The tonal phonology of Yoruba clitics[1]

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Abstract

This paper examines the tonal behavior of six types of enclitics in Standard Yoruba, and shows that in all six cases, a constraint applies preventing the last syllable of the host and the adjacent clitic syllable from having the same (High or Low) tone. There are no other host+clitic cases in Yoruba for which such a constraint would be relevant. Potential violations of the constraint are avoided by one of five different methods, depending on the case: failure to link a floating tone, deletion of a tone belonging to the clitic, deletion of a tone belonging to the host, insertion of a toneless vowel, or failure to delete an otherwise optional toneless vowel. This pattern is thus a morphophonemic "conspiracy" in the classical sense. However, Yoruba does not have a more general constraint against same-tone sequences in underlying or derived environments.

1. Introduction

In this paper we examine the tonal behavior of six types of Yoruba enclitics: the subject marking High tone morpheme, the object pronouns, the emphatic particle, the short subject pronouns, the exclamatory/vocative particle, and reduced forms of the possessive pronouns. We show that in Standard Yoruba, an Obligatory Contour Priniciple (OCP) constraint applies to all six types of enclisis, preventing the last syllable of the host and the adjacent clitic syllable from having the same tone. There are no other host+clitic cases in Yoruba for which this constraint is relevant, and thus it is an exceptionless generalization that Yoruba enclisis is subject to the tonal OCP.

This application of tonal OCP across six cases of enclisis is a morphophonemic "conspiracy" in the classical sense. Potential violations of the constraint are avoided by one of five different methods, depending on the case: failure to link a floating tone, deletion of a tone belonging to the clitic, deletion of a tone belonging to the host, insertion of a toneless vowel, or failure to delete an otherwise optional toneless vowel. Thus this phenomenon adds to the considerable body of evidence in favor of the role of constraints such as the OCP in morphophonology. However, there are interesting conceptual and technical difficulties in the way of providing a formal solution in terms of current domain- and constraint-based theories.

To start with, a constraint against derived sequences of like tones is not generally applicable in Yoruba. Although it applies with complete generality to host+enclitic combinations, it does not apply at all to combinations of stem+suffix, prefix+stem, stem+stem, or proclitic+host. Nor is there any evidence of any constraint against sequences of like tones in the lexical representation of individual Yoruba morphemes. In this last case, it is natural to represent apparent sequences of High or Low tones as

multiple linkage of single tonal feature. However, we must still explain the limitation of a tonal OCP constraint in derived environments in Yoruba to all and only the cases of enclisis.

We can appeal to the difference between lexical and phrasal levels to deal with the lack of a tonal OCP constraint in affixal and compounding cases; and we can appeal to an order-dependent definition of phonological domains in order to distinguish between the clitic+host and host+clitic cases. Some evidence for this approach can be found in an examination of the patterns of vowel harmony, which in Standard Yoruba also fails to apply between proclitic and following host. Alas, in Oyo and Ibadan dialects, vowel harmony applies in the proclitic+host case, while the tonal OCP does not. These phonological phenomena clearly embody generalizations about clitic structure, and yet a clear picture of a clitic group or phonological word domain, governing all clitic-related phonological activity in a uniform way in a given dialect, does not emerge.

In the second place, although the uniform lack of adjacent matching tones across host+clitic boundaries is a clear and simple goal, easily expressed as a constraint, this goal is achieved by a complex pattern of repairs, replacements and avoidance of normal processes, whose details and distribution do not follow from any obvious combination of constraints otherwise motivated in the language. A variety of solutions are possible, as always, but in this paper we will limit ourselves to establishing the basic descriptive generalizations and discussing some of the issues that will arise in modeling them formally.

A fuller survey of clitic-related phenomena across Yoruba dialects should provide a clearer verdict on the existence and nature of clitic-related prosodic domains, and on the basic characteristics of clitic-related morphophonemics.

2. Background on Yoruba Tonal Phonology

Yoruba has three phonemically distinctive tones-H(igh), M(id), and L(ow). H occurs in word-initial position only in marked consonant-initial words, which reveal an implicit initial vowel when preceded by another word in genitive construction. Most words start with a vowel, which is L or M but not H. Except for this minor tonotactic restriction, tones occur freely in lexical representations, without apparent restrictions on word melodies. So there are three possible tonal patterns for monosyllables, nine possible tonal patterns for disyllables, and so on, as in (1).[2]

(1) Lexical tone contrast

rá H “to disappear”	**ra M** “to rub”	**rà L** “to buy”
ọkọ́ MH “hoe”	**ọkọ MM** “husband”	**ọkọ̀ ML** “vehicle”
ìlú LH “town”	**ìlu LM** “opener”	**ìlù LL** “drum”
pákó HH “plank”	**kése HM** mythological place name	**pákò HL** “chewing stick”

2.1 *Non-specification of the Mid tone: Mid tone is no tone*

The Yoruba mid tone has been analyzed as underlying tonelessness since Akinlabi (1985) and Pulleyblank (1986a). In both Akinlabi's and Pulleyblank’s works, several arguments are given for this hypothesis. For reasons of space, we will briefly sketch one example, relating to *tonal stability*. When an object noun follows a verb in Yoruba, the two words are combined phonologically by deleting either the final vowel of the verb or the initial vowel of the object. Any High or Low tones of the deleted vowel are retained in the result. However, Mid tones are not stable in this sense, but instead behave in various combinations with other tones as if they were simply not there. Thus a Mid tone verb followed by an object whose initial vowel is Low will yield a combined form whose first vowel is simply Low, not some sort of Mid-Low contour, or a Mid with a following downstep, or anything else of the sort.

The crucial cases are exemplified below. The tone patterns in each of the (a) and (b) examples in (2) - (6) are the same; in the (a) examples the vowel of the verb is deleted whereas in the (b) examples the vowel of the noun is deleted[3].

H verb + L initial noun

2(a)	wa H look (for)	ẹkọ L H education	→	wẹkọ H LH “look for education”
(b)	mu H take	iwe L H book	→	muwe H LH “take a book”
3(a)	wa H look (for)	ọnọ L L way	→	wọnọ H L “look for a way”
(b)	wa H look (for)	imọ L L knowledge	→	wamọ H L “look for knowledge”

4(a)	ji H	ọbẹ L M	→	jọbẹ H (L) M
	steal	knife		"steal a knife"
(b)	fẹ H	iwo L M	→	fẹwo H (L) M
	want	horn		"want a horn"

H verb + M initial noun

5(a)	wa H	owo M H	→	wowo H H
	look (for)	money		"look for money"
(b)	wa H	ile MH	→	wale H H
	look (for)	house		"look for a house"

M verb + L initial noun

6(a)	jọ M	ajẹ L H	→	jajẹ L H
	resemble	witch		"resemble a witch"
(b)	sin M	oku L H	→	sinku L H
	bury	dead (body)		"bury the dead"

A few remarks are necessary for the motivation behind the selection of the above forms. First, as noted above since V-initial nouns cannot start with H in Yoruba, no examples of the form X+HX can arise. Second, when a L-tone verb precedes its object, the tone always deletes even if the vowel is preserved, so the case L+XX offers no evidence in this matter.

Extracting the tonal input and output alone from the above examples, we have the following:

Summary of Tonal Input and Output:

2(a-b)	H + L H	→	H L H
3(a-b)	H + L L	→	H L
4(a-b)	H + L M	→	H L M[4]
5(a-b)	H + M H	→	H H
6(a-b)	M+ L H	→	L H

Thus in all the cases that can arise, and whose output is not obscured by the deletion of the verbal L, we can say that H and L always remain when their lexically-associated vowel deletes, while M never does. We assume therefore that Yoruba has privative H and L tones, and that the Mid tone is simply lack of tone.

2.2 The subject-marking High tone

There are certain examples that have historically has raised doubts about the hypothesis that Yoruba Mid tone is no tone. Yoruba has a purely tonal morpheme, the "subject marking High tone" (SMHT), that marks the end of (most) subject noun phrases. When the SMHT combines with some subject noun phrases ending in Mid-toned vowels, the result is an NP-final High vowel, as an analogy with the verb-object cases would suggest. However, in other cases, the result is a Mid-High contour tone on the NP-final vowel. This is unexpected if Mid is just lack of tone: we must assume that for some reason, the SMHT floating High does not associate with the toneless vowel, but instead remains floating at the juncture. This is a highly marked situation at best.

We propose that the SMHT is a clitic whose host is the preceding NP. Syntactically, it is presumably some sort of auxiliary element. The H tone occurs at the end of the NP subject, regardless of where the end of the NP is or how complex it is. We indicate the SMHT as input H in all of the examples in this section.[5]

(7) Subject H tone

ọmọ H lọ → ọmọ́ lọ
child go "The child went"

ọmọ H máa lọ → ọmọ́ máa lọ
child asp. go "The child will go"

ọmọ ọkùnrin H lọ → ọmọ ọkùnrín lọ
child male go "The boy went"

ọmọ ọkùnrin tí ó rí mi H lọ → ọmọ ọkùnrin tí ó rí mī lọ
child male rel 3sg. see 1sg SMHT go "The boy who saw me went"

It occurs only at the NP-VP jucture and not just simply after an NP. Therefore question particles do not trigger the H tone:

(8) Question particles

ọmọ kẹ̀ → ọmọ kẹ̀ cf. *ọmọ́ kẹ̀
child Q "why the child?"

ọmọ dà → ọmọ dà cf. *ọmọ́ dà
child Q "where is the child"

It links straightforwardly onto the last mora of the NP; therefore a toneless vowel surfaces as H as in output of the second vowel of **ọmọ́** in (9a), a final L surfaces as an LH contour

as in the second vowel of **ọkǒ** in (9b), and a final H remains unchanged as in the second vowel of **adé** in (9c).

(9) Normal realization of the subject-marking H tone

a.	ọmọ H lọ	→	ọmọ́ lọ	
	child go		"The child went"	
b.	ọkò H lọ	→	ọkǒ lọ	
	car go		"The car went"	
c.	adé H lọ	→	ad**é** lọ	
	Ade go		"Ade went"	

The forms in (10) constitute counterexamples to the above generalization. In the examples in (10), the input words **ọmọ́le** (MHM) and **ẹlẹ́ran** (MHM) end in Mid tones, so the subject marking H tone should simply turn the final M tones to H, resulting in MHH pattern in "Omole went" and "The meat-seller went". However, this is not what happens. Instead, in this case, the last syllable of the subject emerges with a Mid-High contour. Put simply, when the NP ends in an HM, the final toneless syllable surfaces as a Mid-High contour instead of a level H. Thus the final HM is realized as H MH. (Note that in the second example in (10), the orthographic sequence [an] represents a nasalised [a] and not a sequence of two segments.)

(10) Exceptions

ọmọ́le H lọ	→	ọmọ́l**ḗ** lọ "Omole went"	(< ọmọ́ le "the child is difficult")
ẹlẹ́ran H lọ	→	ẹlẹ́r**āń** lọ "The meat-seller went"	(< oní + ẹran "prefix + meat")

There are several differences between example (9a) -- where M+H become H -- and example (10) -- where M+H becomes MH. One difference is that **ọmọ** "child" is synchronically monomorphemic, while **ọmọ́le** is a morphologically complex form, specifically a phrasal name meaning "the child is difficult." In 1985, Akinlabi observed some other morphologically complex examples that worked the same way, such as the second example in (10), and concluded that this distinction between simple and complex forms was the crucial one.

Such a conclusion fit well with two theoretical concerns of Akinlabi's overall treatment, concerns that were also central issues for phonological theory in 1985. First, underspecification theory said that underlyingly unspecified elements should become fully specified on the surface. Therefore, it seemed that the Yoruba Mid tone, though lacking underlying tonal features, should be provided with some by default in the course of the

derivation. Second, the difference between simple and complex forms suggested a role for the level-ordering that is characteristic of so-called "lexical phonology." Thus Akinlabi proposed that Mid tones, though unspecified in underlying representations, should be given specific tonal feature values at a certain point in the derivation. He then suggested that in derivationally-complex examples like (10), the Mid tones had already been "filled in" at the point where the SMHT was added, while in derivationally-simple examples like (9), the Mid tones remained unspecified. In today's theoretical climate, the solution in Akinlabi 1985 is problematic. In a constraints-based approaches to phonology, such as Optimality theory (Prince and Smolensky 1993), there are typically only two levels, underlying and surface, without intermediate derivational steps. Also, in our work on the phonetic interpretation of Yoruba tone (Akinlabi and Liberman in progress), we find it useful to assume that Mid tone is a lack of tonal specification on the phonological surface as well as in the lexicon.

More importantly however, this solution is empirically incorrect. The same Mid-High contours may be created on some underived words which could not have gone through an earlier cycle. Thus, underived NP's in (11) with initial H's behave in the same way as the NP's in (10).

(11)

kóro H jìn	→	kórṓ jìn
Koro be far		"Koro (an Ekiti town) is far"
tóbi H sùn	→	tóbī́ sùn
Tobi to sleep		"Tobi slept" [6]

Therefore the crucial difference between (10) and (9) is NOT derivational complexity, but rather tonal specification. The SMHT creates a final MH contour if and only if the subject-final word ends in the tone sequence HM. Because of the tonal structure of the Yoruba lexicon, nearly words of this type are complex (derived) nouns, but not all are.

More specifically, the generalization appears to be avoidance of creating a High-toned syllable immediately adjacent to another High tone. This may be taken to be an instance of the constraint, originally proposed by Leben (1973), known as the "Obligatory Contour Principle" or OCP (see also McCarthy 1986, and others). The relevance of the OCP to the case of the Yoruba SMHT is intuitively clear: whenever the SMHT attaches to a Mid (toneless) vowel at the end of the subject NP, that vowel becomes High. However, if the penultimate vowel of the subject NP is also High, then attaching the SMHT to the final vowel would be a violation of the OCP. In that case, the SMHT does not attach at all, but remains floating (though expressing a morpheme that is otherwise phonologically null). The observed Mid-to-High contour at the end of the vowel in question is simply the phonetic interpretation of such High tone, which is clearly located at the juncture between the last syllable of the subject and the first syllable of the verb or auxiliary, whether or not it has an associated vowel. In this sense, it is phonetically like the "boundary tones" that have often been hypothesized for intonational and accentual systems.

If another tone, such as a L tone, shields the subject-marking H tone from a preceding H tone then the subject H tone links. In HL nouns, the subject marking H always links, creating a LH contour on the last vowel of the noun.

(12)

pákò H	dára	→	pákǒ dára
chewing stick	be good		"The chewing stick is good"
débọ̀ H	mọ̀wě	→	débọ̌ mọ̀wě
Debo	knows books		"Debo is brilliant"

3. The tonal patterns of other Yoruba enclitics

The OCP effect that is noted in the subject marking H tone clitic is not an isolated occurrence in Yoruba. It appears that whenever the tone of a clitic is identical to the tone of the last vowel of the preceding host (usually a noun or a verb), the OCP comes into effect to forbid the expected outcome. There are five other cases: the object pronouns, the emphatic particle, the short subject pronouns, the exclamatory/vocative particle, and the reduced forms of singular possessive pronouns. We will treat them one at a time.

3.1 A brief note on the definition of "clitic"

Following the traditional perspective, we assume that "clitics" are morphemes that are independent from the point of view of syntax, but are a dependent part of a larger word from the point of view of phonology. In more contemporary terms, clitics are prosodically deficient in some way, and need a host to provide prosodic support. In Yoruba, we can define "clitics" as "all and only the closed-class elements that have a phrasally-defined distribution and that contain one vowel or less." The prosodic deficiency, in this case, is then a simple failure to meet the garden-variety minimality condition of containing at least two moras. The members of the class of formatives thus defined share some clearly clitic-like properties: they cannot occur by themselves, and they engage in special phonological interactions with their hosts, of which tonal OCP effects are pre-eminent.

Yoruba verbs are also typically monosyllabic, and it is probably not an accident that they also combine in a compound-like fashion with (lexical) direct objects, but they do not act in other ways like clitics -- for instance, they can perfectly well occur independent of a host, and they will happily exist in derived environments that violate the tonal OCP.

3.2 The Object clitics

As (13 b,c) show, after Low or Mid tone verbs, the object clitics are all always High in tone. By contrast, after High tone verbs, the enclitic object pronouns either become Mid (by deleting the High tone), or (in the case of the 2nd plural object), are separated from the verb by an "extra" Mid vowel that cannot otherwise occur with these forms (13a).

(13a) With High tone verb **kọ́** "to teach"

ó kọ́ **mi**	"he/she/it taught me"
ó kọ́ **ẹ**	"he/she/it taught you"
ó kọ́ **ọ**	"he/she/it taught him/her/it"
ó kọ́ **wa**	"he/she/it taught us"
ó kọ́ ọ **yín**	"he/she/it taught you-all"
ó kọ́ **wọn**	"he/she/it taught them"

(13b) With Mid tone (i.e. toneless) verb **pa** "to kill"

ó pa **mí**	"he/she it killed me"
ó pa **ẹ́**	"he/she it killed you"
ó pa **á**	"he/she it killed him/her/it"
ó pa **wá**	"he/she it killed us"
ó pa **yín**	"he/she it killed you-all"
ó pa **wọ́n**	"he/she it killed them"

(13c) With Low tone verb **kọ̀** "to divorce"

ó kọ̀ **mí**	"he/she/it divorced me"
ó kọ̀ **ẹ́**	"he/she/it divorced you"
ó kọ̀ **ọ́**	"he/she/it divorced him/her/it"
ó kọ̀ **wá**	"he/she/it divorced us"
ó kọ̀ **yín**	"he/she/it divorced you-all"
ó kọ̀ **wọ́n**	"he/she/it divorced them"

The common generalization is that the tone of the clitic cannot be the same as the tone of the previous vowel. Thus the object clitic in Yoruba is High, except when the verb is High toned, in which case the clitic is Mid (i.e. toneless). If the enclitic forms one domain with the host, then the tonal alternation (i.e. H tone deletion) in the examples in (13a) is motivated by the same constraint(s) preventing the linking of the subject High tone in the preceding section.

In Standard Yoruba, the H tone of the second person plural **yín** is not deleted, as seen in **ó kọ́ ọ yín** "he/she/it taught you-all". Instead an extra Mid vowel separates the clitic from the verb, which of course also prevents an OCP violation. Depending on how we represent this extra vowel (is it epenthetic? or is it a lexically-given part of an allomorph?), the second person plural object pronoun following a High-toned verb might not be technically an enclitic at all. This is an alternative way of ensuring that the H tone of the clitic is not adjacent to the H tone of the verb, though there is no obvious morphophonemic characteristic of the second person plural object clitic that motivates this alternative outcome. Indeed, in Igbomina and Owe dialects, the second person plural clitic patterns just like the other object clitics, where no vowels are inserted:

(14) Second person clitic in Igbomina dialect

ó kọ́ **yin** “he/she/it taught you-all”

In Standard Yoruba, the Igbomina outcome is not permitted, and in Igbomina, the Standard Yoruba outcome is apparently not an option. Though some Igbomina speakers also can speak a version of SY, they will generally use their native form in this case, even when speaking SY. However, dialect variation in these matters remains to be carefully studied.

3.3 The emphatic clitic

The next case is that of the emphatic clitic, shown in (15) through (18). This morpheme is a copy of the previous vowel, bearing a Low tone. The examples in (15) through (17) demonstrate its realization after major lexical classes. The ones in (18) show the same realization after another clitic (the third person clitic (13)). The (a), (b) and (c) examples represent the realization of the clitic after Mid (i.e. toneless), High and Low tone vowels respectively. The clitic is realized as Low, except when the preceding tone is Low, in which case it is toneless (i.e. Mid). Again, the generalization is that the clitic tone cannot be the same as the tone of the previous vowel.

(15) After verbs

(a)	ó lọ	“he went”
	ó lọ **ọ̀**	“he went (emph.)”
(b)	ó dé	“he arrived”
	ó dé **è**	“he arrived (emph.)”
(c)	ó sùn	“he slept”
	ó sùn **un**	“he slept (emph.)”

(16) After nouns

(a)	ó lé akin	“he pursued Akin”
	ó lé akin **ìn**	“he pursued Akin (emph.)”
(b)	ó lé olú	“he pursued Olu”
	ó lé olú **ù**	“he pursued Olu (emph.)”
(c)	ó lé Rọ̀gbà	“he pursued Rogba”
	ó lé Rọ̀gbà **a**	“he pursued Rogba (emph.)”

(17) After adjectives

(a)	ó mọ̀wé ganan	“he knows books very well” i.e. “he is intelligent”
	ó mọ̀wé ganan **àn**	“he knows books very well” i.e. “he is intelligent (emph.)”
(b)	ó mọ̀wé burúkú	“he knows books badly” i.e. “he is very intelligent”
	ó mọ̀wé burúkú **ù**	“he knows books badly” i.e. “he is very intelligent (emph.)”
(c)	ó mọ̀wé púpọ̀	“he knows books a lot” i.e. “he is intelligent”
	ó mọ̀wé púpọ̀ **ọ**	“he knows books a lot” i.e. “he is intelligent (emph.)”

(18) After clitics

(a)	ó dé e	“he covered it”
	ó dé e **è**	“he covered it (emph.)”
(b)	ó jẹ́ ẹ́	“he ate it”
	ó jẹ́ ẹ́ **ẹ**	“he ate it (emph.)”
(c)	ó mọ̀ ọ́	“he knows it”
	ó mọ̀ ọ́ **ọ̀**	“he knows it (emph.)”

The pattern of the forms in (15) through (17) is identical to that for the object clitics (other than the second person plural): the tone of the emphatic clitic is deleted if and only if it is identical to the tone of the host.

In the case of the emphatic clitic, no other repairs are possible: we may not insert a “buffering” toneless vowel, nor may we delete the final tone of the host rather than that of the clitic.

3.4 Subject clitics with preceding grammatical formatives

In certain circumstances, subject clitic pronouns can attach to preceding pragmatic particles ending (mostly) in High tones (**ngbọ́**, **àbí**, **ǹjẹ́**, **ṣé**, **àní**, **àṣé**, **ni**, **bí**, **tí**, **pé**, **kí**). Examples are given in (19) through (23). The focus here is on the third person subject clitic **wọ́n** (in 22), but to be exhaustive we provide the realization of the other subject clitics in (20) and (21).

(19) Subject clitics in Yoruba

mo	a	1st person sg/pl
o	ẹ	2nd person sg/pl
ó	wọ́n	3rd person sg/pl

Assimilation takes place between the final vowel of the pragmatic particles and the first and second person subject clitics as in (20)(a)-(b). In the same context, the final vowel of the formative deletes before third person singular clitic (21). This deletion (of both vowel and tone) avoids what would otherwise have been an OCP violation (see Akinlabi in progress, for details.)

(20) Assimilation in the first and second person subject clitics:

(a)	ngbọ́ a wá	→	ngbá a wá	"confirm, did we come?"	*ngbá wá
	àbí a wá	→	àbá a wá	"did we come?"	*àbá wá
	ǹjẹ́ a wá	→	ǹjá a wá	"did we come?"	etc.
	ṣé a wá	→	ṣá a wá	"did we come?"	etc...
(b)	ngbọ́ o wá	→	ngbó **o** wá	"confirm, did you come?"	*ngbó wa
	àbí o wá	→	àbó **o** wá	"did you come?"	*àbó wá
	ǹjẹ́ o wá	→	ǹjó **o** wá	"did you come?"	etc.
	ṣé o wá	→	ṣó **o** wá	"did you come?"	
	etc...				

(21) Deletion in the third person subject clitic.

ngbọ́ ó wá	→	ngbó wá	"confirm, did he come?"
àbí ó wá	→	àbó wá	"did he come?"
ǹjẹ́ ó wá	→	ǹjó wá	"did he come?"
ṣé ó wá	→	ṣó wá	"did he come?"
etc...			

The third person plural pronoun **wọ́n** (with High tone) normally loses its initial glide, and the vowel of the preceding formative consequently assimilates. The High tone of the clitic pronoun may optionally become Mid following the final High of the previous vowel as in (22) and (23). This example is less clear-cut, because of its optionality, but follows the same pattern as the others we discussed in the preceding sections.

(22)

ngbọ́ wọ́n wá	→	ngbọ́n **ọ́n** wá	"confirm, did they come?"
àbí wọ́n wá	→	àbọ́n **ọ́n** wá	"did they come?"
ǹjẹ́ wọ́n wá	→	ǹjọ́n **ọ́n** wá	"did they come?"
ṣé wọ́n wá	→	ṣọ́n **ọ́n** wá	"did they come?"

(23)	ngbọ́ wọ́n wá	→	ngbọ́n **ọn** wá	"confirm, did they come?"
	àbí wọ́n wá	→	àbọ́n **ọn** wá	"did they come?"
	ǹjẹ́ wọ́n wá	→	ǹjọ́n **ọn** wá	"did they come?"
	ṣé wọ́n wá	→	ṣọ́n **ọn** wá	"did they come?"
	etc.			

Though this evidence is not as strong as in the object clitics, we believe that it is the same constraint against identity of tone of clitic and host that is at work in (23). Perhaps the forms in which the High tone is retained represent cases where cliticization does not occur fully.

3.5 The exclamatory/vocative particle

The exclamatory particle in Yoruba is a low tone vowel /**ò**/. It is also used in calling to someone by name. The particle occurs after the name that is being called or after the noun in an exclamation, as in (24) below. Like the emphatic clitic it is low toned, but unlike the emphatic clitic the vowel /**ò**/ is not assimilated to the preceding vowel.

(24a)	Exclamation	
	ẹmu **ò**	"What a drink!"
	ìṣẹ́ **ò**	"What poverty!"
	èpè **o ò**	"What a curse!" (repair by Mid vowel insertion)
	èpe **ò**	"What a curse!" (repair by LL host changed to LM)
	agọ̀ **o ò**	"What stupidity!" (repair by Mid vowel insertion)
	*agọ **ò**	"What stupidity!" (no repair by ML host changed to MM)

(24b)	Vocative	
	Akin **ò**	
	Adé **ò**	
	Rọ̀gbà **o ò**	(repair by Mid vowel insertion)
	Rọ̀gba **ò**	(repair by LL host changed to LM)
	Olè **o ò**	(repair by Mid vowel insertion)
	*Ole **ò**	(no repair by ML host changed to MM)

In the forms in (24) the exclamatory particle is Low toned after a noun with a final High or Mid tone, but after final Low toned nouns, an OCP violation would result. This is prevented or repaired in one of two alternative ways: either a surface Mid tone vowel intervenes between the noun and the Low toned exclamatory particle, or the final Low tone of the host is deleted. However, deletion of the final Low tone of the host is only possible if the deleted tone is the last of two or more adjacent Low-toned syllables. This is presumably because the Low tone in this case remains realized on the surface, as long as it is also linked to one or more earlier tone-bearing segments.

3.6 The possessive pronouns

The Yourba possessive pronouns are listed in (25). They are all disyllabic, and thus should not be candidates for enclisis in Yoruba. We nevertheless present their patterns, partly to show the lack of OCP repair in non-enclitic constructions, even those involving bound closed-class formatives, and partly because there are reduced (monosyllabic) forms of the singular possessive pronouns that do show OCP effects

The forms on the right are those that occur independently, in constructions without a possessed noun, as in answers to the question "whose is it?" In the (combining) forms on the left, the initial symbol **v** represents a vowel assumed to lack input vocalic features, and not the consonant /v/ (see Oyelaran 1971, Pulleyblank 1986b and others).

(25) Possessive pronouns

ṽmi	vwa	1st person sg/pl	èmi	àwa
ṽrẹ	vyín	2nd person sg/pl	ìrẹ / ìwọ	èyin
vrẹ̀	vwọn	3rd person sg/pl	irẹ̀	àwọn

The possessive pronouns take the following (tonally invariant) forms after nouns ending in Low tone, High tone and Mid tone respectively.

(26a) After a Low-final noun such as **ọkọ̀** "car/vehicle"

ọkọ̀ **ọ̀**mi	"my car"
ọkọ̀ **ọ̀**rẹ	"your car"
ọkọ̀ **ọ**rẹ̀	"His/her/its car"
ọkọ̀ **ọ**wa	"our car"
ọkọ̀ **ọ**yín	"your (pl.) car"
ọkọ̀ **ọ**wọn	"their car"

(26b) After a High-final noun such as **ọkọ́** "hoe"

ọkọ́ **ọ̀**mi
ọkọ́ **ọ̀**rẹ
ọkọ́ **ọ**rẹ̀

ọkọ́ **ọ**wa
ọkọ́ **ọ**yín
ọkọ́ **ọ**wọn

(26c) After a Mid-final noun such as **ọkọ** "husband"

ọkọ ọ̀mi
ọkọ ọ̀rẹ
ọkọ **ọ**rẹ̀

ọkọ **ọ**wa
ọkọ **ọ**yín
ọkọ **ọ**wọn

The only thing that changes in these forms is the assimilation of the initial vowel of the possessive. This vowel assimilation across word boundaries is ubiquitous in Yoruba genitive constructions, including those involving full noun phrases. In genitive constructions involving full noun phrases, the assimilation is normally regressive, unless the second vowel is /i/, in which case it is progressive:

(27a)	ìwé ọmọ tí ó dé	→	ìwọ́ ọmọ tí ó dé
	book child that he came		"the book of the child that came"
(27b)	abẹ́ ìlù tí ó ya	→	abẹ́ ẹ̀lù tí ó ya
	bottom drum that he tore		"the bottom of the drum that tore"

Thus the behavior of the Yoruba possessive pronouns is completely regular, assuming that they are not enclitics and that their initial vowel is "weak" with respect to assimilation in the way that /i/ is.

However, there are variant forms of the Yoruba singular possessive pronouns that do appear to be clitics, on several grounds including tonal OCP issues. In the singular forms the initial vowel may be omitted, with the initial Low tone of the missing vowel (in the first and second person forms) "floating". The result is monosyllabic and thus a candidate for enclisis. In addition, the consonant /r/ of the second and third persons may optionally be deleted by an independent process (Akinlabi 1993).

Whether or not the /r/ deletes, the question will be what happens when the possessive pronoun become monosyllabic and the (preceding) possessed noun ends in a Low tone, since the (monosyllabic remnant of the) singular possessive clitics either starts with a floating Low (first or second person), or has an associated Low tone (third person).

With H or M final hosts, the OCP does not pose any problems, and indeed, nothing happens, as shown in (28 a,b). The initial floating L of the first and second person singular remains floating (see Connell and Ladd 1990, Laniran 1992, Akinlabi and Liberman 1995 for phonetic details). With the reduced third person singular possessive, the initial M of the disyllabic form is of course not realized, since it does not exist, and nothing happens to the final L.

(28a) After a High-final noun such as **ọkọ́** "hoe" *(unaligned L is a floating Low tone)*

ọ k ọ́ mi	"my hoe"
M H L M	
ọ k ọ́ ẹ	"your hoe"
M H L M	
ọ k ọ́ ẹ̀	"his hoe"
M H L	

(28b) After a Mid-final noun such as **ọkọ** "husband"

ọ k ọ mi	"my husband"
M M L M	
ọ k ọ ẹ	"your husband"
M M L M	
ọ k ọ ẹ̀	"her husband"
M M L	

When the possessed noun ends with Low, we expect some action, and we are not disappointed. The floating initial L of the first and second person clitic always deletes following a Low-final possessed noun, so that the results are consistent with the OCP.

The most interesting case occurs when we try to combine the reduced form of the third person possessive with a Low-final host. There is obviously an OCP violation, and it is avoided or repaired in one of two different ways, depending on whether the host ends with ML or LL. When the host ends in ML, the initial (Mid) vowel of the third singular possessive may not be deleted (or equivalently must re-appear), even if the medial /r/ disappears. When the host ends in LL, the initial (Mid) vowel of the third singular possessive may disappear, but in this case the potential OCP violation is remedied by changing the (end of the) host's tone pattern from -LL to -LM.

(29a) After a Mid Low noun such as **ọkọ̀** "vehicle"
(Mid vowel inserted between Low host and Low clitic)

ọ k ọ̀ mi	"my vehicle"
M L M	
ọ k ọ̀ ẹ	"your vehicle"
M L M	
ọ k ọ̀ **ọ** ẹ̀	"His/her/its vehicle"
M L M L	

(29b) After a Low Low noun such as **ọ̀kọ̀** "spear"
(final Low of host becomes Mid before Low clitic)

ọ̀ k ọ̀ mi	"my spear"
L L M	
ọ̀ k ọ̀ ẹ	"your spear"
L L M	
ọ̀ k ọ ẹ̀	"His/her/its spear"
L M L	

Alternative forms for "His/her/its spear": ọ̀kọ̀ ọrẹ̀ , ọ̀kọ̀ ọẹ̀ but not *ọ̀kọ rẹ̀

Note that if the Low tone of the third singular possessive had been deleted instead, the result would have been homophonous with the second singular.

3.7 A possible source for Mid-tone vowel epenthesis: genitive morpheme and/or empty prefix?

We have noted three cases in which potential OCP violations arising from enclisis are remedied by the introduction (or preservation) of a Mid-tone vowel that assimilates to the final vowel of the host. This occurs in the second person plural object pronoun, in the exclamatory particle, and in the third person singular possessive pronoun. In considering possible sources of these epenthetic forms, especially those involving pronouns, we should take note of the similar case of genitive constructions involving full nouns.

A Mid tone vowel occurs pervasively (though usually optionally) in the middle of such genitive constructions. It assimilates in quality to the vowel that precedes. This vowel is obligatory only when the possessor (the noun in second position) is consonant-initial. When the second noun is vowel-initial (the normal situation), then the vowel is optional. In the case of a vowel-initial possessor, it is natural to think of this extra vowel as an optional possessive morpheme. In the case of a consonant-initial possessor, we are tempted to think of it as an empty prefix. Nearly all native Yoruba nouns are vowel-initial, so that we might postulate a constraint requiring such an initial vowel in all nouns. Consonant-initial nouns would then be supplied with an unspecified vowel prefix, which would pick up actual vowel features (and thus be pronounced) only if it winds up in an assimilatory situation (which the possessive construction clearly is, on independent grounds).

As the examples in (30a-c) indicate, the Mid tone extra vowel must occur in any possessive construction whose second noun starts with a consonant, regardless of the tonal values of the preceding and following vowels. Likewise, the examples in (30d-f) show that the extra vowel is optional in any possessive whose second noun starts with a vowels, again independent of the tonal pattern of the nouns involved. Thus this Mid-vowel

quasi-morpheme has no OCP interactions when it occurs with full nouns: it is not required to avoid adjacent like tones, and it is not forbidden in the absence of such a like-tone sequence.

However, this vowel is plausibly the source of the similar forms in the case of possessive pronouns -- which would otherwise be consonant-initial -- and may also be implicated in the history of the second person plural object pronoun.

(30a)	ile (MH) house	Tayọ (HL) Tayo	→	ile **e** Tayọ / *ile Tayọ “Tayo's house”	MH M HL
(30b)	ọkọ (ML) car	Dọtun (LM) Dotun	→	ọkọ **ọ** Dọtun / *ọkọ Dọtun “Dotun's car”	ML M LM
(30c)	ile (MH) house	Dọtun (LM) Dotun	→	ile **e** Dọtun / *ile Dọtun “Dotun's house”	MH M LM
(30d)	ile (MH) house	Ojo (L H) Ojo	→	ile **e** Ojo / ile Ojo “Ojo's house”	MH (M) LH
(30e)	ọmọ (MM) child	akin (MM) Akin	→	ọmọ **ọ** akin / ọmọ akin “Akin’s child”	MM (M) MM
(30f)	ọkọ (ML) car	Ojo (L H) Ojo	→	ọkọ **ọ** Ojo / ọko Ojo “Ojo's car”	ML (M) LH

4. Lack of tonal OCP effects in other environments

Although a tonal OCP constraint applies in all relevant cases of Yoruba enclitics, it does not apply in any other environment in Yoruba.

4.1 The tonal OCP does not apply to Yoruba proclitics

Standard Yoruba has two types of subject pronouns, “independent pronouns” and “short pronouns”, also sometimes called “pronominals” and “pronouns” respectively (see Bamgbose 1966a).

(31)

Short Pronouns		Independent Pronouns		
mo	a	èmi	àwa	1st person sg/pl
o	ẹ	ìwọ	ẹ̀yin	2nd person sg/pl
ó	wọ́n	òun	àwọn	3rd person sg/pl

As seen in (31) the independent subject pronouns are polysyllabic, may be used in isolation, may be marked by the subject-marking H tone, and in general act like full nouns -- which is exactly how they are normally analyzed. The short subject pronouns are monosyllabic, may only be used in combination with other words, may not be marked by the subject-marking H tone, and in general act like clitics -- which again is how they are normally analyzed. In fact, when a potential host morpheme precedes them, they show tonal OCP effects with respect to the preceeding host, in that the sequence H H is repaired by deletion of the pronoun or (optionally) of its tone, as we saw in (21) through (23).

However, when the short subject pronouns are phrase-initial, and appear on the other cited grounds to be proclitic to a following verb or auxiliary, OCP effects do not apply. This is demonstrated by the realization of the third person subject proclitics in the examples in (13) through (18) above. The relevant examples are those in which the third person proclitic, **ó** and **wọ́n**, which bear High tones, occur before High tone verbs (as in 13a, 15b, 16, and 18a). In none of these cases, or any similar ones, is the OCP "violation" ever prevented or repaired.

4.2 The tonal OCP does not apply to Yoruba derivational processes

Four derivational processes are shown in (32) though (35). In all of these cases, an affix-like element either retains its lexical tone or copies tones from the stem. Never does a vowel in such cases lose its tone on the basis of identity with the tone of an adjacent vowel; never does a tone float so as to avoid adjacent vowels with identical tones, and never is a toneless vowel introduced to prevent like-toned vowels from coming into contact. This pattern (of failure to show any OCP effects) is generally characteristic of word-level derivational processes in Yoruba.

(32) *Derived V-CV nouns with mid vowels.*
The tone of the prefix is not changed before an identical stem tone. Notes that (a) there are no High tone prefixes, and (b) this process does not represent tone spreading because the same prefixes can be used before High tone stems.

ẹ̀-bẹ̀	"pleading"	< bẹ̀	"to plead"
è-rò	"thought"	< rò	"to think"
è-ṣẹ̀	"offense"	< ṣẹ̀	"to offend"
è-bùn	"gift"	< bùn	"to give"
ọ-dẹ	"hunter"	< dẹ	"to hunt"
a-bẹ	"knife"	< bẹ	"to slice"
è-kọ́	"teaching"	< kọ́	"to teach"
è-gé	"slice"	< gé	"to cut"

(33) *Bisyllabic nominal prefix **oní** with a final H tone.*
The final H is not deleted before before a high tone initial stem.

oní	bàtà	→	oníbàtà	"owner/seller of shoes"
oní	fìlà	→	onífìlà	"owner/seller of caps"
oní	tẹ́tẹ́	→	onítẹ́tẹ́	"gambler"
oní	kókó	→	oníkókó	"one with lumps or hard knots"

(34) *Prefixed reduplicant in nominal reduplication.*
The initial tone of the stem is copied onto the reduplicant.

òròòru	"every late night"	(< òru "late night" LM stem)
àrààrún	"five by five"	(< àrún "five" LH stem)
alaalẹ́	"every night"	(< alẹ́ "night" MH stem)
isiisán	"every nineth day"	(< isán "nineth day" MH stem)
ogoogún	"in twenties"	(< ogún "twenty" MH stem)
ọgbọọgba	"in equals"	(< ọgba "equal" MM stem)

(35) *Diminutive suffix in ideophones (Awoyale 1985, 1989).*
The tone of the stem is copied onto the suffix. (The suffix vowel is a copy of the stem vowel, the consonant is [l] or [n] depending on whether the vowel of the stem is oral or nasal respectively.)

jáńjá	jáńjá-**lá**	"small shapeless piece / very small shapeless piece"
tóńtó	tóńtó-**ló**	"small roundish piece / very small roundish piece"
béńbé	béńbé-**lé**	"small handy object / very small handy object"
tínńtín	tínńtín-**ní**	"tiny particle / very tiny (almost invisible) particle"
ṣínńṣín	ṣínńṣín-**ní**	"small quantity / very small quantity"

5. Prosodic Domains and Vowel Harmony

In this section we present further evidence, from vowel harmony, showing that short pronouns in Standard Yoruba are outside the domain of a phonological constraint involving their host.

Standard Yoruba has tongue root harmony. In simple (monomorphemic) words, the last vowel of the word determines the rest of the vowels in the word. If the last vowel is a non-ATR vowel (a, ẹ, ọ), then all the preceding vowels are non-ATR as well. Only mid vowels (e, o, ẹ, ọ) are fully involved in the harmony. The High vowels (i, u) do not participate in the harmony at all; that is, the high vowels can occur with any vowel.

Concentrating on non-high vowels therefore, the following are the permissible and the nonpermissible sequences:

Permissible sequences
Any sequences of mid vowels in which all the vowels are either non-ATR or ATR are allowed.

(36) non-ATR mid vowels only

ọ ... ọ	ọjọ́	“day”	ẹ ... ẹ	ẹsẹ̀	“leg/foot”
ẹ ... ọ	ẹjọ́	“case”	ọ ... ẹ	ọ̀sẹ̀	“week”

(37) ATR mid vowels only

o ... o	òjò	“rain”	e ... e	ètè	“lips”
e ... o	ejò	“snake”	o ... e	olè	“thief”

The vowel [a] may precede any mid vowel (38); but the vowel [a] may only be preceded a non-ATR mid vowel or by itself (39).

(38) Sequences of [a] preceding mid vowels

a ... ọ	àjọ	“(pool) contribution”	a ... ẹ	asẹ́	“sieve”
a ... o	àjò	“journey”	a ... e	ajé	“commerce”

(39) Sequences of [a] or non-ATR mid vowels preceding [a].

a ... a	ajá	“dog”
ọ ... a	ọjà	“market”
ẹ ... a	ẹja	“fish”

Nonpermissible sequences
Any sequence in which ATR and non-ATR mid vowels are mixed is disallowed (40). Also disallowed is a sequence in which an ATR mid vowel precedes the vowel [a] (41).

(40) disallowed sequences of ATR and non-ATR mid vowels

*o ... ọ
*e ... ọ
*ẹ ... e
*ọ ... e

(41) disallowed sequences of [a] preceded by ATR mid vowels

*e ... a
*o ... a

In sum, any sequence of mid vowels in which the final vowel is non-ATR and the preceding vowel is ATR (or vice versa) is forbidden. Therefore there are no words with the sequences in (40). The low vowel [a] may precede any mid vowel, as in the examples in (38), but the vowel [a] may not be preceded by an ATR mid vowel, hence the sequences in (41) are forbidden. The fact that the sequences in (38) are permitted, whereas those in (41) are forbidden implies that vowel [a] triggers harmony in vowels to its left, and thus Yoruba harmony is anticipatory (Archangeli and Pulleyblank 1989).

Derived V-CV nouns

Nouns may be derived from verb roots by vowel prefixation in Yoruba, but not through suffixation. Just as in underived forms the mid vowel prefixes must harmonize with the vowel of the verb stem. There are no counterexamples to this restriction in the language.

(42) Derived V-CV nouns with mid vowels.

	ẹ̀-bẹ̀	"pleading"	(< bẹ̀ "to plead")
	ọ-dẹ	"hunter"	(< dẹ "to hunt")
	ẹ̀-kọ́	"teaching"	(< kọ́ "to teach")
	ọ-fọ̀	"incantation"	(< fọ̀ "to speak")
	è-rò	"thought"	(< rò "to think")
	o-gbó	"adulthood/old age"	(< gbó "to be ripe")
	è-gé	"slice"	(< gé "to cut")
(èjì)	o-gbè	"name of odù ifá theme"	(< gbè "to support/to favour")

Thus, prefixes fall within the domain of tongue root harmony in standard Yoruba.

Subject clitics

In contrast to prefixes, subject clitics do not alternate to harmonize with verb stems in Standard Yoruba. We must conclude therefore that subject clitics fall outside of the harmony domain in this dialect.

However, in contrast to what obtains in Standard Yoruba, in some dialects both prefixes and subject clitics fall within the domain of vowel harmony. In such dialects, subject clitics alternate to agree in ATR value with the stem vowel of the verb, just as prefixes do. To make the comparison easy we will limit ourselves to seven vowel dialects like Standard Yoruba. Two such dialects are Ibadan and Oyo. A comparison of the (singular) subject clitics in these dialects with those of standard Yoruba shows that while the clitics in Ibadan and Oyo alternate between advanced and retracted depending on the verb, those in the standard dialect do not. (Fresco 1970, Akinlabi 1986, Akinlabi and Oyebade 1987, Folarin 1987, Archangeli and Pulleyblank 1989). Listed in (43) are the subject clitics, and (44) illustrates the ATR alternation in the singular clitics. The plural ciltics are unrevealing since they are invariantly non-ATR. The Oyo dialect data is from Ajuwon (1981).

(43) Subject clitics in SY and Oyo Yoruba

Standard Yoruba		Oyo/Ibadan		
mo	a	mo/mọ	a	1st person sg/pl
o	ẹ	o/ọ	ẹ	2nd person sg/pl
ó	wọ́n	ó/ọ́	wọ́n	3rd person sg/pl

(44)	Standard Yoruba	Oyo/Ibadan	
a.	mo lọ	**mọ** lọ	"I went"
	mo wá	**mọ** wá	"I came"
	mo wè	**mọ** wẹ̀	"I bathed"
b.	mo dé	mo dé	"I have come"
	mo yó	mo yó	"I am fed"
	mo jí	mo jí	"I woke up"
	mo kú	mo kú	"I am dead"
c.	ó lọ	**ọ́** lọ	"He/she went"
	ó wá	**ọ́** wá	"He/she came"
	ó wẹ̀	**ọ́** wẹ̀	"He/she bathed"
d.	ó dé	ó dé	"He/she came"
	ó yó	ó yó	"He/she is fed"
	ó jí	ó jí	"He/she woke up"
	ó kú	ó kú	"He/she is dead"
e.	ẹ lọ	ẹ lọ	"You-all went"
	ẹ wá	ẹ wá	"You-all came"
	ẹ wẹ̀	ẹ wẹ̀	"You-all bathed"
f.	ẹ dé	**ẹ** dé	"You-all came"
	ẹ yó	**ẹ** yó	"You-all are fed"
	ẹ jí	**ẹ** jí	"You-all woke up"
	ẹ kú	**ẹ** kú	"You-all are dead"

The forms in (44a) show that the first person clitics are non-ATR before verbs with non-ATR vowels in Oyo, while such harmony does not take place in SY. The forms in (44c) show the same thing with the third person subject clitic. We can thus assume that all mid vowel clitics undergo the alternation. The forms in (44e) and (44f) reaveal that the plural clitics remain invariantly non-ATR.

If as Ola (1995) proposes, the domain of harmony in Standard Yoruba is the prosodic word, then affixes fall within the prosodic word whereas proclitics fall outside of it. However, there do not seem to be any Yoruba dialects in which enclitics (such as object pronouns) harmonize with a preceding verb.

6. Boundary conditions for an explanatory account

Our primary goal in writing this paper has been to establish and document certain complex descriptive generalizations, which will remain valid, subject to factual correction, across future changes in approaches to phonological modeling. The documentation of such descriptive generalizations is sometimes clearer and more accessible when expressed in terms of a detailed formal reconstruction, but only in the rare and happy case that the formalism fits the data so well that the resulting account is clearer and easier to understand than the list of categories of facts that it encodes. Our considered opinion is that the topic of this paper, given available morphophonemic formalisms, is not such a case.

In this less happy (and all too common) situation, subsequent scholars must often struggle to decode a description in an out-of-date formal framework so as to work back to a more superficial version of the facts, typically in terms of list of paradigm-like displays, which they can then re-formalize in a new way. Having experienced this struggle often ourselves, we have decided to accomodate our successors by providing them directly with a plainer account.

Of course, such descriptive accounts provide the basis for theoretical explorations, which feed back the descriptive results of asking new kinds of questions, as well as contributing to the empirical push and pull by which theories get better. We believe that the content of this paper raises several important questions for current theories of phonology, morphology and morphosyntax, questions that we (and others) will explore in subsequent work. In this paper, we will limit ourselves to a sketch of some issues.

The systematic avoidance of same-tone sequences across host+enclitic boundaries is a robust principle of Yoruba phonology. At the same time, the apparently analogous cases of proclitic+host, prefix+stem, stem+stem and so on do not show any similar OCP constraint. In some dialects, vowel harmony operates between proclitics and hosts, but not between hosts and enclitics; no other phonological processes allow us to check for clitic-related domains in this language. Furthermore, the mechanisms for avoidance of same-tone sequences in the host+enclitic case are diverse, and there is often no obvious or even plausible phonological basis for the pattern. Finally, the alternative forms used to avoid same-tone sequences are sometimes limited to OCP environments, while in other cases they are optionally used in non-OCP environments as well.

If we accept that in (22) as opposed to (23) the short subject pronouns fail to cliticize to the sentence-initial particles, then Yoruba's avoidance of OCP violations in host+clitic sequences is exceptionless, not only in the standard language but also in all dialect forms known to us. Given the relative large number of instances supporting this constraint, and

the diverse set of techniques used to avoid or repair potential violations, this is a striking fact, and one that appears to present a strong argument in favor of constraint-based approaches to phonology.

6.1 Conspiracies in generative phonology and optimality theory

In the conventional rule-based systems of generative phonology, it is often difficult to do justice to such phonological conspiracies. The constraint tends to be repeated over and over in the structural description of many repairing or avoiding rules, which seems to miss a generalization; worse, the system ought to be simpler if one or more of the repairs were omitted. The only satisfactory way to handle a global conspiracy in such theories is to set up the representational system so that forms violating the constraint are simply not well-formed phonological representations. This is always possible, even if only by stipulation, and sometimes such restrictions even have intrinsic representational plausibility. Of course, problems arise if the constraints are occasionally violated.

How might such an approach deal with the Yoruba OCP conspiracy we have described in this paper? One way would be to require Yoruba tones to participate in higher-level structures, like tonal syllables. Then adjacent identical tones would be impossible for the same reason that CC sequences may be forbidden in a strictly CV language. Within lexical items, individual tonal features can spread across sequences of tone-bearing segments; across phonological words, or at the initial boundary of a host, a new pattern can be started. Across a host+clitic boundary, neither option is available, and so adjacent identical tones cannot be combined into a well-formed higher-level structure. On this sort of account, the repair and avoidance mechanisms must be independent rules or forms, which are not created by the representational constraints, but combine and operate freely to produce outputs consistent with them, inconsistent outcomes being blocked.

A recently popular alternative is Optimality Theory, which handles all phonological patterns in terms of universal, ranked, violable constraints. From this perspective, a robust conspiracy like Yoruba's same-tone avoidance at host+clitic boundaries is just an "undominated" constraint. In a treatment of this kind, the first challenge will be to restrict the tonal OCP constraint in Yoruba to all and only the host+clitic contexts. The most obvious way to do so would involve a definition of tonal structures and domains allowing two adjacent like tones to coalesce in some cases, and preventing them from coming into contact at all in other cases, with the host+clitic cases left to trigger an OCP violation. This part of the treatment would be quite similar to the representational aspects of a derivational account.

6.2 Phonologically-conditioned allomorphy

The remaining challenge will then be the details of the diverse methods for repair or avoidance of OCP violations in different cases. In traditional generative treatments, we are free to write forms and rules as needed to handle each case. The convenient availability of remedies for each potential violation is typically not explained within the theory, but must be referred to some theory-external notion of grammatical adaptation. In an OT account, on the other hand, the formalism guarantees some remedy for any problem, but makes it somewhat harder to handle the details of a complex range of cases such as those we have surveyed. Because of the view that all constraints are universal, we cannot (honestly) add a rule for each case; instead, any difference in outcomes must be a natural consequence of a difference in input forms.

Another problem is that standard OT theory does not permit optional alternative outputs, of the kind we have cited for several of the Yoruba enclitic cases. Since it is well known that all languages show phonological optionality, we join others in regarding this aspect of the theory as a temporary simplifying assumption, to be eliminated or evaded in one of several ways. Here we note only that some such change would be required in order to give a satisfactory account of the facts under discussion.

Several facts about Yoruba enclitics look on their face like a problem for the view that all constraints are universal, since they involve instances of a phonologically regular OCP constraint for which the repairs are morphologically specific. For example, consider the facts in (13). The basic form of all six object clitic pronouns is a monosyllable with High tone, so that all such pronouns create an OCP violation when following a High-toned verb. For five of these object pronouns, the result is deletion of the clitic's tone; for the second person plural, the result is introduction of a Mid tone vowel, copying the quality of the verb-final vowel, between the verb and the object pronoun. There is no phonological property of the second plural pronoun that would plausibly motivate this different outcome, nor is there any greater or lesser similarity to other pronominal forms that would plausibly account for the difference in terms of analogy or paradigmatic leveling. Thus it seems unavoidable for something in the grammar of Yoruba to connect the second person plural object pronoun specifically to the outcome of vowel epenthesis rather than tone deletion in the case of an OCP violation.

The hypothesis of universal constraints makes it impossible to do this directly, by (for instance) forbidding the second person plural object pronoun to come out as [yin], or otherwise establishing a constraint mentioning particular formatives on either the input or output side. If such constraints are construed as suitably-parameterized universal ones, then the universalist hypothesis becomes meaningless.

The most obvious solution to this problem is phonologically-conditioned allomorphy, of the same type that is involved in handling English "a" vs. "an". The availability of the alternative forms /a/ and /an/ for the definite article is a particular fact about the English

lexicon, but their distribution is plausibly determined by universal considerations of optimal syllable structure.

On this view, the lexical entry for the Yoruba second person plural object clitic must provide two alternative underlying pronunciations, /yín/ and /Vyín/, which are simultaneously considered as possible inputs in every case. This might be done by considering the optional initial vowel as a "ghost segment" in the sense of Zoll (1998): a segment that is defective in some way, and will therefore be deleted unless a higher-ranking constraint makes it worth repairing. This ghost vowel will surface following a High-toned verb, in order to avoid an OCP violation, but will be omitted in all other cases. The other object clitics, lacking underlying ghost vowels, will prefer to remedy an OCP violation by omitting their tone.

6.3 Other non-uniformities of avoidance/repair strategies

As another relevant example, consider the reduced forms of the singular possessive pronouns, in which the initial unspecified vowel disappears, as exemplified in (25)-(29). By the same sort of argument given for the sometimes-seen initial Mid vowel in the second person plural object clitic, these reduced forms must be some sort of allomorphs, rather than being derived by a regular process of vowel deletion, since there is no obvious basis for restricting the vowel deletion to just these three cases, excluding the plural possessive pronouns as well as many other cases where such vowels are not dispensible. Thus (for example) the third singular possessive must have lexically-listed alternative forms like /Vrẹ̀/ (or /irẹ̀/) and /rẹ̀/.

However, the distribution of possible outcomes for the 2nd plural object clitic and the 3rd singular possessive are different. The disyllabic form of the third singular possessive pronoun may be used anywhere, not just where it prevents an OCP violation; in contrast, the disyllabic form of the second plural object pronoun may only be used in case an OCP violation would result if the monosyllabic form were used.

(45a) ọkọ̀ ọ(r)ẹ̀ "his/her/its vehicle"
(45b) *ọkọ̀ (r)ẹ̀ "his/her/its/vehicle" *(OCP violation)*

(45c) ọkọ ọ(r)ẹ̀ "his/her/its husband"
(45d) ọkọ (r)ẹ̀ "his/her/its husband"

(46a) ó kọ́ ọyín "he/she/it taught you-all"
(46b) *ó kọ́ yín "he/she/it taught you-all" (*OCP violation*)

(46c) *ó pa ayín "he/she/it killed you-all" *(vowel-copying violation?)*
(46d) ó pa yín "he/she/it killed you-all"

Thus we need an additional distinction in underlying forms, to explain the fact that (45c) is fine, while (46c) is impossible. One possibility would be to use a ghost segment in the case

of the second-person plural object pronoun, so that the two forms are jointly optimized, but to treat the reduced form of the third-person singular possessive pronoun as separate morpheme, to be treated separately by the grammar. Alternatively, we might treat the disyllabic forms of the singular possessive pronouns as involving a Mid-vowel possessive morpheme, which can be deleted in the singular forms by an optional morphosyntactic process. Or again, we might try to rely on the different morphosyntactic relationships between verbs and objects versus between possessed and possessor: Yoruba verb-object relations are rather compound-like, with the junctural vowel-vowel sequence usually being reduced to a single vowel, as exemplified in (2)-(6).

6.4 A curious correlation

In finding an account for the above-cited differences between the reduced third singular possessive pronoun and the second plural object pronoun, we must not spoil our account of a curious property that is shared by all and only the Yoruba enclitics for which insertion of a Mid vowel is an available method of OCP repair.

The alert reader will have noticed that the (Low-toned) exclamatory/vocative particle and the (Low-toned) reduced form of the third singular possessive pronoun both permit an OCP repair in which a host whose tone pattern ends in LL surfaces with the ending pattern LM. In these two cases, the other option for repair is the introduction of an additional Mid-toned vowel, which is optional when the host ends in LL, and obligatory for a host ending in any other Low-final sequence. The option of changing the final host L tone to M is not permitted for three of the other cases: the SMHT, the emphatic particle, and the short subject pronouns in combination with preceding particles. These happen also to be the three cases that do not allow OCP repair by introduction of a Mid-toned vowel.

This leaves the case of the object pronouns, which are mixed in terms of whether they permit repair by introduction of a Mid-toned vowel. The second plural form does, and the other five forms do not. Here the clitic tone is High, and so the crucial case will be a host (verb) ending in HH. It is not easy to test this, because all but a very few Yoruba verbs are monosyllabic. One Yoruba verb with the tone pattern HH is /kóbá/ “to get X in trouble”. For this test case, the generalization holds: HM is an option for OCP repair only with the second person plural object pronoun, and not with any of the others!

(47)

Input	Clitic H deletion	Host H deletion	M vowel insertion	Translation
ó kóbá mí	ó kóbá mi	*ó kóba mí	*ó kóbá a mí	“He got me in trouble”
ó kóbá ẹ́	ó kóbá ẹ	*ó kóba ẹ́	*ó kóbá a ẹ́	“He got you in trouble”
ó kóbá á	ó kóbá a	*ó kóba á	*ó kóbá a á	“He got her/him in trouble”
ó kóbá wá	ó kóbá wa	*ó kóba wá	*ó kóbá a wá	“He got us in trouble”
ó kóbá yín	*ó kóbá yin	ó kóba yín	ó kóbá a yín	“He got you-all in trouble”
ó kóbá wọ́n	ó kóbá wọn	*ó kóba wọ́n	*ó kóbá a wọ́n	“He got them in trouble”

The correlation (between availability of the Mid-vowel insertion repair and availability of the LL → LM or HH → HM repair) might be explained in several different ways. One option is to note that the two repair methods in question both preserve the clitic’s underlying tone, whereas the alternative repair method (deleting the clitic’s tone) does not. Thus a representational method for making some tones more durable than others, in terms of input/output relations, would encode the distinction correctly. Technically, this would be similar to the “ghost segment” move. Another (we think more promising) option would be to assume that the extra Mid-toned vowel is underlyingly present in the all cases of LL → LM or HH → HM repair, but coalesces with the final vowel of the host in a way that licenses its tonal change.

These choices are not isolated ones. The vowel-coalescence solution will interact with the treatment of verb-object combination, among other things, while the tone durability route interacts with many other cases of tonally variant forms. This pervasive interdependence of choices makes formal models of a phonological system quite unstable. As a result, formal modeling (at least by current methods) is usually inefficient as a practical method for linguistic description. This applies equally to rule-based generative phonology, to OT, to neural nets, and so on. Whether formal modeling is treated simply as programming for some practical purpose, or as a method of investigating the properties of the cognitive systems involved, it can and should be separated in most cases from the problem of determining the facts and the descriptive generalizations. It is the latter problems that we have focused on in this paper.

[1] We would like to thank Seye Adesola, Yiwola Awoyale, Ayo Bamgbose, Nick Clements, Doug Pulleyblank, Rolf Noyer and Hubert Truckenbrodt for discussions of earlier versions of this paper.

[2] The examples in this paper are given in the standard Yoruba orthography. In this orthography, ẹ = [ɛ], ọ = [ɔ], ṣ = [ʃ], p = [kp], j = [dʒ]. A nasal vowel is written as an oral vowel followed by "n", otherwise an "n" before a consonant represents a syllabic nasal. An accute accent on a vowel [´] indicates a (H)igh tone, a grave accent [`] marks a (L)ow tone, a rising tone glide is indicated with [ˇ], and a falling tone glide with [ˆ], (M)id tones are unmarked. Where necessary we indicate the tones with the letters HML in addition to marks on the vowels. In Yoruba, a High tone is realised as a Low-High contour after a Low tone, and a Low tone is realised as a High-Low contour after a High tone. We abstract away from this predictable tone spreading in this paper. Whenever we indicate a contour, such a contour is formed by surface re-combination of two tones on a single vowel through tonal re-association.

[3] We will not discuss vowel deletion, which is complex question requiring a monograph-sized treatment of its own.

[4]Any examples whose output is specified as (HL M) are pronounced exactly as this notation implies in some dialects, but in standard Yoruba, they are pronounced as a raised H followed by an M. In earlier studies (see Bamgbose 1966b, Akinlabi 1985, Pulleyblank 1986), this was thought to be an H followed by a tone between M and L, a sort of "downstepped Mid." The essential point is that the L tone is in some sense preserved.

[5] In addition to the orthographic conventions stated in note 2 above, the following tone marking conventions are adopted in these examples and in the rest of the paper: a Mid-High contour derived from a combination of a lexical Mid and the subject marking H tone is marked as [¯´], while a Low-High contour derived the same way with a lexical Low is indicated as [ˇ].

[6] The form **tóbi** is actually an underived disyllabic verb meaning "to be big/large".
Thus **ọlọ́run tóbi** "God is mighty"

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