (1), i.e. liaison, can be either possible or impossible and, when possible, either obligatory or optional.

(3)-(8) are typical cases in which liaison is obligatory:

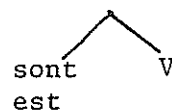
- (3) très aimable
 plus aimable

- (4) vous avez
 nous avons

très A
 plus

vous V
 nous

- (5) sont allés
est allé



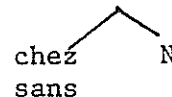
- (6) grand arbre
gros arbre



- (7) des ennemis
trois ennemis

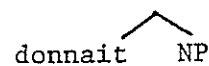


- (8) chez elle
sans elle

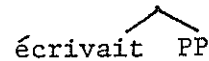


(9)-(12) on the other hand are typical cases in which liaison is optional:

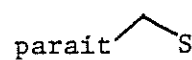
- (9) donnait un cours



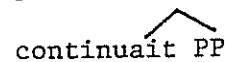
- (10) écrivait à Paul



- (11) paraît aimer

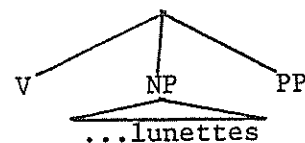


- (12) continuait à aimer

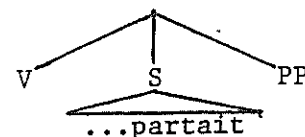


(13)-(16) finally are typical cases in which liaison is impossible:

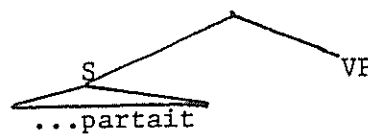
- (13) donner les lunettes/à Marcel



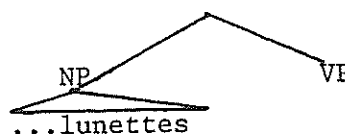
- (14) dire qu'on partait/à Marie



- (15) Qu'on partait/était clair



- (16) Les lunettes/étaient là



The problem is: what does distinguish between structures such as the ones in (3)-(12) and structures such as the ones in (13)-(16)? and what does further distinguish between structures such as the ones in (3)-(8) and structures such as the ones in (19)-(12)?

A possible hypothesis is that what distinguishes between structures in which liaison can apply and structures in which it cannot is a relation of c-command* satisfied in the former and not in the latter. In other words, the idea is that for any two words involved in the unless clause in (1) a relation of c-command* holds between the two, as in (17), with c-command* defined as in (18):

(17) In α] [β

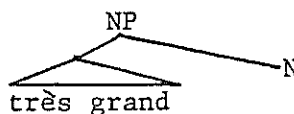
α c-commands* β

(18) α c-commands* β iff neither one dominates the other and the first phrasal node which dominates α dominates also β

That in fact c-command* does not hold in the cases in which liaison does not apply is easily seen; in (13) for example lunettes does not c-command* à, since the first phrasal node which dominates lunettes, namely NP, does not dominate à.

That in fact c-command* holds in the cases in which liaison applies is easily seen also; in (9) for instance, the first phrasal node which dominates donnait, namely VP, dominates also un, hence donnait c-commands* un. Notice however that in (6), in order for (17) to work, it must be the case that the first phrasal node which dominates grand is NP, which also dominates arbre; it cannot be the case that grand is dominated by some phrasal node AP which excludes arbre; obviously the same is true of (19):¹

(19) très grand arbre



(17) finally, in discriminating between the cases in which liaison

is possible and the cases in which liaison is not possible answers only half of the question asked by the data. What does account for the fact that liaison is obligatory in certain cases and optional in others?

In the examples given, it is easy to verify that whenever liaison is optional, only right to left c-command* holds; but whenever liaison is obligatory, reciprocal c-command* holds. So in (3)-(8) and in (19) it has been shown that the rightmost of the words involved in liaison c-commands* the leftmost one; that the reverse holds can be analogously checked. The possible exception is (8); but Prepositions can naturally be conceived as Case markers and PPs in this sense as NPs. In (9)-(12) on the contrary, while the word on the right c-commands* the word on the left, as has been shown, it can easily be checked that the word on the left is always dominated by some phrasal node which does not dominate the word on the right, hence does not c-command* the word on the right.

By consequence, a possible hypothesis is that what accounts for the distinction between obligatory and optional cases of liaison is again the relation of c-command*, holding in the latter cases only from left to right and in the former cases in both directions. In other words, the idea is that (17) is revised as in (20):

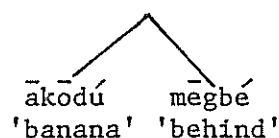
- (20) In $\alpha] [\beta$
 α and β c-command* each other (=obligatory application)
 α c-commands* β (=optional application)

2. Strikingly, for Ewe the correct distinctions between cases in which tone sandhi is possible and cases in which tone sandhi is impossible seems to be obtained under the mirror image of (17), namely (21):

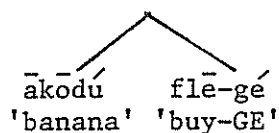
- (21) In $\beta] [\alpha$
 α c-commands* β

Examples in which tone sandhi applies as indicated are in (22)-(24) (where $\bar{}$ stands for M tone, $\prime$ for H tone, $\prime\prime$ for R tone):

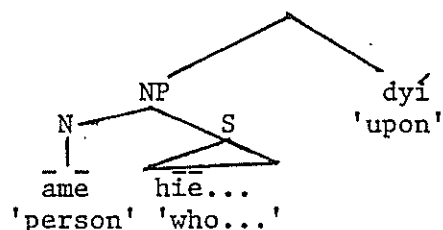
- (22) ākōdu mēgbé
ākōdu mēgbé



- (23) ākōdu flē-gé
ākōdu flē-gé



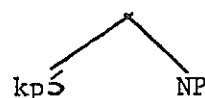
- (24) āmē hīē flē mé á vĕ-ē dyí
vĕ-ē dyí



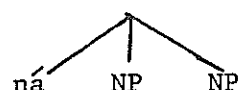
In all of the three cases of the two words involved in tone sandhi, the word on the right c-commands* the word on the left as (21) requires.

On the other hand, tone sandhi does not apply in examples such as (25)-(26) (where ` stands for Low tone):

- (25) kpɔ́ ǎnyí
see bee



- (26) ná àtyí kōfí
give stick Kofi



In (25), kpɔ́ does not c-command* ǎnyí and in (26), kōfí does not c-command* àtyí, as predicted under (21).²

After that, in Ewe a distinction also obtains between cases in which tone sandhi is obligatory and cases in which tone sandhi is optional. Is it the case that the mirror image of (20), namely (27), makes the correct predictions in this respect as well?

- (27) In α β
 α and β c-command* each other (=obligatory application)
 α c-commands* β (=optional application)

Among the examples given, cases of obligatory application of tone sandhi are (22) and (23); (24) is a case of optional application. Obviously, in (24), it is true that the left word involved in tone sandhi does not c-command* the other one. The question is whether it is true that the word on the left c-commands* the word on the right in (22)-(25). For (22), a solution analogous to the solution advanced for (8) can be advanced; for (23), the only possible solution is that the position at the left of the V is an N position, not an NP position. That this is so is independently suggested by the fact that at least for some of the structures with a complement Noun preceding the Verb, a complement PP, a phrasal complement, has to follow the verb (Clements 1975).

Tentatively then, the discussion so far leads to the conclusion that essentially the same condition holds for languages as different as French and Ewe, and for rules as different as (1) and (2), the only parameter open being a parameter of directionality.

3. In summary, what this note proposes is that there is a universal condition on phonological rules applying across words of the type of (28):

- | | | | |
|----------------------|------------------------|------------|--------------------------|
| (28) In α] | [β or β] | [α | (parameter) |
| α and β | c-command* | each other | (obligatory application) |
| α | c-commands* | β | (optional application) |

The condition in (28) is very naturally conceived as a formalization of the intuition that rules applying across words are constrained by considerations of juncture strength; and is a very natural formalization indeed, since it relies only on the notion of c-command*, i.e. in fact on the notion of phrasal nodes, whose phonological relevance -- for instance for the purposes of stress as in Chomsky and Halle (1969) -- has scarcely been doubted.³

FOOTNOTES

1. The theory of Selkirk (1972, 1974) allows for liaison in (3)-(5) and (7)-(8) under the condition in (i):

- (i) In $_{\alpha}$ [$_{\beta}$ or $_{\beta}$] [$_{\alpha}$]
 α is a non lexical category and there is a γ such that γ is the first node which dominates α and γ dominates β

It further allows for liaison in (6) and (19) under the condition in (ii):

- (ii) In $_{\alpha}$ [$_{\beta}$]
 α is an A and there is a γ such that
 γ dominates α and γ is a projection of β

And it finally allows for liaison in (9)-(12) under the condition in (iii):

- (iii) In $_{\alpha}$ [$_{\beta}$]
 α is a lexical category and there is a γ such that γ is an immediate projection of α and γ dominates β

Under the same conditions, the theory disallows for liaison in (13)-(16).

Actually, the theory of Selkirk (1972, 1974) assumes that "external sandhi rules are blind to ... syntactic structures, but not to word boundaries, which, along with distinctive feature matrices and other boundary elements, comprise the terminal string to which ... rules can apply". However, "word boundaries are themselves the reflection of syntactic structure. It suffices to consider the two universal conventions for the introduction of word boundaries...". Therefore, what in Selkirk is stated in terms of word boundaries can be stated in a provably equivalent way in terms of syntactic structure. A proof of the equivalence of (i) with the one word boundary condition in the rule of Selkirk in absence of readjustment rules is found in Rotenberg (1978); the equivalence of (ii) and (iii) with the conditions on corresponding readjustment rules is trivial; for (ii), Selkirk explicitly mentions A before N inside NP, for (iii), she explicitly mentions head before complement.

Another generative theory of liaison is provided in Rotenberg (1978). Rotenberg has liaison applying across two different types of elements. When liaison applies across words, the condition in (iv) holds, where C configuration is any configuration including one and only one non C word along with the right oriented C words at its left and the left oriented C words at its right:

- (iv) In $_{\alpha}$ [$_{\beta}$ or $_{\beta}$] [$_{\alpha}$]
 α and β are in a C configuration

The class of C's itself is an arbitrary class as are the classes of left oriented and right oriented C's. When liaison further applies across C configurations, the condition in (v) holds:

- (v) In $_{\alpha}$ [$_{\beta}$ or $_{\beta}$] [$_{\alpha}$]
 α and β are in an XP and either α or β is the leftmost node in XP

Of the two conditions, (iv) accounts for the cases in (3)-(8) and (21), (v) accounts for the cases in (9)-(13). But (v) does not account for modified cases in which a complement as in (9)-(10) is followed by another complement; in these cases the prediction of (v) is incorrectly that liaison is impossible between the head and the first complement.

More seriously, (v) predicts that liaison is possible in examples such as (13)-(14); clearly, for instance les lunettes and à Marcel are C configurations in (13) and VP dominates both of them (and -- not essentially now -- à Marcel is the leftmost branch of VP): but not less clearly, liaison is impossible. The faithfulness of (iv)-(v) to what Rotenberg states is trivially checked.

2. The theory of Clements (1977) allows for tone sandhi in (22)-(24) under the condition in (i):

- (i) In β] $[\alpha$
the first node which dominates α dominates β

Notice that Clements does not assume that tone sandhi is subject to syntactic structure conditions but rather that syntactic structure conditions mark the phonological representation in a way to which the tone rules are sensitive; notice also that he speaks in terms of labelled brackets representations rather than in terms of tree representations. But as usual everything translates.

3. One problem is left. Though native speakers of French can be made to assume a style of speech in which liaisons are possible in all of the various cases given, this style of speech is extremely artificial. What happens under normal circumstances is that liaison is possible with a certain number of words; and nothing more.

Now, on the other hand, the characterization of normal circumstances liaison is obtained simply by rewriting the rule in (1) as in (i), where L marks the belonging to some class L:

- (i) $[-son] \rightarrow \emptyset / \frac{\text{V}}{\text{L}}$ unless

In other words, an obstruent is deleted at the end of a word α unless a word β follows beginning with a vowel and α itself is an L word.

On the other hand, also for the purposes of normal circumstances liaison, it can be proven that syntactic conditions are necessary. For suppose that these were not operative; since in (ii) liaison is clearly at work, it would be expected that it were at work in (iii) as well; but it is not:

- (ii) Quand est-ce que tu es parti
(iii) Je dirai quand/à Marie

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