J. Linguistics **36** (2000), 39–84. Printed in the United Kingdom
© 2000 Cambridge University Press

Syllable asymmetries in comparative Yoruba phonology[1]

ỌLANIKẸ ỌLA ORIE

Tulane University

(Received 23 July 1997; revised 29 March 1999)

Syllables display symmetrical and asymmetrical properties in two Yoruba dialects. In the asymmetrical dialect, only a vowel with an onset participates in syllable-conditioned processes; an onsetless vowel is syllabically inert. In the symmetrical dialect, a vowel, with or without an onset, participates in syllable processes. It is argued that onsetless vowels are not syllabified in the asymmetrical dialect. Since there is no phonological contrast between syllables with onsets and those without onsets in the symmetrical dialect, all vowels are parsed into syllables exhaustively. Using ideas from Optimality Theory, attested interdialectal variation is shown to follow from different rankings of the same syllable and faithfulness constraints.

1. Introduction

Syllables display symmetrical and asymmetrical properties in two dialects of Yoruba (Niger-Congo/Nigeria). In the asymmetrical dialect (Standard Yoruba), vowels without onsets exhibit exceptional properties which distinguish them from vowels with onsets. Unlike vowels with onsets, onsetless vowels do not reduplicate; they cannot be truncated without consonantal augmentation; they do not satisfy the minimal word constraint; and they cannot bear a high tone, nasality or a high back feature when they occur word-initially. In the symmetrical dialect (Ondo Yoruba), however, there is no such distinction: a vowel, with or without an onset, participates actively in the processes mentioned above. The properties of syllables in these dialects raise two formal questions. First, why does the absence of an onset have two different manifestations in two closely related dialects? Second,

[1] I am grateful to Doug Pulleyblank, Pat Shaw, Laura Downing, Akin Akinlabi, Mark Hewitt, Ping Jiang-King, Rose-Marie Déchaine, Myles Leitch and Victoria Bricker for comments and suggestions. I would also like to thank the two *JL* anonymous referees for extensive and valuable comments which were very useful in reworking an earlier version of this paper in Correspondence Theory. Earlier versions have been presented in talks given at the University of British Columbia and the Twenty-Sixth Annual Conference on African Linguistics held at UCLA in March 1995. This research was supported in part by SSHRCC grant 410-94–0035 awarded to Douglas Pulleyblank and a faculty research grant funded by Tulane University.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

how can this difference be captured to reflect attested typological unity and diversity?

To answer the first question, the paper proposes that obedience to the ONSET constraint plays a fundamental role in determining whether or not vowels are syllabified (Hyman 1990, Spring 1991, Downing 1993, Ọla 1993, Odden 1995). In the asymmetrical dialect, obedience to ONSET is obligatory: a vowel is syllabified if preceded by an onset; otherwise, it remains unsyllabified (Ọla 1993). In the symmetrical dialect, on the other hand, obedience to ONSET is not compulsory; consequently, a vowel is syllabified whether or not it is preceded by an onset. The second question receives a straightforward answer in Optimality Theory (OT, Prince & Smolensky 1993, McCarthy & Prince 1993a, b), a constraint-based theory that derives interlinguistic variation through the principles of violability and ranking. Based on these principles, the observed syllable asymmetries are accounted for in terms of the different rankings of the same syllable and faithfulness constraints. On this view, the typological unity follows from constraint identity,[2] while observed typological diversity follows from the different rankings each dialect assigns to the common constraints.

The rest of the paper is organized as follows. Section 2 provides an outline of the theoretical framework, Syllable Theory and Optimality Theory. Section 3 presents Standard Yoruba, an asymmetrical dialect which distinguishes onsetful vowels from onsetless vowels. A whole range of evidence from minimality effects, truncation, reduplication, and morpheme structure conditions is presented to show the distinct characteristics of syllables. These asymmetries are shown to follow from constraint ranking in Optimality Theory. In section 4, the discussion shifts to Ondo Yoruba, a symmetrical dialect that treats onsetful and onsetless vowels alike in prosodic and morphological processes. It is shown that Ondo Yoruba, unlike Standard Yoruba, syllabifies a vowel even if it does not have an onset. These symmetric properties, too, are shown to follow from constraint ranking in Optimality Theory. Section 5 examines alternative hypotheses, and section 6 concludes the paper.

2. Optimality Theory and Syllable Theory

This section begins with an introduction to the main ideas of Optimality Theory and Syllable Theory. Schematic examples are then used to illustrate the characterization of marked and unmarked syllables in Optimality Theory.

[2] The term 'constraint identity' is used to capture the observation that the same syllable and faithfulness constraints are operative in the two dialects.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

2.1 *Optimality Theory*

In Optimality Theory (Prince & Smolensky 1993), the grammar of each language is obtained by ranking the constraints of Universal Grammar. Ranking is carried out in a dominance order, so that some constraints are higher-ranked while others are lower-ranked. Higher-ranked constraints take precedence over lower-ranked constraints. In fact, a lower-ranked constraint may be violated to satisfy a higher-ranked constraint. From a given input form, a grammar generates, by the function GEN, an infinite number of candidate forms, and these candidates are evaluated in parallel against the hierarchically ranked set of constraints. Following evaluation, the candidate that best satisfies the ranked hierarchy of constraints is selected as the optimal (or winning) candidate.

Consider the ranking A ≫ B, and the possible output candidates in (1).[3]

(1) A >> B

Candidates	A	B
☞ cand1		*
cand2	*!	
cand3		**!

In (1), violation of A, the undominated constraint, rules out cand2; the fact that it obeys B does not count. From this point on, the competition is between cand1 and cand3, forms in which the higher-ranked constraint A is fully obeyed. Here, the selection of the optimal candidate is dependent on the number of violations of constraint B incurred by the two competitors. Cand1 incurs fewer violations of B, so it emerges as the winner.

In the following sections, these OT principles will be applied to constraint interaction in syllabification. It will be shown that both marked and unmarked syllables result from the interaction of syllable constraints and faithfulness constraints.

[3] The basic conventions developed by Prince & Smolensky for interpreting a tableau are the following: (a) A ≫ B means constraint A dominates constraint B, (b) left-to-right column order shows the domination order of the constraints, (c) violation of a constraint is marked by an asterisk '*', (d) fatal violation of a constraint (which results in the rejection of a candidate) is marked by an exclamation mark '!', (e) constraint satisfaction is indicated by a blank cell, and (f) ☞ indicates the optimal or winning candidate.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

2.2 *The syllable*

The unmarked syllable is a CV, a syllable consisting of an onset and a vocalic mora (a nuclear mora, following Shaw 1992).[4] No known natural language forbids this syllable. Thus, even though languages may disallow syllables without onsets (Vσ) or syllables with codas (CVCσ), CV syllables are found in all languages (Jakobson 1962, Steriade 1982, Clements & Keyser 1983, Prince & Smolensky 1993). The two syllable constraints which determine syllable markedness are ONSET and NO-CODA (Itô 1986, 1989):

(2) (a) ONSET: A syllable must have an onset.
(b) NO-CODA: A syllable must not have a coda.

To obtain a crisp unmarked syllable, obedience to ONSET and NO-CODA is compulsory. If, for example, an unmarked syllable is required in a given context, a syllable which would otherwise yield a violation of ONSET and/or NO-CODA is usually redeemed by violating one or more faithfulness constraints. Faithfulness is assessed in terms of Correspondence (McCarthy & Prince 1995), which is defined as a relation between the element of a string S_1 and the elements of string S_2. Correspondence demands segmental and prosodic identity between the input and the output. Two faithfulness constraints are relevant to the present discussion, MAX and DEP. MAX requires that correspondence be complete. Thus, it prohibits deletion in lexical/surface relation and demands total identity in base/reduplicant relation. Constraints of the DEP family also require resemblance between an input and an output (reduplicated or non-reduplicated), hence, insertion is banned by it. These two correspondence constraints are stated below:

(3) MAXIMALITY (MAX-IO: Prohibits deletion; MAX-BR: Demands total copying)
Every segment of an S_1 has a correspondence in S_2.
(4) DEPENDENCY (DEP: Prohibits epenthesis)
Every segment of S_1 has a correspondence in S_2.

If an unmarked syllable is absolutely required in a language, the faithfulness constraints in (3–4) may be violated to satisfy ONSET and NO-CODA. Schematic examples illustrating the effect of ranking ONSET and NO-CODA above MAX-IO are shown in (5) (an angled bracket indicates a deleted segment).

[4] I assume a nuclear vs. non-nuclear distinction between vocalic and consonantal moras respectively (Shaw 1992). As argued in Ọla (1994b), this structural distinction is needed to explain the various prosodic mismatches displayed by vowels and tone-bearing nasals in Yoruba. One crucial difference is that only vowels can function as syllable nuclei; consonantal moras cannot. For simplicity, however, vowels are just represented as moras in this paper.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(5) Consonant deletion to satisfy NO-CODA: ONSET, NO-CODA >> MAX-IO

/CVC/	ONSET	NO-CODA	MAX-IO
☞ (a) CV <C>			*
(b) CVC		*!	

In (5), candidate (b) is sub-optimal because it is a marked syllable, incurring a fatal violation of higher-ranked NO-CODA. Failure to parse the final consonant in (a) yields a non-fatal violation of lower-ranked MAX-IO, and enables optimal (a) to satisfy NO-CODA, a high ranking constraint.

In a situation where the input is an onsetless vowel, an unmarked syllable could be obtained by inserting a consonant prevocalically. Ranking ONSET and NO-CODA above DEP derives this result, as shown in (6) (epenthetic consonants are bold-faced).

(6) Consonant insertion to satisfy ONSET: ONSET, NO-CODA >> DEP

/V/	ONSET	NO-CODA	DEP
☞ (a) **C**V			*
(b) **C**V**C**		*!	**
(c) V	*!		

In (6), the violator of DEP in (a) emerges as the optimal form because the inserted consonant is an onset. On the other hand, (b) violates DEP to create a coda consonant and is considered illicit. Lastly, the faithful parse of candidate (c) creates a sub-optimal onsetless syllable.

To sum up, the unmarked syllable is a CV, and languages adopt two strategies, segmental deletion and insertion, to repair marked syllables in contexts where unmarked syllables are required. In general however, languages do admit marked syllables, syllables without onsets, and syllables with codas. How does Correspondence theory deal with such cases?

I will illustrate with CV languages – languages that permit CV or V syllables.[5] In such languages (for example, Yoruba and Hawaiian), a V syllable is marked because it violates ONSET. If a V syllable surfaces without

[5] Because the cases to be presented in this paper are cases involving open-syllable type languages, only open marked syllables are discussed; cases involving close marked syllables are left out of the discussion.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

restructuring through deletion or epenthesis, this shows that MAX-IO and DEP crucially dominate ONSET:

(7) No insertion or deletion to satisfy ONSET: MAX-IO, DEP >> ONSET

/V/	MAX-IO	DEP	ONSET
☞ (a) V			*
(b) **C**V		*!	
(c) <V>	*!		

In (b), ONSET, a lower-ranked constraint is obeyed. The output yields an unmarked syllable but does so at the expense of DEP, a higher-ranked constraint. Violation of DEP thus excludes candidate (b). On the other hand, candidate (c) does not violate ONSET because it is not syllabified, but it is excluded as an optimal output because it fails to respect higher-ranked MAX-IO, the constraint prohibiting deletion. Candidate (a) is the winner: even though it violates lower-ranked ONSET, it is not penalized because it obeys higher-ranked MAX-IO and DEP, which are violated by its competitors.

Across languages, marked syllables often exhibit interesting properties. Sometimes, they behave like their unmarked counterparts; sometimes, they exhibit unique characteristics that distinguish them from unmarked syllables. These two patterns are attested in Yoruba. In Standard Yoruba, marked syllables are usually inert to syllable-referring processes, while in Ondo Yoruba, they group with marked syllables, patterning alike in syllable-driven processes. In the following sections, these cases are examined, and observed divergences in the syllabicity of marked syllables are shown to follow from constraint interaction; the constraints at the heart of the matter are syllable well-formedness and input/output faithfulness constraints.

3. Syllable asymmetries in Standard Yoruba

There are a number of phenomena that require the presence of a syllable in Yoruba phonology. Such phenomena include the minimal word condition, morpheme structure conditions, and templatically induced truncation and reduplication. Dialects of Yoruba differ with respect to the syllabification of vowels, causing syllable conditioned processes to diverge in interesting ways. In the Standard dialect, onsetful vowels differ from their onsetless counterparts in many ways. For example, a word must minimally contain a

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

CV; therefore, words that are comprised of only vowels are disallowed (see section 3.1 below); a truncative template is expressed as CV causing V-initial verbs to augment to CV by [h] epenthesis (section 3.2); three morpheme structure conditions require the presence of a CV in word-initial position (section 3.3); in forming distributives, the reduplicant is well-formed if spelled out as VCV, not as CVCV or VV (section 3.4). This section lays out the asymmetric behavior of vowels showing that an onset is required for syllabification in Standard Yoruba.

3.1 *The Minimal Word Condition: no* [*r*] *deletion*

Every word in Standard Yoruba must contain a CV. Thus, no matter how many vowels are present in a word, word well-formedness is satisfied only if a CV is present (Ọla 1995, Orie 1997). This requirement blocks consonant deletion in contexts where it would otherwise have applied. Consider, for example, the process of intervocalic [r] deletion that is triggered when one of the following conditions is met (Akinlabi 1993):

(8) (a) The two vowels flanking [r] are identical, OR
    (b) one of the vowels is high.

The data in (9a) illustrate the process of [r] deletion (which is accompanied by progressive assimilation of vocalic features), while the forms in (9b) show that an [r] in any VCV noun canon consistently resists deletion:[6]

(9) [*r*] *deletion*

	Full form	[r] deletion		
(a)	erùpẹ̀	eèpẹ̀		'sand'
	òrìṣà	òòṣà		'god'
	oríkì	oókì		'praise name'
	orórì	oórì	*oǒì	'mausoleum'
(b)	orí	*oi		'head'
	àrá	*aa		'thunder'
	oró	*oó		'pain'
	ọrọ̀	*ọọ̀		'wealth'

The data in (9b) contrast sharply with those in (9a). In (9b), the environment for deletion is appropriate, yet [r] does not delete. Deletion is blocked in (9b) because the output would be made up of onsetless vowels in violation of minimality.

Ọla (1995) defines the minimal word condition in terms of Properheadness (PROP-HEAD, Itô & Mester 1992), as follows:

[6] The Standard Yoruba orthography is adopted in the citation of all Yoruba examples: ẹ = [ɛ], ọ = [ɔ], Vn = nasalized vowel, ṣ = [ʃ], p = [kp], ´ = H-tone, ` = L-tone, and absence of tonal marking on a vowel or moraic nasal indicates M-tone.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(10) PROP-HEAD: Every Prosodic Word contains a foot.
Every foot contains a syllable.
Every syllable contains a mora.

Based on PROP-HEAD, a well-formed prosodic word must have a syllable. As argued in Ọla (1993), a well-formed syllable must have an onset in Standard Yoruba; consequently, the segmental instatiation of PROP-HEAD is a CV. What this means in Optimality theory is that PROP-HEAD and ONSET outrank the constraint requiring [r] deletion. Following Akinlabi (1993), I assume that [r] is susceptible to deletion because it is unspecified for CORONAL.[7,8] The relevant constraint is formulated as follows:

(11) *M/COR[r]: [r] is not a good margin consonant

The established ranking and tableau appear in (12) ('.' indicates syllable margin):[9]

(12) PROP-HEAD, ONSET >> *M/COR[r]

/orí/	PROP-HEAD	ONSET	*M/COR[r]
☞ (a) o.rí			*
(b) o.<r>í	*!	*	

In (12), PROP-HEAD and ONSET must be satisfied simultaneously. Failure to satisfy one yields a fatal violation of the other. Thus, the optimal form,

[7] The second argument, and perhaps the stronger one, for claiming that [r] is unspecified comes from the transparency of [r] to V-spreading in loans. See Akinlabi (1993) for details.

[8] Among coronals, only [r] is argued to be unspecified in underlying structure. The coronal node is thus assumed to be activated underlyingly for obstruents in Standard Yoruba. That is, obstruents are linked to the CORONAL node in the lexical entry. The claim that CORONAL is the default value in Yoruba raises a question on the epenthetic status of [h] in loans: why is [r] not the epenthetic consonant in loan syllabification if it is truly unspecified for place features? I would like to suggest two plausible answers to this question. First, Nigeria was a British colony and most of the loans are borrowed from British English, R.P., a variety of English in which a glottal stop [ʔ] may appear before vowel-initial words. When such words are borrowed, the glottal stop surfaces as a glottal fricative [h] since Yoruba does not have a glottal stop. In this respect, the [h] insertion reported for loans in (14) may be a property of direct borrowing from English. Lillooet (a Salish language) also inserts [h] in the same context, as pointed out by Henry Davis (personal communication). Secondly, assuming that we adopt the proposal that both [r] and [h] are unspecified for place features as advanced in Akinlabi (1991) and (1993), respectively, there is still a significant specification difference between these segments. If we compare the specification of glottal [h] with that of [r], the former lacks an oral place-node (both in the underlying and surface representations. The latter, on the other hand, acquires an oral place-node by default. Under this view, [h] is considered less specified than [r].

[9] In tableaux (12) and (13), ONSET violations are not counted for initial vowels, which are analyzed as non-syllabic in section 4.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

candidate (a), wins because it respects the higher-ranked constraints. A surface violation of *M/COR[r] is tolerated because of its low ranking status. On the other hand, candidate (b) is non-optimal because it obeys lower-ranked *M/COR[r], which leads it to incur fatal violations of PROP-HEAD and ONSET.

Because [r] is not deleted under duress to satisfy higher-ranked PROP-HEAD and ONSET, MAX-IO is satisfied in (12). However, when there are two [r]s in a word, *M/COR[r] forces the leftmost one to delete, leading to a MAX-IO violation; the rightmost [r] is shielded from deletion because of undominated ALIGN-RIGHT, which requires the presence of noun heads (where head = σ) at the right edge of the word (Ọla 1995).

(13) PROP-HEAD, ONSET, ALIGN-RIGHT >> *M/COR[r] >> MAX-IO

/orórì/	PROP-HEAD	ONSET	ALIGNR	*M/COR[r]	MAX-IO
☞ (a) o.<r>ó. r̀i				*	*
(b) o.ró.rì				**!	
(c) o.<r>ó. <r>̀i	*!	**	*		**
(d) o.ró. <r>i			*!	*	*

In (13), the prohibition against having [r] in the onset is accommodated as long as that enables higher-ranked PROP-HEAD and ONSET to be satisfied. Additional violations of *M/COR[r] are heavily penalized. Thus, even though candidate (b) obeys MAX-IO completely, it is still not harmonic because it violates *M/COR[r] fatally. Candidate (c) is not optimal because it violates three undominated constraints. The last candidate is a potential competitor for the optimal candidate because they both satisfy and violate PROP-HEAD, ONSET, *M/COR[r], and MAX-IO equally. The deciding constraint here is ALIGN-RIGHT, which requires the head of a prosodic word to be aligned to the right edge in Yoruba.

3.2 *Loan Verb Truncation: augmentation by* [*h*] *epenthesis*

Another syllable-conditioned process that contrasts a CV syllable and an onsetless vowel is a truncation process that reduces loan verbs to the initial syllable in the word (reduced verbs signify an action done secretly).[10]

[10] This process is very common in the speech of Yoruba/English bilinguals, especially high school and college students.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(14) *Loan verb truncation*

	Base	Truncated form	
(a)	páàsì	pá	'to pass'
	pọ́m̀bù	pọ́	'to pump'
(b)	ẹ́ńfì	hẹ́ *ẹ́/ *ẹ́ń/ *fì/ *hẹ́ń	'to envy'
	ọ́gìlì	họ́/ *ọ́/ *gì/ *lì	'to be ugly'

As the above examples show, consonant-initial loan verbs shorten to the initial CV. In vowel-initial verbs, however, prevocalic [h] epenthesis is obligatory with the truncation of vocalic materials: an onsetless vowel is an illicit output of truncation.[11]

As was demonstrated in the case involving the failure of [r] deletion, [h] epenthesis demonstrates the priority of ONSET in syllabification. Since the secret code template is a syllable (σSECRET), higher-ranked ONSET forces a violation of DEP to satisfy the templatic constraint. Another constraint motivated by the data is ANCHOR-LEFT (Prince & Smolensky 1993, McCarthy & Prince 1993a, 1995), which demands correspondence between the left edge of the base and the truncated form:

(15) ANCHOR-LEFT
The leftmost element in the base and the output of truncation must match.

ANCHOR-L is fully obeyed in consonant-initial loans (páàsì → pá). However, because of ONSET-induced epenthesis in cases involving vowel-initial loans, ANCHOR-L is crucially dominated. The following tableau shows that DEP and ANCHOR-L are outranked by the templatic constraint and ONSET.

(16) σSECRET, ONSET >> ANCHOR-L, DEP

/ọ́gìli/	σSECRET	ONSET	ANCHOR-L	DEP
☞ (a) họ́			*	*
(b) ọ́		*!		
(c) ọ́gìli	*!			

The selection of the optimal form follows from the ranking in (16). Non-optimal (b-c) violate one higher ranked constraint or another. The winner is (a): it disrespects lower-ranked ANCHOR-L and DEP, but these violations are inconsequential because the high ranking constraints are obeyed.

[11] [h] epenthesis may occur in the untruncated V-initial forms as well, but it is optional.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

There are two potential competitors for the output form in (16): *gọ́* and *gì*, forms in which ANCHOR-L is also violated, as in *họ́*. Unlike *họ́*, these contenders obey DEP, making them appear more optimal than the actual output. The fact that these forms are non-occurring motivates two additional constraints proposed in McCarthy & Prince (1993a, 1995). The first is LINEARITY, a constraint that militates against metathesis. The second is CONTIGUITY, which disallows the skipping of segments. By ranking these two constraints higher than DEP, the unattested forms will be correctly ruled out from appearing on the surface.

(17) σSECRET, ONSET, LINEARITY, CONTIGUITY >> ANCHOR-L, DEP

/ọ́gìli/	σSECRET	ONSET	LINEAR	CONT	ANCHOR-L	DEP
☞ (a) họ́					*	*
(b) gọ́			*!		*	
(c) gì				*!	*	

In (17), all the candidates fare equally on σSECRET, ONSET, and ANCHOR-L. However, the metathesis in candidate (b) violates higher ranked LINEARITY because the linear order of the segments in the based is not preserved in the output. The other loser, candidate (c), is rejected because the initial vowel in the base is skipped, resulting in the violation of higher-ranked CONTIGUITY. Thus, candidate (a) still emerges as the winner because it obeys the higher-ranked constraints violated by its competitors.

3.3 *Word-initial Morpheme Structure Condition: no H-tone, nasal or H-back V*

Three morpheme constraints provide additional evidence illustrating the difference between CV syllables and onsetless vowels. Briefly, the constraints require that a high tone vowel (✓ # cv́), a nasalized vowel (✓ # cṽ)[12] and a high back vowel (✓ # cu) may be the first vowel in a word only if such words are consonant-initial: (*# v́), (*# ṽ), (*# u).[13] These constraints are considered in turn below.

[12] A nasal vowel is indicated by a superimposed tilde.

[13] In loan phonology, these constraints are violable as shown by forms such as [ẹ́ńfĩ] 'envy', [ĩ̀ǹkĩ̀] 'ink' when not augmented to CV-initial forms by [h] epenthesis.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

3.3.1 *Initial high tone*

Words containing initial high tones are very common in Standard Yoruba, but there is a prosodic restriction on their distribution. Word-initially, high tones can only be associated with CV syllables; onsetless vowels cannot bear a high tone in the same context (18). Thus, even though it is common to find mid and low tone-bearing onsetless vowels in word-initial position, word-initial high tone vowels are completely unattested (19).

(18) High toned vowels do not occur word initially: cv́, cv́cv, *v́v, *v́cv

ké	'shout'	*é
bẹ́	'cut'	*ẹ́
wúrà	'gold'	*úrà
púpọ̀	'many'	*úpọ̀
rárà	'allergy'	*árà
rógódó	'small and round'	*ógódó

(19)

(a) *Mid-toned initial*	(b) *Low-toned initial*	(c) **High-toned initial*
owó 'money'	òwò 'business'	*ówó
ewé 'leaf'	èwe 'youth'	*éwe
ẹwà 'beauty'	ẹ̀wá 'ten'	*ẹ́wà
ẹrápó 'type of plant'	àgbàdo 'corn'	*ábàrì

Prefixation provides additional evidence for the general ban on the occurrence of word-initial high tone vowels. In Standard Yoruba, V prefixes either bear a mid or a low tone; the only high tone prefix in the dialect is consonant-initial.[14] As shown below in (20a, b), both the mid and low tone prefixes are expressed as V. The high tone prefix, in contrast, is expressed as CV, following the general pattern of distribution of initial high tones in the language (20c).[15] (20) exemplifies these observations.

(20) PREFIXATION: H-tone prefix must be a CV syllable, (*#v́).

(a) *Mid-toned prefix*	(b) *Low-toned prefix*	(c) *High-toned prefix*
ɪ-jó 'dance'	**ì**-jó 'dancing'	**jí**-jó *í-jó 'dancing'
ɪ-kú 'death'	**ì**-kú 'dying'	**kí**-kú *í-kú 'dying'
ɪ-só 'fart'	**ì**-só 'farting'	**sí**-só *í-só 'farting'
ɪ-là 'marks (e.g. facial)'	**ì**-là 'splitting'	**lí**-là *í-là 'spliting'

[14] These prefixes are nominalizers. When prefixed to a verb, the low tone prefix [ì] and the High tone prefix [í] turn verbs into gerunds: the former denotes 'manner of action', while the latter denotes 'the act of doing something'; the Mid tone prefix [ɪ] is a non-gerundive nominalizer.

[15] This observation is parallel to the situation observed in other languages where (a) high tones can only be associated with syllables with onsets (see Odden 1995 on Kikerewe and Bamba 1991 on Mawukakan), and (b) stress associates with onsetful syllables but ignores onsetless syllables (see Davis 1988 on Aranda and Buller, Buller & Everett 1993 on Banawá).

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

Previous accounts of the data in (20c) treat the prefix as a reduplicative morpheme – a monosyllabic reduplicant which has a fixed high tone and a default vowel /i/ (Akinlabi 1984, Alderete et al. 1997). In accounting for (20c), the data in (20a, b) are usually not taken into account, even though the prefixes in (20) are vocalically identical. The asymmetrical realization of /i/ in (20) raises the question of why this vowel is expressed as a non-reduplicative morpheme when it bears a mid or low tone, and why it is expressed as a reduplicative morpheme when associated with a high tone.

The above asymmetry shows that the following constraint is active in Yoruba:

(21) INITIAL HIGH TONE/SYLLABLE (IHTS)
A word-initial high tone must be associated with a syllable.

If a syllable is characterized as CV, the facts of high tone gerundives follow straightforwardly: a verbal root's initial consonant spreads leftward into the high tone prefix's onset to avoid a violation of IHTS. Under this account, the general ban on word-initial high tone vowels is also an instantiation of IHTS: if an onsetless vowel is not a proper syllable, it would not be a proper licenser of a high tone word-initially. In addition to IHTS, the constraints ALIGNLEFT-CPLACE and MAX-IO are crucial for an OT analysis of high tone gerundives: ALIGNLEFT-CPLACE is crucial because leftward-spreading of the root's initial consonant is involved,[16] MAX-IO is relevant because the input is preserved in the output. In terms of the ranking, IHTS is undoubtedly undominated; so also is MAX-IO in this context because the input is intact in the output. The fact that ALIGNLEFT-CPLACE is respected by the optimal candidate is also proof that this constraint is high ranking:

(22) IHTS, ONSET, MAX-IO, ALIGNLEFT-CPLACE

/í-jó/	ONSET	IHTS	MAX-IO	ALIGNLEFT-C
☞ (a) jí-jó				
(b) í-jó	*!	*		*
(c) jó-jó			*!	

[16] In Optimality Theory, spreading is analyzed in terms of alignment. On spreading as alignment, see among others Kirchner (1993), Pulleyblank (1993) and Akinlabi (1996).

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

Candidate (c), a replica of the base, is excluded because MAX-IO is not obeyed; a fatal violation of higher ranked ONSET and IHTS rules out candidate (b). Candidate (a) is the optimal form – in this form, all the high ranking constraints violated by the losers are respected.

As pointed out by an anonymous reviewer, there is another possible candidate not considered in the tableau: *hí-jó*, a form that satisfies IHTS through [h] insertion. The rationale is that if [h] insertion is independently attested in the language, as demonstrated in secret loan formation (14b), why is the same strategy not adopted in (20c)?

What appears to be at issue here is the choice between the spreading of an underlying segment or the insertion of a default segment. There is independent evidence in Yoruba that spreading takes precedence over insertion if an intervening segment is underspecified. This evidence comes from loan syllabification. In Yoruba, generally, the only possible syllables are of the form (C) V. There are no closed syllables and no consonant clusters. Because Yoruba does not permit consonant clusters, loans with clusters are resyllabified through vowel insertion or spreading to fit the permissible syllable shape in the language. As pointed out in Akinlabi (1993), all consonants except underspecified [r] adopt the insertion strategy (23a); cases involving [r] entail vocalic spreading (23b).

(23) (a) Cl *or* Cn *simplification: vowel insertion*

síléètì	'slate'
gílóòbù	'globe'
sínóò	'snow'
sínọ̀ọ̀fù	'snuff'

(b) Cr *simplification: vocalic spreading*

kérésìmesì/ kérési	'Christmas'
fẹ́rẹ́dìikì	'Fredick'
mátáráàsì	'mattress'
tọ́rọ́fì	'trophy'
kórólà	'krola: a type of soda'

Given the pattern of cluster simplification in (23), the data in (20c) may be analyzed as a consonantal spreading process made possible by the underspecified nature of [i] (Pulleyblank 1988). This shows then, that DEP, the constraint governing epenthesis, outranks ALIGNLEFT-CPLACE, the constraint responsible for consonantal spreading:

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(24) IHTS, ONSET >> DEP >> ALIGNLEFT-C

/í-jó/	ONSET	IHTS	DEP	ALIGNLEFT-C
☞ (a) jí-jó				
(b) hí-jó			*!	*
(c) í-jó	*!	*		*

The crucial difference between candidate (b), the loser, and candidate (a), the winner, is that the former satisfied higher-ranked ONSET and IHTS by violating higher-ranked DEP, while the latter obeys all higher-ranked constraints as well as lower-ranked ALIGNLEFT-CPLACE.

3.3.2 *Initial nasal vowels*

Let us now examine the restriction on the occurrence of word-initial nasals. As the examples in (25) show, nasalized vowels must be preceded by an onset consonant at the beginning of words. There are no examples of native words beginning with nasalized vowels in the Standard dialect.

(25) Nasalized vowels do not occur word initially: cṽ, *ṽv, *ṽcv

rìn	[rĩ́]	'walk'	*ìn
fọ́nrọ́n	[fɔ̃́rɔ̃́]	'strand'	*ọ́nrọ́n
kìnnìún	[kĩ́nĩ́ũ̃]	'lion'	*ìnnìún
kánún	[kã́ũ̃]	'potash'	*ánún
kànga	[kã́ga]	'well, bore hole'	*ànga
gángan	[gã́gã́]	'a talking drum'	*ángan

Like the restriction on initial high tones, the impossibility of initial nasal vowels reflects a prosodic restriction on the association of word-initial nasals. This constraint can be formalized as the Initial Nasal/Syllable constraint:

(26) INITIAL NASAL/SYLLABLE (INS)
A word-initial nasal must be associated with a syllable.

To derive the fact that nasality never occurs on initial vowels, INS must outrank faithfulness, so that even if there is a lexical word-initial nasal vowel, it will not be preserved in the output:

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(27) ONSET, INS >> MAX-NAS, MAX-IO

/ĩ-jó/	ONSET	INS	MAX-NAS	MAX-IO
☞ (a) ijó	*		*	*
(b) ĩjó	*	*!		

The form in which the input is completely preserved (27b) is excluded because INS and ONSET are violated; (27a) violates ONSET, but obeys INS, through a MAX-NAS violation; for that reason, it is a possible optimal output.

There is dialectal evidence for the scenario in (27). Onko Yoruba has words beginning with moraic nasals and nasalized vowels whereas cognate forms in the Standard dialect begin with high front vowels, as these examples depict:

(28)	Onko	Standard Yoruba		
(a)	ǹyá/ìnyá	ìyá		'mother'
	ǹrọ̀lẹ́/ìnrọ̀lẹ́	ìrọ̀lẹ́		'evening'
	ǹtàdógún/ìntàdógún	ìtàdógún		'fifteen days'
(b)	pín	pín	*pí	'divide'
	rìn	rìn	*rì	'walk'
	sin	sin	*si	'bury'

The asymmetric realization of nasality, illustrated in the examples given above, demonstrates the difference between CV and V syllables in Standard Yoruba. When the first nasalized vowel in a word is associated with an onsetful syllable, nasality is preserved (28b). When it is associated with an onsetless vowel, denasalization applies to avoid an INS violation (28a).

3.3.3 *Initial high back vowel*

The third morpheme structure constraint that is sensitive to the presence or absence of preceding onsets is the constraint that prevents a high back vowel from occurring word-initially. Thus in (29), we see that the first vowel of consonant-initial words may be a high back vowel [u]. Completely unattested in Standard Yoruba, however, is the occurrence of words that begin with a high back vowel.

(29) High back vowels do not occur word-initially: cu, cucv, *u *ucv

kú	'die'	*ú
rù	'carry'	*ù
lu	'pierce'	*u

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

kùtà	'unsuccessful'	*ùtà
burú	'wicked, bad'	*urú
ṣubú	'fall'	*ubú

The pattern illustrated by (29) motivates the following constraint:

(30) INITIAL HIGH BACK/SYLLABLE (IHBS)
A word-initial high back vowel must be associated with a syllable.

IHBS ensures that any occurrence of a high back specification in word-initial position is contained within a syllable, expressed as CV. If a high back vowel appears in word-initial position, it must either lose its backness or receive an onset to avoid a fatal violation of undominated IHBS.

Cross-dialectal data provide evidence showing that the former strategy is adopted in Standard Yoruba. In dialects such as Ekiti and Ijẹṣa, some nouns begin with high back vowels; cognates in Standard Yoruba, in contrast, begin with high front vowels (31a). This difference is neutralized, however, when a word is consonant-initial (31b):

(31)	Ekiti/Ijẹṣa	Standard Yoruba		
(a)	uṣu	iṣu		'yam'
	ulé	ilé		'house'
	ʊgba	igba		'two hundred'
	ùkòkò	ìkòkò		'pot'
(b)	kú	kú	*kí	'die'
	lu	lu	*li	'pierce'
	burú	burú	*birú	'wicked'
	kʊ̀ta	kùtà	*kìta	'unsuccessful'

The realization of the initial high vowel as front instead of back in Standard Yoruba is accounted for by the interaction of IHBS, ONSET, MAX-BK, and MAX-IO, shown in the following tableau.

(32) ONSET, IHBS >> MAX-BK, MAX-IO

/ulé/	ONSET	IHBS	MAX-BK	MAX-IO
☞ (a) ilé	*		*	*
(b) ulé	*	*!		

In (32), the two candidates tie with respect to ONSET violation. The

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

selection of an optimal form is therefore passed to the other higher ranked constraint – IHBS. Candidate (a) emerges as the optimal form because it respects IHBS, which its competitor violates.

To summarize, the three morphemic constraints: IHTS, INS and IHBS show that there is a phonological contrast between vowels depending on whether or not they have a preceding consonant, demonstrating the importance of ONSET for syllabification.

The rankings established so far are summarized in (33).

(33)

Ranking	Reason
PROPHEAD, ONSET, ALIGNHEADR ≫ *M/COR[r], *MAX-IO	This ranking accounts for the failure of [r] deletion to satisfy minimality, which requires the presence of a CV syllable in every word.
σSECRET, ONSET ≫ DEP	This ranking is required to yield consonant epenthesis in vowel-initial loan word truncation.
IHTS, ONSET ≫ DEP ≫ ALIGNLEFT-C	The constraint militating against epenthesis outranks the constraint motivating consonant spreading. This ranking is required to produce spreading instead of insertion when the intervening vowel is underspecified. Consonant spreading enables the syllable of the high tone vowel to be expressed as CV.
ONSET, INS ≫ MAX-NAS, MAX-IO	Required to yield denasalization when an onsetless vowel is word-initial.
ONSET, IHBS ≫ MAX-BK, MAX-IO	Needed to make a high vowel non-back (front) when an onsetless vowel is word-initial.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

As the rankings in (33) show, in all the processes examined, ONSET is undominated. Other higher ranked constraints tied to ONSET satisfaction are PROPHEAD, σSECRET, IHTS, INS and IHBS. The interim conclusion at this point is that ONSET is strictly required for syllabification in Standard Yoruba. The following section presents the final evidence illustrating the difference in the syllabicity of vowels.

3.4 *Distributive reduplication*

Yoruba forms distributives by a process of reduplication which reduplicates the initial VCV of a noun, as shown in (34).

(34) *Distributive reduplication: VCV-initial nouns*

Base	Reduplicated form	Gloss	Distributive
ewé	ewe-ewé	'leaf'	'every leaf'
ìlà	ìlì-ìlà	'line'	'every line'
òru	òrò-òru	'midnight'	'every midnight'
ìrọ̀lẹ́	ìrì-ìrọ̀lẹ́	'evening'	'every evening'

In previous accounts, the reduplicative prefix in (34) is analyzed as a foot (Fọlarin 1987, Pulleyblank 1988). Within the standard moraic framework of assumptions, where the onset does not count for syllabification (For example, Hayes 1989), one would expect any CVCV, VV, CVV or VCV to be a well-formed reduplicant. Surprisingly, the reduplicant is always realized as VCV, never as VV, CVV or CVCV, as shown in (35)[17, 18] and (36). This

[17] Note that the forms in (35b, c) are reduced forms of (35a) derived after glide deletion (Akinlabi 1991); in (35c), the glide is deleted; in (35b), both the glide and the high vowel are replaced by a copy of the initial vowel, [o]. Given that the paper has presented materials illustrating only [r] deletion until now, an anonymous referee suggested, and rightly so, that instead of citing VV-initial nouns resulting from glide deletion in (35), vowel sequences resulting from [r] deletion should be cited as examples. The problem is that it is difficult to find such examples because vowel assimilation applies following [r] deletion in word-initial position, removing the hiatus context required to show the asymmetric patterning of postvocalic V and CV syllables in vowel-initial nouns.

[18] Morpheme-internally, underlying VV sequences are not common in Yoruba. Most surface VV sequences result from consonant deletion. In terms of distribution, such sequences are found: (a) word-initially (for example, (i) *òòṣà* 'god', (ii) *òúrọ̀* 'morning'); (b) medially (for example, (iii) *kẹ̀ìndé* 'second-born twin', (iv) *ọmọlúàbí* 'nice person'); and (c) word-finally (as in the following examples, (v) *ọlọ́un* 'God', (vi) *àjàí* 'child born with cord around the neck').

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

process is further exemplification that the Standard dialect contrasts Vs with onsets and those without onsets.

(35) *VV-initial noun: does not reduplicate*

	Base	Gloss	Reduplicated form	Distributive
(a)	òwúrọ̀	'morning'	òwò-òwúrọ̀	'every morning'
(b)	òórọ̀	'morning'	òrò-òórọ̀	'every morning'
(c)	òúrọ̀	'morning'	*òò-òúrọ *òrò-òúrọ	'every morning'

(36) *CVCV: does not reduplicate*

Base	No Reduplication	Gloss
fílà	*fìlà-fìlà *ilà-fìla *fìì-fìla	'cap'; 'every cap'
bàtá	*bàtá-bàtá *àtá-bàtá *bàà-bàtá	'bata'; 'every bata drum'

Focusing for a while on bases with sequences of vowels in initial position, a further complication is noted: the VV sequences in (35) reduplicate differently. In (35b) reduplication is possible, whereas in (35c) reduplication is impossible. At first glance, this reduplication pattern appears mysterious, but a closer look shows that the lack of uniformity in reduplication follows from whether the initial vowel sequences are identical or non-identical. In (35b), where the base begins with a long vowel, reduplication proceeds without any hindrance. In (35c), the base begins with a sequence of non-identical vowels; here, reduplication is prohibited.

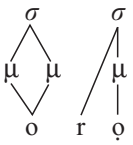
The asymmetry in (35b, c) is explained if we assume: (i) that long vowels are represented as two moras linked to one segment (Hayes 1989), (ii) that non-identical vowels are represented as two moras linked to two different segments, and (iii) that copying targets melody, not prosody (McCarthy & Prince 1986). Under these assumptions, initial identical vowels are copied as a monosegment whereas non-identical vowels are copied as two different segments.

Applied to the reduplication data in (35b, c), in a base such as *oorọ*, the initial VCV will be copied as *orọ-oorọ*, following which regressive assimilation applies to produce the actual output, *oro-orọ*.[19] These processes are shown below using McCarthy & Prince's (1986) pre-Optimality theory of Prosodic Morphology (I assume that long vowels are syllabified together in the same syllable and that unlike vowels constitute separate syllables, given that Yoruba does not have diphthongs):

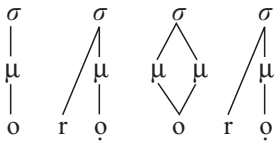
[19] Without regressive assimilation, the output would be *orọ-òórọ̀* – an output with a hiatal context between the base and the reduplicant. Yoruba adopts two strategies in resolving vowel hiatus created by morpheme juxtaposition: deletion and assimilation. Deletion is favored between a monosyllabic verb and a following object, while assimilation is adopted in hiatal resolution between nouns (see for example, Bamgbose 1967, Awobuluyi 1978). Given that the distributive reduplicant is VCV in shape like the canonical noun, vowel hiatus resolution follows the normal pattern established for nouns in the language.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

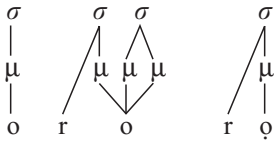
(37) REDFt + Base *Underlying*



REDFt + Base *Copying and Mapping*



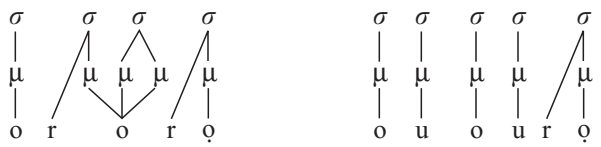
REDFt + Base *Regressive Assimilation and Output*



However, in a base such as *ouro*, all possible reduplicants are defective: in **ouro-ouro*, the segmental materials in the reduplicant are more than needed for an optimal foot in Yoruba; in **oro-ouro*, the VCV reduplicant is a well-formed foot, but a segment, /u/, is skipped – this a costly operation, as the skipping of vowels is forbidden in Yoruba; finally, in **ou-ouro*, the illicit reduplicant is a VV. One might wonder why a VV is not a good reduplicant. After all, this form does not have any of the shortcomings noted for ill-formed **ouro-ouro* and **oro-ouro*. Why is **ou-ouro* impossible?

To answer this question, let us compare well-formed *oro-ooro* with illicit **ou-ouro*. The two reduplicants begin with a vowel, so the illicitness of **ou-ouro* cannot be attributed to this property. However, the well-formed reduplicant ends in a CV syllable, while the illicit form ends in an onsetless vowel. The structural distinction is as follows:

(38) òrò-òórọ̀ vs. *òú-òúrọ̀



The structural difference, illustrated in (38), is one of the deep dividing lines separating the two reduplicants: a distributive prefix cannot end in an onsetless vowel in Standard Yoruba, it must end in a syllable with an onset.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

Distributives have another unique property illustrated by the pattern of reduplication in forms such as *fìlà*, **fìlà-fìla* (36). As pointed out earlier, these CVCV nouns do not reduplicate. The failure of reduplication in this case is due to the fact that these nouns are C-initial. The base of distributive reduplication must begin with a vowel, as the data in (34) and (35) illustrate. The language does not compromise this requirement, a requirement that further shows that a V is distinct from a CV.

In Ọwọn-Afa, a closely related language, the ill-formedness of C-initial nouns is redeemed by [i] epenthesis;[20] following epenthesis, reduplication applies (Ọla 1995):

(39) *Ọwọn-Afa: distributive reduplication, C-initial nouns*

Base	Gloss	Reduplicated form		Gloss
bàtà	'shoe'	ɪbɪ - ɪbàtà	*bàtà-bàtà	'every shoe'
kòkó	'cocoa'	ɪkɪ - ɪkòkó	*kòkó-kòkó	'every cocoa'
kɛ̀kɛ́	'bicycle'	ɪkɪ - ɪkɛ̀kɛ́	*kɛ̀kɛ́-kɛ̀kɛ́	'every bicycle'
kpákó	'wood'	ɪkpɪ - ɪkpákó	*kpákó-kpákó	'every wood'

Like Ọwọn-Afa, Standard Yoruba also has an epenthetic [i] (Pulleyblank 1988), but does not exploit the option of augmenting the nominal base to the desired V-initial shape required for reduplication. Instead, Standard Yoruba simply does not reduplicate non-conforming nominals such as those in (36). The distributive is expressed in consonant-initial forms by prefixing the lexical item *gbogbo* which means 'every' to unreduplicated nouns. Thus, 'every cap' is expressed as *gbogbo fìlà*.

To summarize the distributive facts, the distributive reduplicant cannot be expressed as CVCV or VV, even though it is supposed to be a foot (Folarin 1987).[21] It is always expressed as VCV. Some previous accounts have proposed, and rightly so, that by being a VCV, the distributive is like the canonical noun in shape (Akinlabi 1984, Pulleyblank 1988).[22] But a question

[20] In Ọwọn-Afa, consonant-initial nouns are optionally realized as [i]-initial. The presence of [i] is however obligatory in reduplication because the pattern is as shown for Standard Yoruba, where the base and reduplicant must begin in a vowel.

[21] As an anonymous referee points out, one could assume as an alternative that the distributive reduplicant (DIST-RED) is a syllable, which is expressed as VCV because of the high ranking status of IDENT-BR and possibly ANCHOR-LEFT. This alternative is weakened by the fact that CV-initial nouns do not reduplicate in Standard Yoruba as one would expect if DIST-RED is a syllable.

[22] Within a Generalized Template theory analysis (McCarthy & Prince 1995, Urbanczyk 1996), where the shape of a reduplicant follows from its morphological classification, the shape of the distributive in Yoruba would also be analyzed as following from the fact that nouns are canonically VCV in shape. Without due consideration for the differences in the syllabification of an onsetless vowel, the fact that the distributive reduplicant is represented as VCV or VV in Ondo Yoruba (presented in section 4) would be a mystery in a Generalized Template theory analysis.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

still arises as to what the exact prosodic characterization of this canonical noun is. This question is addressed in the following section.

3.5 *Non-exhaustive syllabification in Standard Yoruba*

In the foregoing, we have examined syllabic processes in Standard Yoruba. The generalization that emerges is that this dialect contrasts vowels with onsets and those without onsets. In the OT analysis proposed, high ranking ONSET is shown to block or trigger processes such as deletion, segmental insertion, and spreading. There is therefore no doubt that the Onset Principle (Itô 1989) is crucial for syllabification in Standard Yoruba.

Claiming that ONSET is undominated raises the issue of whether the high ranking status of this constraint is an emergent unmarked property of some processes, or a general property of the grammar. In OT, the fact that a language has onsetless vowels is usually considered as strong evidence that ONSET is outranked in some contexts by faithfulness constraints such as MAX and DEP. This is actually the position adopted in this paper until now. However, the problem with this approach is that it does not explain why a marked onsetless syllable is required at the beginning of a distributive and its base. This requirement is in fact contrary to the ideas of universal syllable markedness: there are some languages where all syllables have onsets, and there are some languages where some syllables have onsets, but no language obliges syllables to be onsetless (Jakobson 1962, Clements & Keyser 1983, Steriade 1982, McCarthy & Prince 1994a, b).

To avoid this theoretical problem, I will consider two alternative approaches which employ other prosodic structures for the characterization of onsetless vowels.[23] First, following Hyman (1990), Downing (1993) and Odden (1995), one could assume that onsetless vowels are moraically licensed but do not constitute syllables (40a).[24] Second, following Piggott (1995), one could propose that vowels lacking onsets are syllables without moras (40b).

[23] A third possibility, analyzing the exceptionality of onsetless vowels in terms of prosodic misalignment (Downing 1998), fails on two grounds. First, this proposal cannot explain why onsetless vowels are never misaligned in Yoruba. Second, it cannot account for the obligatoriness of initial onsetless vowels in distributive reduplication.

[24] Bagemihl (1991) also adopts the moraic licensing approach in accounting for the asymmetrical properties of voweless syllables in Bella Coola. Unlike the cases discussed in Hyman and Downing, where failure of syllabification is attributed to the Onset Principle, the Bella Coola case is not onset-driven. In, Zec (1988) and Spring (1991), the moraic licensing approach is also used to account for the surface realization of unsyllabified segments.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(40) (a) *Moraic licensing* (b) *Non-moraic syllabic licensing*



Within the moraic licensing account, the initial vowel in (40a) has no syllable, so ONSET is not violated. In the non-moraic syllabic account, this initial vowel has a syllable but lacks a mora. By not having a mora, it is not compelled to have an onset, thus ONSET is not violated.

Let us examine the latter view first. The idea that a syllable lacks a mora was originally proposed to capture the fact that certain syllables with epenthetic vowels are ignored by weight-sensitive phenomena in Mohawk and Iraqi Arabic. Thus, with a formal representation like (40b), if stress is sensitive to weight, it will overlook the initial moraless syllable even if the antepenult is normally stressed in the language. To derive a parallel analysis in cases involving onset-sensitive phenomena, one would have to assume the following: (i) that a moraless syllable does not require an onset, and (ii) that a moraic syllable requires an onset. These assumptions could be expressed in constraints such as MORA/ONSET and *V/ONSET, defined as follows:

(41) (a) MORA/ONSET: A moraic syllable must have an onset.
(b) *V/ONSET: A non-moraic syllable must not have an onset.

In addition to the proposed modification, the constraints regulating reduplication are needed: ANCHOR-LEFT, LINEARITY, CONTIGUITY, MAX-BR, DEP, IDENT-BR (McCarthy & Prince 1995). All reduplicative constraints except IDENT-BR were defined and motivated earlier. IDENT-BR is the constraint regulating the featural and prosodic identity of the base and reduplicant; it demands complete featural and prosodic identity between the base and reduplicant:

(42) IDENT-BR
Correspondents (Base and RED) are featurally and prosodically identical.

Armed with the appropriate theoretical tools required for handling reduplication, let us now apply the ideas in (40b) to the distributive data. In the non-moraic syllabic account, the distributive would be defined as a binary foot whose left edge corresponds with the left edge of a non-moraic syllable and its right edge aligned with the right edge of a syllable containing a mora. This generalization can be stated in terms of Generalized Alignment (McCarthy & Prince 1993b) as follows:

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(43) (a) DISTRIBUTIVE PREFIX is a Binary Foot (FOOTBIN, Prince & Smolensky 1993, Hewitt 1994).
(b) ALIGN-LEFT
The left edge of the distributive is aligned with the left edge of a non-moraic syllable.
(c) ALIGN-RIGHT
The right edge of the distributive is aligned with the right edge of a moraic syllable.

Together with MORA/ONSET and MAX-BR, the constraints in (43) would be ranked as follows:[25]

(44) DISTFOOT, ALIGN-L, ALIGN-R, MORA/ONSET, MAX-IO >> MAX-BR

RED-owuro	DIST	ALIGNL	ALIGNR	M/ONSET	MAXBR
☞ (a) σ σ | \ | μ | owo- owuro					***
(b) σ σ \ | μ | o- owuro				*!	****

The ranking in (44) yields the following result. The violator of higher-ranked MORA/ONSET is sub-optimal: the second syllable of the reduplicant in (b) has a moraic syllable, but lacks an onset. The winner, candidate (a), violates lower-ranked MAX-BR; nevertheless, it is optimal because it obeys the high ranking constraint violated by the loser.

To complete the illustration of the application of the non-moraic syllabic account to the distributive data, let us examine the analysis of an input with sequences of initial vowels such as /òúrọ̀/.

[25] Contrary to my earlier assumption that long vowels are syllabified into one syllable, in (44), a long vowel is linked to two separate syllables. This representation is necessary to avoid a representation where one single vowel is linked to a syllable with a moraless vowel on the left and a moraic vowel on the right.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(45) DISTFOOT, ALIGN-L, ALIGN-R, MORA/ONSET, CONTIGUITY >> MAX-BR

RED-ouroo	DIST	ALIGNL	ALIGNR	M/ONSET	CONT	MAX-BR
(a) σ σ | μ | o u- ouroo				*!		**
(b) σ σ \ | μ | o- ouroo				*!		***
(c) σ σ \ / | μ | or o- ouroo					*!	

Reduplication fails completely in (45), as the output forms fail to respect one higher-ranked constraint or another. Both (a) and (b) fail to respect MORA/ONSET, and candidate (c) violates CONTIGUITY by skipping a vowel to pick up an onset.

Let us evaluate the non-moraic syllabic account. This account appears to derive the correct result, but it has two major problems. First, the MORA/ONSET constraint predicts that there is an inseparable relationship between having a mora and having an onset. This prediction does not have empirical support in Yoruba. As will be shown in section 4, in the symmetrical dialect, syllables with onsets and those without onsets display identical characteristics. If the MORA/ONSET constraint is inseparable, this symmetrical behavior should be impossible. The second problem concerns the issue of whether or not syllables may be moraless. Pulleyblank (1994) proposed, based on evidence from tone, that in Yoruba, the tonal anchor is the mora, not the syllable.[26] Since vowels are always tone-bearing

[26] One argument for this proposal is the existence of CVV syllables, in which the vowels bear separate tones, as in the following examples: (i) *yìí* 'this', (ii) *máa* 'future marker' (iii) *náà* 'the', and (iv) *bẹ́ẹ̀* 'so'. If the mora is the tonal anchor, each syllable in (i)-(iv) will have two moras, and tones will map to moras on a one-to-one basis. If, on the other hand, the

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

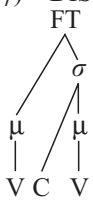
in Yoruba, the idea that an onsetless vowel could be represented as a moraless syllable is flawed. One potential piece of evidence for an initial vowel being moraless would be a process that deletes the tone of initial onsetless vowels; such a process is non-existent in Yoruba. In the absence of this type of evidence, I conclude that vowels have moras in Yoruba.

Let us now examine the application of the moraic licensing approach to the facts of distributives. As (40a) indicates, the moraic licensing account represents onsetless vowels as moras that are not syllabified. On this view, the distributive foot is analyzed as being aligned with a mora on the left and a syllable on the right. This would produce a VCV form and rule out VV, which is not aligned with a syllable on the right. By the same token, a CVCV form would also be rendered impossible because its left edge is not aligned with a mora. The alignment constraints are given below:

(46) (a) ALIGN-LEFT
The left edge of the distributive is aligned with the left edge of a mora.
(b) ALIGN-RIGHT
The right edge of the distributive is aligned with the right edge of a syllable.

DISTFOOT alignment results in the structure given in (47):

(47) DISTFOOT



The structure in (47) violates Itô & Mester's (1992: 11) mora confinement condition, which states that 'a mora is licensed only by a syllable'. This condition is phrased as a LINK constraint, following Hewitt (1994) and Crowhurst (1996):

(48) μ-to-σ: Link (μ, σ)
A mora must be linked to a syllable.

Even though the structure in (46) violates μ-to-σ, its well-formedness can be maintained if we adopt the Weak Layering Hypothesis, which allows a

syllable is the tone-bearing unit, the two tones in these examples will be linked to a single prosodic unit. While forms with High-Low or Low-High sequences may not be problematic for the syllable-based hypothesis, a form like *máa* 'future marker,' which has a High-Mid tonal sequence, is a problem because it would be incorrectly realized as High-High (**máá*), given the underspecified nature of Mid tones in Yoruba (Akinlabi 1984, Pulleyblank 1986).

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

prosodic constituent like the syllable to bypass a foot, linking directly to the prosodic word (Itô & Mester 1992). If the Weak Layering Hypothesis is extended to cases involving moras, a mora can bypass a syllable and link directly to a foot, as in (47).

To account for the distributive data in a moraic licensing approach, the relevant alignment, correspondence and faithfulness constraints are ranked as in (49):

(49) DIST, ALIGNL, ALIGNR, ONSET, CONTIGUITY >> MAX-BR, LINKμ-σ

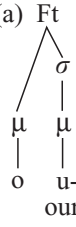
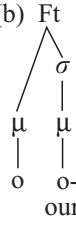
RED-owurọ	DIST	ALIGNL	ALIGNR	ONSET	CONT	MAX	μ-σ
☞ (a) Ft σ μ μ o w o-owurọ						***	**
(b) Ft σ μ w o-owurọ	*!					***	*
(c) Ft σ σ μ μ w o w o-owurọ		*!				***	*
(d) Ft μ μ o-owurọ			*!			****	***
(e) Ft σ μ μ o r o-owurọ					*!	***	**

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

In (49), DISTFOOT disqualifies (b) because the distributive prefix is less than a binary foot. Alignment violation disqualifies (c) and (d); finally, (e) is disqualified by incurring a violation of higher-ranked CONTIGUITY. Candidate (a), the optimal form, illustrates the importance of obedience to higher ranked constraints.

Compare now the input form /òúrọ̀/.

(50) DIST, ALIGNL, ALIGNR, ONSET, CONTIGUITY >> MAX-BR, LINKμ-σ

RED-ouro	DIST	ALIGNL	ALIGNR	ONSET	CONT	MAX	μ-σ
(a) Ft 			*	*!		**	****
(b) Ft 			*	*!		***	****
(c) Ft 					*!	**	***
(d) Ft 	*!					**	**

The crucial difference between VCV initial nouns like *òwúrọ̀* and VV-initial

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

ones like *òúrọ̀* is that the former can reduplicate without violating alignment while the latter cannot reduplicate without violating ALIGN-R (as in candidates 50a, b). Other candidates are ruled out by other high ranking constraints: (c) is excluded by CONTIGUITY, and DISTFOOT disqualifies (d).

Three relevant candidates not considered in (50) are: **ohu-ouro̩*, **oho-ouro̩*, **owo-ouro̩*. Like the optimal candidate in (49a), they obey DISTFOOT, ALIGN-L and ALIGN-R. Unlike (49a), they have segments that are not in the base in violation of IDENTBR. Additionally, **ohu-ouro̩* and **oho-ouro̩* incur violations of DEP. Below, first, a definition of IDENT-BR is repeated from (42) for convenience; the ranking that derives the non-occurring candidates follows after it.

(51) IDENT-BR
Correspondents (Base and RED) are segmentally and prosodically identical.

(52) DISTFOOT, ALIGN-L, ALIGN-R, IDENT-BR >> μ-*σ*, MAX-BR

RED-ouro̩	DIST	ALIGNL	ALIGNR	IDENT	DEP	μ-*σ*	MAX
(a) ohu-ouro̩				*!	*	***	**
(b) ohu-ouro̩				*!	*	***	***
(c) owu-ouro̩				*!		***	***

All candidates in (52) obey and violate higher-ranked constraints equally. Specifically, IDENT-BR violation disqualifies these forms. In (a) and (b), IDENT-BR is violated because of [h] insertion. Candidate (c) is quite an interesting form. Assuming glides and their corresponding high vowels are identical in featural terms (Guerssel 1986), the first two segments in base (ou) and the reduplicant (ow) are identical feature-wise, but prosodically, they are not. The prosodic distinction yields a segmental difference, thereby excluding candidate (c).

From the analysis presented above, we see that the asymmetrical property of vowels with onsets and those without onsets is captured quite simply as a difference in the syllabicity of moras, based on whether or not they are preceded by onsets. In Standard Yoruba, a vowel with an onset constitutes a proper syllable, while an onsetless vowel is licensed by a mora, not a syllable. Representing an onsetless vowel as a mora avoids the theoretical problems associated with alternative representations. For example, it avoids

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

the problem encountered in the standard OT analysis previously adopted, which would require the characterization of the initial vowel of the distributive as a marked syllable, contrary to the common assumption in the theory of syllable markedness. Furthermore, it also avoids the problem of incorrectly characterizing the distributive's initial vowel as lacking a mora, as is the case in the non-moraic syllabic analysis.

The adoption of the theory of moraic licensing has a significant implication for the ranking of ONSET in Standard Yoruba. Given that all syllables required by syllable-driven processes have onsets, and given the proposal that onsetless vowels are not syllabified, it follows that the high ranking status of ONSET is a general property of the grammar of Standard Yoruba, not just an emergent property of some processes. Thus, the established rankings in sections 3.1–3.4, where ONSET ranks very high on the ranking scale, are maintained in a moraic licensing account.

To summarize, syllabic asymmetry is accounted for by ranking ONSET above faithfulness constraints (such as MAX and DEP) and LINK, the constraint governing the incorporation of phonological elements into prosodic structure, required to satisfy Itô's Prosodic Licensing or Selkirk's Strict Layering Hypothesis. In Standard Yoruba, the high ranking of ONSET and PROPHEAD block the deletion of [r] in violation of MAX and *M/COR[r]. Other processes illustrating the dominance of ONSET over MAX are the morphemic constraints, INS and IHBS, constraints that induce featural processes such as denasalization and vowel fronting. The high ranking of ONSET also induces [h] epenthesis in loans in violation of DEP. In addition to confirming the high ranking status of ONSET, the analysis of the distributives also show that moraically licensed vowels are allowed in Standard Yoruba, thus demonstrating that μ-to-σ is violable if a mora is not preceded by an onset.

4. Syllable Symmetries in Ondo Yoruba

Syllabically, Ondo Yoruba (OY, an eastern Yoruba dialect) is the mirror-image of Standard Yoruba (SY). An examination of syllable-driven processes in this dialect reveals that vowels, with or without onsets, exhibit symmetrical patterning. In particular, the loss of [r] in OY (Adetunji 1988) gives rise to the violation of a whole range of conditions that obligatorily hold of the Standard dialect. For example, in lexical items which obligatorily contain [r] in Standard Yoruba, [r]-less OY violates the CV minimal condition (see section 4.1 below); the three morphemic conditions are also disrespected in words where [r] is lost (section 4.2); and the distributive reduplicant, a foot, is expressed as VCV or VV in words where [r] is missing (section 4.3).

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

4.1 *The Minimal Word Condition and the loss of* [r]

As demonstrated in section 3.1, minimality requires the presence of a CV syllable in every word in SY. This requirement was shown to block the deletion of [r] in contexts where this segment would have otherwise been deleted. Adetunji (1988) observes the complete loss of [r] in OY and shows that words which have [r] in the Standard dialect do not surface with [r] in Ondo. This observation is made explicit by comparing the following cognates in the two dialects.

(53)

SY	OY		
rí	í	*hí	'see'
rà	à	*hà	'buy'
rìn	ẹn [ɛ̃]	*hẹ̀n	'walk'
rù	ù	*hù	'carry'

(54)

SY		OY		
irun	*iun	ian	*ihan	'hair'
ọ̀rọ̀	*ọ̀ọ̀	ọ̀ọ̀	*ọ̀họ̀	'word'
ara	*aa	aa	*aha	'body'
ẹ̀rın	*ẹın	ẹ̀ın [ɛ̃ĩ]	*ẹ̀hin	'four'
gààrí	*gààrí	gàí	*gàhí	'cassava flour'
eérú	*eéú	eúú	*ehúhú	'ash'
àádọ́rin	*àádọ́in	àídọ́ẹn	*àidọ́hẹn	'seventy'

Notice in (54) that the loss of [r] in Ondo gives rise to sequences of vowels; consequently, words may be expressed as V, VV or VVV in this dialect. Observe, too, that [h] insertion is not possible for augmentation to CV, VCV or VCVCV. These facts show that the constraints *M/COR[r] and DEP are undominated; crucially, these constraints dominate ONSET. This ranking is shown in (55):[27]

[27] Since [r] is completely lost in Ondo, I am assuming that it is no longer part of the lexical representation in this dialect. Alternatively, as pointed out by an anonymous referee, if one assumes the two dialects under consideration have the same underlying representation, one could posit an [r] for OY underlying, and then derive its inability to surface through the high ranking of *M/COR[r]. In either case, the ranking established for *M/COR[r] will prevent [r] from appearing on the surface in OY.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(55) PROP-HEAD, *M/COR[r], DEP >> ONSET

/ọ̀ọ̀/	PROP-HEAD	*M/COR[r]	DEP	ONSET
☞ (a) ọ̀ọ̀				**
(b) ọ̀rọ̀		*!		
(c) ọ̀họ̀			*!	

The tableau in (55) demonstrates the domination of ONSET by *M/COR[r] and DEP.[28] Unlike SY where *M/COR[r] is violable under pressure to satisfy PROP-HEAD, OY does not tolerate violations of this constraint, as shown in (b). Likewise, DEP violations are not possible, as demonstrated by the unacceptability of (c). The preferred form is (a), which obeys the high ranking constraints. Given the well-formedness of OY onsetless vowels in (53)-(54), I assume the optimal candidate obeys PROP-HEAD. PROP-HEAD, as defined in section 3, requires the presence of a syllable in a word. That syllable is a CV in SY due to the high ranking of ONSET; in OY, it is a (C)V because of ONSET's low ranking and the undominated status of *M/COR[r] and DEP.

4.2 *Word-initial morpheme condition: H-tone V, Nasal-V, H-back V*

In this section, the effect of the loss of [r] on the instantiation of the three morpheme structure conditions will be examined. As before, the difference between Standard and Ondo Yoruba will be shown to follow from different rankings of the same constraints.

4.2.1 *Initial High Tone*

It was demonstrated in 3.3 that initial high tones are impossible when a word is vowel-initial in SY. Because of the loss of [r] in OY, high-toned initial vowels are attested in this dialect. Thus, it is common to find high tone words that are either C-initial or V-initial. Cases involving monomorphemic words are given in (56), while those involving prefixation are shown in (57) below.

[28] Placeless nodes, specified or unspecified, are generally not tolerated in OY. For instance, in addition to the loss of [r], Ondo dialect has no words containing [h]. Words with [h] in the Standard surface in Ondo as a glide corresponding in backness to a flanking vowel: (i) /ihò/ 'hole' (SY) versus (ii) /uwò/ 'hole' (OY); (iii) /hó/ 'boil' (SY) versus (iv) /wó/ (OY) 'boil'.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(56) *High toned vowels occur word initially in Ondo*

	SY	OY	
(a)	wúrà	wúà	'gold'
	nípọn	nípọn	'thick'
(b)	réré	éé	'far'; 'deep'
	rógódó	ógódó	'small and round'

(57) *Prefixation: a high tone prefix may either be C-initial or V-initial in Ondo*

	SY		OY	
(a)	ì-lọ		ù-lọ	'going'
	ì-jẹ		ù-jẹ	'eating'
	ì-rìn		ù-ẹ̀n [ù-ɛ̃]	'walking'
	ì-rẹjẹ		ù-ẹ́jẹ [ù-ɛ́dʒɛ]	'cheating'
(b)	lí-lọ	*í-lọ	lílọ	'going'
	jíjẹ	*í-jẹ	jíjẹ	'eating'
	rí-rìn	*Í-rìn	í-ẹ̀n [í-ɛ̃]	'walking'
	rí-rẹ́jẹ	*í-rẹ́jẹ	í-ẹ́jẹ [í-ɛ́dʒɛ]	'cheating'

Observe in (57a), where the prefix bears a low tone, that the copying of the initial consonant of the base is triggered neither in the Standard variety nor in the Ondo dialect. In contrast, as shown in the first column in (57b), the prefixation of a high tone V to a verb is obligatorily accompanied by root consonantal copying in the Standard dialect in response to the IHTS constraint. The same process is observed in OY. As illustrated in the second column in (56b), with consonant-initial roots, the prefix is expressed as /Cí/; when attached to a vowel-initial root, it is realized as /í/.

The fact that consonant-initial roots induce copying means IHTS and ALIGNLEFT-CPLACE are high ranking, as demonstrated in (58).

(58) IHTS, ALIGNLEFT-CPLACE, DEP >> ONSET

/i-jó/	IHTS	ALIGNLEFT-C	DEP	ONSET
☞ (a) jí-jó				
(b) hí-jó			*!	
(c) í-jó	*!	*		*

The constraints in (58) are exactly the same as required for Standard Yoruba. In the preferred candidate, all constraints are satisfied (58a). Observe that IHTS cannot be satisfied by [h] insertion since DEP is undominated (58b); the dominance of IHTS and ALIGN-LEFT-CPLACE is not compromised

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

either, thus, when a root is consonant-initial (58c), a copy of the initial consonant of the root must appear before the high tone vowel.

Consider next the tableau illustrating a case involving an [r]-less word.

(59) IHTS, *M/COR[r], DEP ALIGNLEFT-C >> ONSET

/í-ɛ̃/	IHTS	*M/COR	DEP	ALIGNLEFT-C	ONSET
☞ (a) í-ɛ̃					**
(b) rí-ɛ̃		*!			
(c) hí-ɛ̃			*!		

Tableau (59) illustrates the difference between SY and OY. As mentioned previously, IHTS and ALIGNLEFT-CPLACE are high ranking in the two dialects. What differentiates OY from SY is that *M/COR[r] and DEP are also high ranking, thus preventing the consonantal spreading or insertion in an [r]-less-initial root in OY. Given that there is no consonant to spread in vowel-initial roots, ALIGN-LEFT-CPLACE is vacuously satisfied. The fact that the initial high tone vowel is considered well-formed in a non-[r] related form in (58) and in an [r]-less initial form in (59) shows that both forms are treated as well-formed syllables in OY. If the high tone prefix is not regarded as a proper syllable, it should either induce violation of *M/COR[r] as in SY, or lose its tone. Given that neither of these events occur, I conclude that the onsetless high tone prefix is syllabified in Ondo Yoruba.

4.2.2 *Initial nasals*

In the Standard dialect, initial nasals are always contained in a CV syllable. Vowels occurring word-initially cannot be nasalized. This observation motivated the constraint INS. In general, in OY word-initial nasalized vowels are also found in CV syllables, the exception being [r]-less-initial words.

(60) Word-initial nasalized vowels may either be C-initial or V-initial in Ondo:

	SY		OY			
(a)	rìn	[rĩ̀]	ẹ̀n	[ɛ̃̀]	*hẹ̀n	'walk'
	rán	[rɔ̃́]	án	[ɔ̃́]	*hán	'send'
	ìrù	[ɪru]	ùnùn	[ũ̀ũ̀]	*hùnìn	'tail'
(b)	pín	[pĩ́]	pẹ́n	[pɛ̃́]		'divide'
	mì	[mĩ̀]	wìn	[wĩ̀]		'swallow'
	fọ́nrọ́n	[fɔ̃́rɔ̃́]	fọ́nọ́n	[fɔ̃́ɔ̃́]		'strand'

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

The fact that nasals are allowed word-initially in (60a) means that surface violations of ONSET are compelled under pressure to satisfy higher-ranked *M/COR[r]. The fact that [h] insertion is not allowed to augment these forms to C-initial demonstrates that ONSET is violable. Because these words are well-formed in OY, I take it that the initial vowels in (60a) are syllables; thus, INS is satisfied. Domination of ONSET by *M/COR[r] and DEP is illustrated in below in (61):

(61) INS, *M/COR[r], DEP >> ONSET

/ɛ̃/	INS	*M/COR[r]	DEP	ONSET
☞ (a) ɛ̃				*
(b) rɛ̃		*!		
(c) hɛ̃			*!	

4.3.3 *Initial high back vowels*

Recall that in the Standard dialect, an initial high back vowel must be associated with a CV syllable. Vowels occurring word-initially cannot be high and back. This was considered as evidence showing the phonological distinction between a CV and an onsetless V. Contrary to what obtains in the Standard dialect, onsetless high back vowels may occur word-initially in Ondo. The examples in (62) show that initial high back vowels may either be C-initial or V-initial.

(62) Word-initial [u] may either be C-initial or V-initial in Ondo

SY	OY	
rù	ù	'carry'
kú	kú	'die'
̈idí	ùdí	'buttock'
ilé	ulí	'house'
kùtà	kùtà	'unsuccessful'
burú	buú	'wicked, bad'

Observe in (62), that high back vowels occur word-initially in [r]-less-initial words and in words that are simply high front vowel-initial in Standard Yoruba. This shows that ONSET is outranked by MAX-BK in Ondo Yoruba. The fact that the word-initial onsetless syllable can be specified as high and back shows that IHBS is satisfied.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(63) MAX-BK, IHBS >> ONSET

/ùdí/	MAX-BK	IHBS	ONSET
☞ (a) ùdí			*
(b) ɪdí	*!		

The ranking in (63) is supported by the superiority of (63a), the form in which MAX-BK is obeyed. On the other hand, (63b) violates MAX-BK and is consequently prevented from surfacing.

To summarize, the three morphemic constraints examined in Standard Yoruba and Ondo Yoruba show variation for the realization of initial high tone, initial nasal, and initial high back specification in syllables. Unlike SY, which upholds the high ranking status of ONSET in satisfying the morphemic constraints (IHTS, INS, and IHBS), the constraint *M/COR[r], which is undominated in OY forces ONSET violations in this dialect. Like *M/COR[r], MAX-BK is also undominated in OY, compelling the surface realization of initial high back vowels.

Based on the analysis presented so far, we see that observed dialectal variation follows from different rankings of the same constraints. The principal constraints driving the differences in the syllabicity of vowels in the two dialects are *M/COR[r], DEP, MAX, and ONSET. The rankings established for OY are summarized below:

(64)

Ranking	Reason
PROPHEAD, *M/COR[r] ≫ ONSET	This ranking accounts for the loss of [r] which results in surface violations of onset. Based on this ranking, the minimal syllable requirement is satisfied by a (C) V.
DEP ≫ ONSET	This ranking is required to account for the fact that consonantal insertion is not employed to augment onsetless syllables to CV.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

IHTS, ALIGNLEFT-C, *M/COR[r] ≫ ONSET	The constraint prohibiting initial high tone vowels triggers leftward spreading of a root's initial consonant. [r]-less roots constitute the exception, yielding violation of ONSET.
INS, MAX-NAS, *M/COR[r] ≫ ONSET	Required to account for the presence of nasal vowel-initial words in [r]-less roots.
IHBS, MAX-BK ≫ ONSET	Required to explain the presence of high back vowels word-initially.

4.3 *Distributive reduplication*

Data presented in section 3.4 show that in order to form distributives in SY, prefixal reduplication targets the initial VCV in the word; word-initial unlike VV sequences do not reduplicate, as illustrated in the following data reproduced from (34) and (35) for convenience:

(65) *Distributive reduplication in Standard Yoruba*

(a) VCV-initial noun

Base	Reduplicated form	Gloss	Distributive
òru	òrò-òru	'midnight'	'every midnight'
irọ̀lẹ́	irì-irọ̀lẹ́	'evening'	'every evening'

(b) VV-initial noun: does not reduplicate

oẁúrọ̀	òwò-òwúrọ̀	'morning'	'every morning'
òúrọ̀	*òò-òúrọ *òrò-òúrọ	'morning'	'every morning'

In forming distributives in Ondo, the impossible scenario noted for Standard Yoruba is indeed possible: nouns rendered as VV by the loss of [r] reduplicate in exactly the same manner as VCV nouns. The relevant data appear in (66).[29]

[29] In OY, monomorphemic CVCV nouns do not reduplicate as distributives. One possible explanation for this gap is the observation that C-initial nouns are rare in Ondo. The few forms are possibly borrowings from SY. One piece of evidence that supports this suggestion is that consonant-initial monomorphemic nouns in Ondo also have alternative vowel-initial forms: (i) *fìlà* (*SY*) = *àkòó* (OY) 'cap', (ii) *yàrá* (SY) = *oúpò* (OY) 'room', (iii) *baba* (SY) = *iba* (OY) 'father' or (iv) *bàbá* = *bài* 'father', (v) *fèrèsé* (SY) = *uwólí* (OY) 'window'.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(66) *Distributive reduplication in Ondo Yoruba*

VCV- and VV-initial nouns reduplicate in Ondo

Base	Reduplicated form	Gloss	Distributive
ewé	ewe-ewé	'leaf'	'every leaf'
̀ila	̀il̀i-̀ilà	'line'	'every line'
òu	òò-òu	'midnight'	'every midnight'
ìọ̀lẹ́	ìì-ìọ̀lẹ́	'evening'	'every evening'

The reduplication pattern in (66) is additional proof that there is no phonological contrast between onsetful (CV) and onsetless (V) syllables. As demonstrated repeatedly in OY, syllables with onsets and those lacking onsets in [r]-less words pattern identically, showing that the loss of [r] does not hinder the syllabicity of onsetless vowels. This lack of contrast makes it possible for the reduplicant foot to be expressed as VV or VCV.

From the behavior of distributives in OY, several points about constraints interaction are evident. First, the fact that the second vowel reduplicates as a syllable in VV sequences means that μ-to-σ is high ranking in OY, unlike the Standard dialect where this same constraint is lower-ranked. Second, the fact that the reduplicant can be expressed as VV or VCV means that DISTFOOT can be bimoraic or disyllabic. Thus, the Standard Yoruba-type alignment constraints are not enforced in obtaining the surface form in Ondo. Third, prohibition against epenthesis establish the dominance of DEP. Fourth, the dominance of CONTIGUITY is shown by the fact that skipping is forbidden. (67) illustrates the ranking of these constraints.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

(67) DIST, LINKμ-σ, CONTIGUITY, DEP >> MAX-BR, ONSET

RED-ìọlẹ́	DIST	μ-σ	CONT	*M/COR	DEP	MAX	ONSET
(a) Ft σ μ μ ì- ìọlẹ́						***	****
(b) Ft σ σ μ μ ì l ì- ìọlẹ́			*!			**	***
(c) Ft σ σ μ μ ì r ì- ìọlẹ́				*!		***	***
(d) Ft σ σ μ μ ì h ì- ìọlẹ́				*!		***	***

In (67), the high ranking of CONTIGUITY excludes (b); higher-ranked *M/COR[r] rules out (c); and undominated DEP violation results in the rejection of (d). Optimal (a) demonstrates the high ranking status of these constraints, as they are all satisfied by it.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

4.4 *Total loss of* [r] *or covert segment?*

The account of syllables in OY presented so far assumes that [r] is devoid of any surface specification, featural or root node. Thus, even though [r]-less syllables behave as if they have onsets, they are analyzed as lacking onsets. One issue that might arise concerns the possibility of positing a ghost or covert segment in [r]-less forms to capture the observed symmetrical characteristics of [r]-less syllables and syllables with overt onsets.

Vowel hiatus resolution provides a good source of evidence to confirm or dismiss this possibility. Consider data showing verbal [rí] infixation in SY and OY in (68). In the input configuration, a hiatus context is created between the vowel of the infix and the vowel of the following noun:[30]

(68) (a) *Standard Yoruba*

Input	Output		
ojú-rí-ojú	ojúrójú	*ojóróju	'eye-see-eye lit'
oṣù-rí-oṣù	oṣùróṣù	*oṣòróṣu	'month-see-month lit'
ẹ̀mí-rí-ẹ̀mí	ẹ̀míṛ́mìí	*ẹ̀míṛ́mìí	'spirit-see-spirit lit'

(b) *Ondo Yoruba*

ojú-í-ojú	ojóójú	'eye-see-eye lit'
oṣù-í-oṣu	oṣòóṣù	'month-see-month lit'
ẹ̀mí-í-ẹ̀mí	ẹ̀mẹ̣mi	'spirit-see-spirit lit'

In (68a), vowel deletion applies to remove the hiatus in SY. In the corresponding OY forms on the other hand, vowel hiatus resolution involves two processes: deletion and assimilation. First, deletion eliminates the hiatus between the verbal infix and its object: *ojú í oju* → *ojú ´ oju*; second, regressive assimilation applies between the non-identical adjacent vowels, as follows: *ojóóju*. If a covert consonant is present between these vowels, assimilation ought to be blocked the same way an overt [r] renders assimilation impossible in the SY examples (*ojú rí oju* → *ojúróju*, not **ojóróju*). What all of this shows is that [r] is not covertly present in OY; if it were, it should be phonologically functional, preventing transconsonantal vowel assimilation.[31]

4.5 *Exhaustive syllabification in Ondo Yoruba*

To recapitulate, we have seen that vowels, with or without preceding onsets, behave as phonological syllables in the morpho-phonemics of OY. In Ondo dialect, unlike in Standard, CV and V do not contrast phonologically. To

[30] As in Standard Yoruba, the vowel of the verb tends to delete in the general pattern. However, at times, it is the vowel of the noun that deletes. On vowel deletion in SY, see among others Ward (1952), Bamgbose (1967), Oyelaran (1971) and Pulleyblank (1988), and on OY deletion, see Adetunji (1988).

[31] On intrusive ghost segments and vowel processes, see Clements & Keyser's (1983) discussion of French h-aspiré, and Marlett & Stemberger's (1983) discussion of Seri empty onsets.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

explain the identical behavioral properties, I proposed that all vowels syllabify in OY regardless of whether or not they have onsets. Phrased in exhaustivity terms, in OY, all vowels are parsed into syllables. Under the exhaustive parsing approach, adopted in the OT analysis in this paper, the structural representations of syllables in OY are as given below:

(69) (a) *Onsetful syllable* (b) *Onsetless syllable*



Thus, the difference between Standard and Ondo Yoruba is that onsetless vowels are syllabified in the latter, while in the former, they are moraically licensed, not syllabified. This structural divergence captures the observed symmetric and asymmetric characteristics of onsetless vowels in the two dialects.

Summarizing the major points of the analysis, the two dialects investigated show variation for the syllabicity of onsetless vowels that follows from the different rankings of the same constraints. In SY, onset-sensitive phenomena like the minimal word constraint, truncation, the morpheme structure constraints, and reduplication require the presence of an unmarked syllable, thus compelling surface violations of constraints such as *M/COR[r], DEP, MAX-NAS, MAX-BK, and the like. In OY, higher-ranked *M/COR[r], DEP, and MAX-BK compel surface violations of ONSET, giving rise to syllables lacking onsets in this dialect.

5. Alternative hypotheses

Thus far, phonological syllabification has been analyzed as either exhaustive (Ondo) or non-exhaustive (Standard Yoruba). I have argued that observed typological variation in the syllabicity of onsetless vowels follows in OT from different rankings of the same constraint. At the center of this hypothesis is the claim that ONSET is undominated in SY and that the same constraint is dominated and violable in OY. In spite of the low ranking status of ONSET in OY, its effects were seen in some contexts. For example, except for cases involving [r]-less roots, a high tone prefix is always expressed as /Cí/, demonstrating the importance of onset in the satisfaction of IHTS.

An alternative account of this typological variation in a pre-Optimality is to set up different syllabification algorithms for SY and OY. Since onset appears to be the differentiating factor, this algorithm would be built around the Onset Principle. For example, in Ọla's (1993) analysis, the exceptionality

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

of onsetless syllables in SY was proposed to follow from the fact that the Onset Principle is strongly enforced, so strongly enforced that vowels without onsets are prevented from syllabifying into syllables. Following the same line of reasoning, one could say that the symmetrical behavior of onsetless syllables in OY is a consequence of the weakening of the Onset Principle, making it possible for vowels to syllabify with or without onsets. This type of analysis raises some questions, questions that cannot be easily answered in pre-Optimality phonological theory. First, what drives the obligatory satisfaction of the Onset principle in one dialect and not in the other? Second, what does it mean to be strongly invoked or weakened in formal terms? There are no obvious answers to these questions in standard generative phonology, as it has no formal mechanism for integrating observed typological divergence into an analysis.

Another possible analysis of this variation is that of parameterized-based theories. In a parameterized-based approach (Paradis 1988a, b; Kaye 1989, among others), the interdialectal diversity would be analyzed as a 'yes' or 'no' type parameter setting assigned to the ONSET constraint.

(70) Parameterized ONSET satisfaction

Yoruba Dialect	ONSET
(a) Standard	YES
(b) Ondo	NO

Under this analysis, the fact that an onset is required for syllabification in SY means that the constraint ONSET is switched 'on', while the syllabicity of vowels with and without onsets means that ONSET is turned 'off'. There is a major problem facing this type of account–accounting for why some syllables have onsets in the dialect where ONSET is supposedly turned 'off'. For example, except for cases involving [r]-less roots, in forming gerunds using a high tone prefix in OY, it was shown that the root's initial consonant spreads leftward prevocalically to avoid a violation of the constraint prohibiting initial high tone onsetless syllables in Yoruba. What this shows, then, is that even in OY, syllables must have onsets if they can without violating undominated *M/COR[r] or DEP.

6. Conclusion

This paper has examined syllabification in two dialects of Yoruba, focusing on the properties of onsetless vowels. Two patterns are attested. First, there is a scenario, observed in Standard Yoruba, where vowels act as syllables only when they have onsets. The second situation, demonstrated by Ondo Yoruba, involves a case where onsetless vowels behave as syllables. Observed

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

divergence in the syllabicity of vowels is obtained by the variable ranking of the syllable constraint, ONSET, and μ-to-σ, the constraint governing the incorporation of moras into syllables. In SY, absolute onset requirement is achieved by ranking ONSET above μ-to-σ: based on this ranking, all syllables must have onsets; onsetless moras are unsyllabified because being unsyllabified is better than lacking an onset. In Ondo, the syllabicity of onsetless vowels is derived by inverting the ranking established for Standard Yoruba: obedience to μ-to-σ is important, even at the cost of ONSET violation.

(71) (a) Standard Yoruba: non-exhaustive syllabification: ONSET $\gg$ μ-to-σ.
(b) Ondo Yoruba: exhaustive syllabification: μ-to-$\sigma \gg$ ONSET.

The satisfaction or violability of ONSET in Standard and Ondo Yoruba is enhanced by the interaction of *M/COR[r] and DEP with ONSET. In Ondo, consonants that have place specifications are licensed in onset position; so, ONSET must be satisfied when such consonants occur prevocalically. On the other hand, underspecified [r] and placeless [h] are non-optimal onsets; in this situation, it is better to be onsetless than to have [r] or epenthetic [h] as onset. On the contrary, because of the undominated status of ONSET in SY, this dialect would rather have [r] or [h] as onsets than be onsetless. The relevant ranking is given below:

(72) (a) Standard Yoruba: ONSET $\gg$ *M/COR[r], DEP.
(b) Ondo Yoruba: *M/COR[r], DEP $\gg$ ONSET.

In spite of the low ranking of ONSET in Ondo, its effect is visible when not overshadowed by higher-ranked *M/COR[r] and DEP. For example, obedience to ONSET is compulsory in forming high tone gerundives in SY and OY, given the high ranking of IHTS and ALIGN-LEFT-CPLACE. However, the forms beginning with [r] constitute the exception in Ondo because of undominated *M/COR[r]; in the Standard dialect, there are no exceptions, as *M/COR[r] is violable when ONSET satisfaction is at stake:

(73) (a) Standard Yoruba: absolute onset satisfaction: ONSET, IHTS, ALIGNL-C $\gg$ *M/COR[r].
(b) Ondo Yoruba: relative onset violation: *M/COR[r], IHTS, ALIGNLEFT-C $\gg$ ONSET.

Finally, this analysis supports one of the central claims in Optimality Theory, namely, that interlinguistic variation is a consequence of different rankings of universal constraints. This idea is illustrated in Standard and Ondo Yoruba by ranking the same set of constraints differently in each dialect. This mechanism captures the typological identity and divergence expressed in the syllabification patterns of examined dialects and thus provides an insightful analysis of comparative Yoruba syllable systems.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

REFERENCES

Adetunji, Olukẹmi (1988). Agbeyẹwo sintaasi ọrọ-orukọ ninu ẹka-ede Ondo, B. A. Degree Long Essay, University of Ilọrin, Ilọrin.

Akinlabi, Akinbiyi (1984). *Tonal underspecification and Yoruba tones*, Ph.D. dissertation, University of Ibadan, Ibadan.

Akinlabi, Akinbiyi (1991). Supraglottal deletion in Yoruba glides. *Proceedings of the Tenth West Coast Conference on Formal Linguistics*. Stanford, CA: Center for the Study of Language and Information. 13–26.

Akinlabi, Akinbiyi (1993). Underspecification and the phonology of Yoruba /r/. *Linguistic Inquiry* **24**. 139–160.

Akinlabi, Akinbiyi (1996). Featural affixation. *Journal of Linguistics* **32**. 239–289.

Alderete, John, Beckman, Jill, Benua, Laura, Gnanadesikan, Amalia, McCarthy, John & Urbanczyk, Suzanne (1997). Reduplication and segmental unmarkedness. Ms., University of Massachusetts, Amherst.

Awobuluyi, Ọladele (1978). *Essentials of Yoruba grammar*. Ibadan: University Press.

Bagemihl, Bruce (1991). Syllable structure in Bella Coola. *Linguistic Inquiry* **22**. 589–646.

Bamba, Moussa (1991). *De l'interaction entre tons et accent*. Ph. D. dissertation, Université du Québec à Montréal, Montréal.

Bamgbose, Ayọ (1967). *A short grammar of Yoruba*. Ibadan: Heinemann Educational Books.

Buller, Barbara, Buller, Ernest & Everett, Daniel (1993). Stress placement, syllable structure and minimality in Banawá. *International Journal of American Linguistics* 59. 280–293.

Clements, George & Keyser, Samuel (1983). *CV phonology*. Cambridge, MA: MIT Press.

Crowhurst, Megan (1996). An optimal alternative to conflation. *Phonology* **13**. 409–424.

Davis, Stuart (1988). Syllable onsets as a factor in stress rules. *Phonology* **5**. 1–19.

Downing, Laura (1993). Unsyllabified vowels in Aranda. *Chicago Linguistic Society* **29**. 171–185.

Downing, Laura (1998). On the prosodic misalignment of onsetless syllables. *Natural Language and Linguistic Theory* **16**. 1–52.

Fọlarin, Yetunde (1987). *Lexical phonology of Yoruba nouns and verbs*. Ph.D. dissertation, University of Kansas, Lawrence.

Guerssel, Mohammed (1986). Glides in Berber and syllabicity. *Linguistic Inquiry* **17**. 1–12.

Hayes, Bruce (1989). Compensatory lengthening in moraic phonology. *Linguistic Inquiry* **20**. 253–305.

Hewitt, Mark (1994). Deconstructing foot binarity. Ms., University of British Columbia, Vancouver.

Hyman, Larry (1990). Non-exhaustive syllabification: evidence from Nigeria and Cameroon. *Chicago Linguistic Society* **26**. 175–196.

Itô, Junko (1986). *Syllable theory in prosodic phonology*. Ph. D. dissertation, University of Massachusetts, Amherst.

Itô, Junko (1989). A prosodic theory of epenthesis. *Natural Language and Linguistic Theory* **7**. 217–259.

Itô, Junko & Mester, Armin (1992). Weak layering and word binarity. Ms., University of California, Santa Cruz.

Jakobson, Roman (1962). *Selected writings 1: phonological studies* (2nd edn.). The Hague: Mouton.

Kaye, Jonathan (1989). *Phonology: a cognitive view*. New Jersey: Lawrence Erlbaum Associates Publishers.

Kirchner, Robert (1993). Turkish vowel disharmony. Paper presented at the Rutgers Optimality Feature Workshop 1, New Brunswick, New Jersey.

Marlett, Stephen & Stemberger, Joseph (1983). Empty consonants in Seri. *Linguistic Inquiry* **14**. 617–639.

McCarthy, John & Prince, Alan (1986). Prosodic morphology. Ms., University of Massachusetts, Amherst and Brandeis University.

McCarthy, John & Prince, Alan (1993a). Prosodic morphology I: constraint interaction and satisfaction. Ms., University of Massachusetts and Rutgers University.

McCarthy, John & Prince, Alan (1993b). Generalized alignment. Ms., University of Massachusetts, Amherst and Rutgers University.

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press

McCarthy, John & Prince, Alan (1994a). An overview of prosodic morphology, Parts 1 and 2. Talks at Utrecht Prosodic Morphology Workshop.
McCarthy, John & Prince, Alan (1994b). The emergence of the unmarked: optimality in prosodic morphology. To appear in Beckman, Jill, Urbanczyk, Suzanne & Walsh, L. (eds.) *University of Massachusetts Occasional Papers in Linguistics* **18**. Amherst: Graduate Linguistic Student Association.
McCarthy, John & Prince, Alan (1995). Reduplicative identity. To appear in Kager, Rene, van der Hulst, Harry and Zonneveld, Wim (eds.), *Proceedings of the OTS/HIL Workshop on Prosodic Morphology*.
Odden, David (1995). The status of onsetless syllables in Kikerewe. *Ohio State University Working Papers in Linguistics* **47**. 89-110.
Ọla, Ọlanikẹ (1993). Non-exhaustive syllabification in Yoruba. Paper presented at the 24th Annual Conference in African Linguistics, The Ohio State University, Columbus, July 23–25, 1993.
Ọla, Ọlanikẹ (1994b). Moraic mismatches: evidence for the nuclear moraic model. Paper presented at the Canadian Linguistics Association Conference, University of Calgary, Calgary, June 3–6, 1994.
Ọla, Ọlanikẹ (1995). Properheadedness and binarity: prosodic words in Yoruba. In Akinlabi, Akinbiyi (ed.), *Theoretical Approaches To African Linguistics* **1**. 273–293.
Orie, Ọlanikẹ Ọla (1997). *Benue-Congo prosodic phonology and morphology in optimality theory*. Muchen: Lincom Europa.
Oyelaran, Ọlasope (1971). *Yoruba phonology*. Ph. D. dissertation, Stanford University, California.
Paradis, Carole (1988a). On constraints and repair strategies. *The Linguistic Review* **6**. 71–97.
Paradis, Carole (1988b). Toward a theory of constraint violation. *McGill Working Papers in Linguistics* **5**. 1–44.
Piggott, Glyne (1995). Epenthesis and syllable weight. *Natural Language and Linguistic Theory* **13**. 283–326.
Prince, Alan & Smolensky, Paul (1993). Optimality Theory: constraint interaction and satisfaction. Ms., Rutgers University and University of Colorado at Boulder.
Pulleyblank, Douglas (1986). *Tone in Lexical Phonology*. Dordrecht: Reidel.
Pulleyblank, Douglas (1988). Vocalic underspecification in Yoruba. *Linguistic Inquiry* **19**. 233–270.
Pulleyblank, Douglas (1993). Vowel harmony and Optimality Theory. In *Proceedings of the Workshop on Phonology*. Associação Portugesa de Linguística, University of Coimbra, Portugal. [1–8.]
Pulleyblank, Douglas (1994). Underlying mora structure. *Linguistic Inquiry* **25**. 344–353.
Selkirk, Elisabeth (1980). The role of prosodic categories in English word stress. *Linguistic Inquiry* **11**. 563–605.
Shaw, Patricia (1992). Templatic evidence for the syllable nucleus. To appear in *North East Linguistic Society* 23. Amherst: Graduate Linguistic Student Association.
Spring, Cari (1991). *Implications of Axininca Campa for prosodic morphology and reduplication*. Ph. D. dissertation, University of Arizona, Tucson.
Steriade, Donca (1982). *Greek prosodies and the nature of syllabification*. Ph. D. dissertation, MIT.
Urbanczyk, Suzanne (1996). *Patterns of reduplication in Lushootseed*. Ph. D. dissertation, University of Massachusetts, Amherst.
Ward, Ida (1952). *An introduction to the Yoruba language*. Cambridge: W. Heffer & Sons.
Zec, Draga (1988). *Sonority constraints on prosodic structure*. Ph. D. dissertation, Stanford University, California.

Author's address: *Department of Anthropology,*
Tulane University,
1021 Audubon Street,
New Orleans, LA 70118,
U.S.A.
E-mail: oorie@mailhost.tcs.tulane.edu

https://doi.org/10.1017/S0022226799008130 Published online by Cambridge University Press