The Ordering of Derivational Tone Rules in Yoruba

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1. Introduction

Although Yoruba has a surface structure which is tonally very diversified, it is generally accepted that it has an underlying structure of only three tones which, moreover, are level. A set of rules is needed to derive this surface structure from the underlying one. By tone rule in this paper is meant any rule which plays a role in determining in part the surface tonal structure of a sentence. These rules have to be ordered carefully, as will be indicated below.

2. Two Types of Tone Rules

When discussing the ordering of derivational tone rules in Yoruba, it may be useful to distinguish two types of rules: (1) syntactic tone rules, those with a syntactic function or that are triggered by a syntactic environment, and (2) phonetic tone rules, those that have no syntactic function and are triggered by a phonetic environment. As an example of the first kind we can take the tonal changes operating under certain conditions in nouns when they function as the subject of a sentence preceding the predicate (Rule 8). As an example of the second type, we can take the tone spreading rule which governs the changing of a high tone to low-high rising when following a low, and the low becoming high-low falling when following a high (Rule 11).

3. Suggested ordering (to be discussed in detail below):

3.1 Syntactic Tone Rules

<table>
<thead>
<tr>
<th>Rule</th>
<th>(before R1)</th>
<th>(After R1)</th>
<th>(gloss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1.</td>
<td>òkò mi</td>
<td>òkòò mi</td>
<td>'my husband'</td>
</tr>
<tr>
<td></td>
<td>ìlè Bàyò</td>
<td>ìlèe Bàyò</td>
<td>'Bayò's house'</td>
</tr>
<tr>
<td>R2.</td>
<td>iyàn düm je</td>
<td>iyàn dümün je</td>
<td>'pounded yam is tasty'</td>
</tr>
<tr>
<td>R3.</td>
<td>ọmọ kan</td>
<td>ọmọkọ kan</td>
<td>'a child'</td>
</tr>
<tr>
<td>R4.</td>
<td>ò mà tì dë</td>
<td>ò mà tì dëe</td>
<td>'he has arrived'</td>
</tr>
</tbody>
</table>
R5. Low-toned verb before noun object

6 rā alūłoṣá > 6 ra alūłoṣá 'he bought onions'

R6. Mid-toned subject pronoun before high-toned syllabic nasal

mo ñifé > mo ñifé 'I want'

R7. Verb-Object Pronoun tone polarization

6 tì sê 6 > 6 tì sê 6 'he has done it'

6 mop 6 > 6 mop 6 'he knows it'

R8. Subject-Predicate high-tone junction

Bayọ fe jáde > Bayọ fe jáde 'Bayọ wants to go out'

(Non-tonal P-rules, including Vowel Assimilation Rules as in:

a 6 lọ > a 6 lọ 'we didn't go'

omọ tì e rì > omọ tì e rì 'the child you saw'

6 gba owọ > 6 gbo owọ 'he got money'

3.2. Phonetic Tone Rules

R9. Condensation and contraction (or Vowel [-segm.] introduction (ψ))

Condensation: omọ tì e rì > omọ tì e rì 'the child you saw'

Bayọ fe jáde > Bayọ fe jáde 'Bayọ wants to go out'

Contraction: 6 rā alūłoṣá > 6 rū alūłoṣá 'he bought onions'

6 gbo owọ > 6 gbo owọ 'he got money'

R10. Restricted ψ-deletion rule, see examples of the operation of this rule in different dialects under 5.6 below.

R11. Spreading

bābā > bābā

pūpū > pūpū

'Father'

'plenty'

R12. Linking into glides

āā lọ > āā lọ 'we didn't go'

R13. Pitch assignment rules

a. Downdrift

[1] slip of low tone

ọrọ [___] > [___] 'word'

[2] downdrift

ọrọ tì mo sọ [___ ___ ___] > [___ ___ ___] 'the word I said'
b. Pitch adjustment rules

[3] shortening of high-low and low-high glides when not linked to a following tone
   kō wā [\(\underline{\text{\(\text{\(\text{\(\text{\(\text{\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\text{-}}\textasureb
4.1. A special problem concerning syntactic tone rules is that of cases where a tone is added to an existing structure, sometimes involving the insertion of an extra vowel which is retained into the surface structure. An example is the subject-predicate high-tone junction rule mentioned above (R6). It has increasingly become more accepted that the origin of this high-tone junction is a high-tone subject marker which is underlyingly present in the predicate, and which subsequently assimilates in vowel quality (not tone) to the preceding noun (see Courtenay (1966:70); Fresco (1970:65); Stahlke (1974:173)). In this case we no longer have to treat this high-tone-junction as a tonal phenomenon, but rather as a mere case of vowel assimilation which will be subjected to the condensation, contraction and spreading rules when reaching the phonetic tone rules. The same analysis could be applied to the high-tone-junction verbs (R2), although the nature of the assimilated element is disputed (see Awobuluyi (1970) and Bamgboye (1974)). The same is true for the possessive tone junction (R1) where the assimilated segment is probably 'ti', with a low tone for the 1st and 2nd person singular, and a mid tone for the other pronouns and for some noun-to-noun possessive relationships. In the case of the low-tone-junction adjectives (R3) the assimilation process is even clearer because both the assimilated and the unassimilated forms occur synchronically in the language.

A slightly different case is that of the emphatic sentence-final tone changes (R4) which is a case of tone polarization (Bamgboye (1966b:45)). There we have to assume the addition of an emphatic marker (a vowel, maybe 'o') to the sentence marked for emphasis. But here a tone rule is needed because the emphatic marker has no constant tone. Its tone is determined by its environment.

Rules which don't require vowel insertion are: the verb-object pronoun tone rule (R7) which assigns tones to object pronouns which polarize with the lexical tone of the verb they accompany; the rule which changes the mid tone of a pronoun to low before a high-toned syllabic nasal (R6); and the rule which changes the low tone of monosyllabic verbs to mid before a noun object (R5).

4.2. Following these considerations, a more radical view of the set of tone rules in Yoruba could be to retain only a set of phonetic tone rules, to which the assigning of a tone to the object pronouns, to the emphatic marker and to the mid-toned pronouns before a high-toned syllabic nasal would be added as mere phonetic processes of polarization. These three rules would have to be ordered before the other phonetic tone rules, however, because of their close relation to syntactic processes, and because they provide input for the other phonetic rules. We would have excluded from the tone rules, therefore, all the so-called syntactic tone rules which require a vowel insertion prior to the assignment of a new tone to the construction. The only remaining syntactic rule is R5 (a low-toned verb becoming mid before a noun object) which apparently has neither a phonetic function, nor does
it require the insertion of a vowel. This rule would, therefore, have to be assigned the status of the only syntactic tone rule in Yoruba. This would be a doubtful situation, however, which would invite further research and the possible eventual inclusion of this rule with the vowel insertion type, which would exclude it from the tone rules. This would leave us with a greatly reduced set of tone rules, all phonetic:

1. Verb-Object Pronoun tone polarization
2. Emphatic sentence-final tone changes
3. Mid-toned subject pronoun before high-toned syllabic nasal
4. Condensation/Contraction rule
5. Restricted W-deletion rule
6. Spreading
7. Linking into glides
8. Pitch assignment rules
9. W-deletion rule

Non-tonal P-rules are ordered before this set. To avoid confusion, in the remainder of this paper we will still refer to the rule numbering given earlier.

5. Phonetic Tone rules

The ordering of the phonetic tone rules is intricate and controversial. The main problems arise from the interaction of non-tonal P-rules and tonal P-rules. As an illustration of the difficulties we list here the set of ordered rules given by Courtenay (1968:50). The application of her rules to all the possible cases of high with non-high tonal contractions point to the problems that exist: ('terracing' is downdrift, 'glide' is spreading)

<table>
<thead>
<tr>
<th>Underlying</th>
<th>After P-r.</th>
<th>Terracing</th>
<th>ø-deletion</th>
<th>glide rule</th>
<th>derived</th>
</tr>
</thead>
<tbody>
<tr>
<td>1' økọ</td>
<td>1' økọ</td>
<td>1' økọ</td>
<td>1' økọ</td>
<td>1' økọ</td>
<td>1' økọ</td>
</tr>
<tr>
<td>1' øla</td>
<td>1' øla</td>
<td>1' øla</td>
<td>1' øla</td>
<td>1' øla</td>
<td>1' øla</td>
</tr>
<tr>
<td>1' òná</td>
<td>1' òná</td>
<td>1' òná</td>
<td>1' òná</td>
<td>1' òná</td>
<td>1' òná</td>
</tr>
</tbody>
</table>

The ordering suggested in this paper, which will be exemplified with the same data below, has the following characteristics:

5.1. The non-tonal P-rules include vowel assimilation rules. The output of these rules are vowel pairs consisting of two vowels that are identical as to their non-tonal features. Some of these vowel pairs will later in R9 be subjected either to condensation, which means that one of them will become non-segmental while the other will carry the tonal features of both, or to contraction, which means that one of the vowels becomes non-segmental while keeping its tonal features. Later, R10 and R14 will delete the non-segmental vowels originating from both condensation and contraction.
This approach means that instead of three groups of P-rules, i.e. (1) vowel assimilation rules (the first of which commonly reads: the vowel \( \text{CiJ} \) assimilates in quality to a neighboring vowel), (2) vowel contraction rules (the first of which—again—usually reads: the vowel \( \text{CiJ} \) is deleted in a contraction with another vowel), and (3) tonal condensation/contraction rules, we now only have two: (1) vowel assimilation rules which are non-tonal P-rules and which establish pairs of identical vowels, and (2) condensation/contraction rules which operate on these pairs and are governed by tonal rules. It is of course the assimilation rules which will carry the burden of determining the quality of the vowel which will be kept after the contraction rules have operated since the latter only operate between vowels that have the same non-tonal features. As can be seen already from the rules concerning the vowel \( \text{CiJ} \) above which have now been collapsed in the assimilation rules, this procedure is more economical. 3

The rules concerning the choice of the vowel and its tone which is to become non-segmental in contraction (and therefore to be deleted) are general and without apparent exceptions. These rules will be similar, of course, to the rules which governed the behavior of tones in vowel contraction as described traditionally. E.g. traditionally, a rule would state that in a contraction between a high tone and a mid tone, the mid tone will be deleted. We now say that the vowel carrying the mid tone becomes non-segmental.

5.2. After the condensation/contraction rule, there is a rule (R10) concerning the deletion of \( \text{Ψ} \) in certain environments. This rule is general in some Yoruba dialects (all \( \text{Ψ} \) deleted before low-toned vowel, as e.g. in the dialect Courtenay was dealing with), it is selectively applied in others (Bamgboye's dialect, see Bamgboye (1966a), where the restriction is that \( \text{Ψ} \) is deleted before low-toned vowels only if itself has a non-low tone), and not applied elsewhere. All outputs have been recorded and are included in the examples given under 5.6. below.

5.3. High-low and low-high glides are introduced through the spreading rule (R11), while all other glides originate through the linking rule (R12) which governs the mere linking up, or slurring, in vowel quality and tone of all contiguous vowels. It would be possible to introduce all glides through the linking rule, and in order to account for the fact that spreading occurs across consonant boundaries, to analyze it as Fresco does by prefixing to the second vowel an extra vowel of the same quality but with the tone of the previous vowel. Linking would later provide the glide, and another rule reducing the length of the glide would give the correct surface output. However, since we may have opted above (4.2.) not to use vowel insertion rules in order to account for tonal changes, it seems better to keep spreading as an independent glide introduction rule. This implies that we are assigning to the low-high and the high-low glides a different status from the other glides in Yoruba.
5.4. The set of rules under R13 can be grouped together. They are the rules that assign phonetic pitches to the vowels bearing the tones.

5.4.1. The slip rule and downdrift rule must be viewed as one process. By slip rule is meant that all low tones end on a slightly lower pitch level than the one they started on, while mid and high tones are always level. This way of analyzing the low tone has already been suggested by J. Stewart (1971:185) and was further described by Hombert during this conference. Downdrift is then a quasi-automatic process if we assume a fixed L-H and L-M pitch interval, since the reference point for the H's and the M's (the preceding L) has been lowered.

5.4.2. The remaining pitch assignment rules could be called pitch adjustment rules, because they operate on the rigorous tonal framework that has been set up so far, by introducing certain low level adjustments in the pitches that have been assigned. The pitch adjustment rules are only roughly ordered here, and the set is certainly incomplete. More detailed research, including the study of dialectal variations and speech tempo, has to be done in this area of tonal phonetics.

5.5. Finally we have the usual clean-up rules where, among other things, the non-segmental vowels, with or without tones, are deleted (R14).

5.6. We can now study the effects of the application of the rule ordering suggested here on the examples used above under 5. The scope of R10 is different for different dialects (see 5.2. above), so we have different sets of data for rules 10-14. Linking (R12) and pitch adjustments of R13 have not been represented.

Under1. 11 ḋko 11 ḋko 11 ḋko 11 ḋko 11 ḋla 11 ḋna
Assim. 1ḥ ḋko 1ḥ ḋko 1ḥ ḋko 1ḥ ḋko 1ḥ ḋla 1ḥ ḋna
R9 contr. 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋla 1ḥ ḋna
R10 1ḥkọ 1ḥkọ 1ḥkọ 1ḥkọ - - 1ḥ ḋna
R11 - - 1ḥkọ 1ḥkọ - - 1ḥ ḋna
R13 - - - - 1ḥ ḋ'la 1ḥ ḋ'na
R14 1ḥkọ 1ḥkọ 1ḥkọ 1ḥkọ 1ḥ'la 1ḥ'na

a. Courtenay

b. Bangboye

Under1. 11 ḋko 11 ḋko 11 ḋko 11 ḋko 11 ḋla 11 ḋna
Assim. 1ḥ ḋko 1ḥ ḋko 1ḥ ḋko 1ḥ ḋko 1ḥ ḋla 1ḥ ḋna
R9 contr. 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋkọ 1ḥ ḋla 1ḥ ḋna
R10 1ḥkọ 1ḥkọ 1ḥkọ 1ḥkọ - - 1ḥ ḋna
R11 - - 1ḥkọ 1ḥkọ - - 1ḥ ḋna
R13 - - - - 1ḥ ḋ'la 1ḥ ḋ'na
R14 1ḥkọ 1ḥkọ 1ḥkọ 1ḥkọ 1ḥ'la 1ḥ'na
c. Other

R10 (not applied)
R11
R13
R14 lókò lókò lókò lókò lókò lókò lókò lókò

Glosses:
'to have a husband, hoe, truck, spear' 'tomorrow' 'yesterday'

6. Conclusion

In this paper an attempt was made—maybe for the first time—to account for all existing tone rules of Yoruba and to categorize them. Without going into the mechanics of each rule, the paper then tried to set up a motivated basis for the ordering of these rules, leaving only one well delimited area vague (the pitch adjustment rules). The measure of the paper's validity depends, therefore, on the completeness of the listing and the validity of the established categories, as well as on the rule ordering itself.

Footnotes

*I am indebted for comments on earlier drafts of this paper to P. Bennett, I. Dihoff and A. Bolstad. During the conference, helpful suggestions were made by A. Bangbóe and W. Welmers.

Terminology suggested by L. Hyman (1973 and personal communication).

The symbols used in this paper are the following:

[': high tone  [': low tone  [ ] or [': mid tone  [#: high-low glide  [#: low-high glide  [Ø]: vowel with no assigned tone

[ ]: the following tone is subjected to downshift

[Ø]: Vowel [-segmental]  [æ], [e] and [ə]: [ɛ], [o] and [ ] respectively.

[Vn]: a nasalized vowel

Vowel contraction and assimilation in Yoruba has been abundantly treated elsewhere, see e.g. Bangbóe (1965); Courtenay (1968:55f.); Oyelaran (1971:165f.).

Discussed by Courtenay (1968:92).

The output of R14 here suggests the existence of a surface tonal distinctiveness between an ordinary slipped L after H (lókò) and a slipped L with downshift (ló'kò). From data recorded, however, I think we are here in an undefinable area of idiolectical changes and free variation.
References


