AN OPTIMALITY THEORETIC STUDY OF THE SYLLABLE STRUCTURE AND TYPOLOGY OF YORÙBÁ NOMINALS

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Abstract

This paper analyzes the syllable structure and typology of non-derived Yorùbá nominals within the framework of Optimality Theory. The objectives of the study are to determine the preferred syllable structure and typology attested in Yorùbá and state the reason for such preference in the language. The study adopted the qualitative research methodology, and the data, collected from selected native speakers of Yorùbá, using the Ibadan wordlist, were content analyzed. The paper established that non-derived Yoruba nominals that allow onsets keep them simple due to the higher-ranking status of the constraint *COMP-ONS in the language. The study also found out that an inter-vocalic consonant in non-derived Yoruba nominals is optimally syllabified as an onset to the next syllable rather than as a coda to the preceding one due to the higher-ranking status of *CODA in the language. Thus, the paper concluded that the preferred syllable structure in Yorùbá is CV, and that the language operates the open syllable typology, as attested in the literature. The paper recommends the continuous application of Optimality Theory to African language data in order to ensure that the languages are scientifically researched with extant contemporary linguistic theories.

Keywords: Syllable structure, Yorùbá, nominals, Optimality Theory, constraints, consonant, typology

1. Introduction

Yorùbá scholars such as Bámgbóṣé (1990), Orie (2000), Owólabí (2011) and Arokoyo (2016) have extensively analysed and described the syllable structure and typology of Yorùbá. However, none of the extant studies (to the best knowledge of the researchers) has been specifically devoted to the analysis and description of the syllable structure and typology of Yorùbá nominals within the framework of a constraint-based model of universal grammar known as Optimality Theory (OT). There is also no theoretically convincing reason posited in the literature why Yorùbá subscribes to simple, one consonant onsets and open syllable typology in its grammar other than the general claim that such preference is governed by the phonotactic requirements of the language. In linguistic theorising, it is customary to justify the empirical facts of a language on theoretical grounds. That is, significant generalizations made about a language are entrenched within the scope or tenets of a relevant theoretical framework.

The shapes of syllables in individual languages are generally governed

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by the interaction of universal constraints whose rankings are language specific. Thus, the most suitable approach to the study of the syllable and the principle of syllabification is a constraint-based one. Interestingly, one of the phonological phenomena which have benefitted immensely from the advent of constraint-based theories, especially Optimality Theory, is the syllable. In fact, syllabification has played a central role in establishing Optimality Theory and, in turn, the theory has contributed to a better understanding of the role of the syllable (McCarthy & Prince, 1993; Prince & Smolensky, 2004).

This paper draws on the insights of OT in analysing the syllable structure and typology of non-derived Yorùbá nominals (NYN). Specifically, it aims at explaining why Yorùbá prefers simple, one consonant onsets and open syllable typology, using OT, whose major goal is the synchronisation of the description and explanation of individual languages with the aid of universal constraints whose rankings are language specific (McCarthy, 2002). Within this purview, the paper seeks to provide answers to three principal questions: (1) What is the preferred syllable structure and typology of NYN? (2) What is the motivation for such preference in the language? (3) What are the hierarchy of markedness and faithfulness constraints that govern the syllabic well-formedness of NYN? In OT, syllabic well-formedness is a product of conflict resolution between markedness (well-formedness) and faithfulness (correspondence) constraints. The present study, therefore, aims at justifying this theoretical assumption in relation to the well-formedness of syllabic parses of various categories of NYN.

Generally, nominals are grammatical categories that relate to nouns or word groups that function as nouns. Yorùbá nominals can be broadly categorised into two: non-derived nominals and derived nominals. However, this paper focuses only on non-derived nominals which are nouns in the language and which have not undergone any grammatical process, e.g., phonological, morphological or syntactic. In other words, they are basic nouns in the language which are non-derived, but from which other nouns and noun phrases can be derived. Examples of NYN are given below:

(1)	òkúta	[òkúta]	‘stone’
	irọ́	[irɔ́]	‘lie’
	olè	[olè]	‘thief’
	bàtà	[bàtà]	‘shoe’
	bàbá	[bàbá]	‘father’

The Yorùbá language belongs to the West Benue-Congo of the Niger-Congo phylum of African languages (Williamson & Blench, 2000). It is one of the three major indigenous languages spoken in the south-western region of Nigeria (Arokoyo & Lagunju, 2019). Apart from Nigeria, Yorùbá is also spoken in Togo, Republic of Benin, Ghana, Sudan, Sierra-Leone and Cote d’Ivoire. Outside Africa, a great number of speakers of the language reside in Brazil, Cuba, and Trinidad and Tobago (Fabunmi & Salawu, 2005).

2. The Syllable

The syllable is a fundamentally important unit both in phonetics and in phonology; every language has syllables, and babies learn to produce syllables before they are able to say a word of their language (Roach, 2000). Matthews (2007, p. 394) defines the syllable as "a phonological unit consisting of a vowel or other unit that can be produced in isolation, either alone or accompanied by one or more less sonorous units". The syllable is a unit that is larger than the segments (consonants and vowels) – it is basically composed of a vowel plus one or more consonants. Because they operate at a level higher than segments, syllables are usually referred to as phonological suprasegmentals.

Sonority, the relative loudness of a sound compared to others, is the defining feature of the syllable. Giegerich (1992, p. 134) says that syllables "are associated with peaks in sonority in such a way that in a given string of phonemes, every syllable corresponds to a sonority peak". Thus, every syllable has a sonority peak, which is usually a vowel because vowels are the most sonorous sounds. However, it is possible for consonants such as nasals, laterals and glides to function as sonority peaks (Abiodun, 2010). The syllable has an internal structure which is composed of an onset and a rhyme; the rhyme, in turn, consists of a nucleus and a coda (Czaykowska-Higgins, Dobrovolsky & Katamba, 2011). The only obligatory component of the syllable's internal structure is the nucleus. Onset and coda, which may be made up of one or more consonant segments, are the peripheral parts of the syllable (Egbokhare, 1994).

According to Kager (1999), typological studies of syllable structure have revealed solid cross-linguistic preferences for certain syllable types. A number of studies have shown that languages generally prefer the syllable type which begins with a consonant (C) and ends with a vowel (V), that is, the CV typology (Jakobson, 1962; Malmberg, 1963; Kager, 1999). In fact, Kager (1999, p. 95) opines that CV is the "perfect" syllable shape while all the remaining shapes are "less perfect" in that they have a coda, or lack an onset, or have both defects. He maintains that whereas all languages allow an onset, lack of coda is preferred to its presence across languages. This again entrenches the preference of languages for the CV syllable structure. Hence, this paper argues that the CV shape is the optimal syllable structure cross-linguistically; and that shapes such as VC, CCV, CCCV, CVC, CVCC, VCCC, and a host of others are less natural. However, this does not rule out the fact that there are languages which attest them. The crucial point here is that no languages are known that disallow onsets generally in their syllables; and no languages are known in which all their syllables have codas only (Kager, 1999). A syllable ending in a vowel is called an open syllable while the one terminating in a consonant is known as a closed syllable (Matthews, 2007). Open syllables are universally unmarked whereas closed syllables are universally marked.

Bámgbóṣé (1990) and Owólabí (2011) posit three types of syllable structure in Yorùbá: (i) a syllable composed of a single Vowel (V); (ii) a

syllable consisting of a Consonant and a Vowel (CV); and (iii) a syllable having a nasal consonant as its peak or nucleus (N). The following examples are used to illustrate the three patterns:

(2) adé [adé] (= a – dé) 'crown'
V CV

èédú [èédú] (= è – é – dú) 'charcoal'
V V CV

garawa [garawa] (= ga – ra – wa) 'bucket'
CV CV CV

gbòǹgbò [gbòǹgbò] (= gbò – ǹ – gbò) 'root'
CV N CV

Bámgbóṣé [bámgbóṣé] (= Bá – m – gbó – ṣé) 'name of someone'
CV N CV CV

Like several other scholars, both Bámgbóṣé (1990) and Owólabí (2011) establish the fact that tone is the determinant factor in ascertaining the number of syllables contained in a Yorùbá word. Owólabí (2011) asserts that the number of tones (the prosodic units which are used to contrast lexical and grammatical meanings) in a word will determine the number of syllables the word is composed of. For instance, a word in which only one tone is realized is monosyllabic; whereas a word having two tonal specifications is bisyllabic, etc., as exemplified in (3):

(3) gé [gé] (one tone (high) = one syllable) 'to cut'
bàtà [bàtà] (two tones (Low-Low) = two syllables) 'shoe'
koríko [koríko] (three tones (Mid-High-Mid) = three syllables) 'grass'

Similarly, Bámgbóṣé (1990) says that the difference between the syllabic nasal consonant (represented by the symbol 'N') and other nasal consonants in the language is that the former must bear tone. Furthermore, Owólabí (2011) observes that no syllable terminates in a consonant in Yorùbá, and no syllable structure which allows onset in the language has more than one onset consonant. In other words, Yorùbá operates only an open syllable typology and disallows complex onset consonants in its grammar.

This paper aligns with the position generally taken in the literature that Yorùbá's preference for simple, one consonant onsets and open syllable typology in its grammar is governed by the phonotactic requirements of the language. However, this reason is not theoretically convincing enough, as it begets two questions: (1) Why do the phonotactic principles of Yorùbá allow some syllables to begin with an onset while others lack it? (2) Why do the phonotactic principles of Yorùbá forbid words from ending in consonants and yet there are words such as *irun* [irũ] 'hair', *irin* [irĩ] 'iron', *ẹran* [ɛrã] 'meat', etc. in the language which terminate in an alveolar nasal consonant /n/ in the orthography but do not surface in the phonetic form? A more theoretically convincing explanation for Yorùbá's preference for such syllable structure and typology can be given within the ambit of a surface-based or

output-oriented grammatical model in which the grammar of every language is analysed as a system of universal but violable constraints, rather than an embodiment of inviolable and idiosyncratic phonotactic rules. It is thus necessary to employ OT in this study to resolve this puzzle.

3. Theoretical Framework

The theoretical framework adopted for this study is Optimality Theory, a grammatical model developed by Prince and Smolensky (1993). OT is a constraint-oriented linguistic model which proposes that the observed forms of language arise from (or are a product of) optimal satisfaction of conflicting constraints (Kager, 1999). According to McCarthy (2002, p. 3), "OT is not operational, rule-based, or transformational; rather, it is comparative: it compares candidates in a set with respect to a given input by applying a hierarchy of violable constraints." This is done with the help of three crucial components: Constraint set (CON), Generator (GEN) and Evaluator (EVAL) (Prince & Smolensky, 1993; Kager, 1999; McCarthy 2002, 2008).

The CON component contains the entire repertoire of constraints that are linguistically universal. GEN then produces a candidate set from an input that is made available by the lexicon, and the candidate set is submitted to EVAL to determine the optimal candidate. Finally, EVAL chooses the optimal candidate by applying a language-particular constraint hierarchy to the set of candidates (McCarthy, 2008). In OT parlance, the optimal candidate is the output form which incurs the least serious violations of the constraint hierarchy. In the context of a given language, the optimal candidate is termed as the "actual output of the grammar" (Kager, 1999, p. 21) or the "grammatically well-formed structure" (Prince & Smolensky, 2004, p. 3). The systemic relationship between the functions of GEN and EVAL abstracted from McCarthy (2008) is shown in (4):

(4) /input/ → {cand$_{1,}$ cand$_{2,}$ ...} → EVAL → [output]

One of the core tenets of OT is the assumption that constraints are innate, universal and violable although violations must be minimal (Bennett, 2016). This assumption is true for all the grammars of the world's languages; the only difference among grammars is the relative ranking of the constraints. OT also assumes that constraints are intrinsically in conflict (Kager, 1999; McCarthy, 2002, 2008; Prince & Smolensky, 2004). Pulleyblank (1997, p. 101), however, says that "the conflict is resolved in each language by assigning particular rankings to the conflicting constraints, and the range of possible rankings produces the rich diversity that is observed in the phonological systems of the world's languages."

OT is strictly a surface-based or output-oriented theory in that no constraints directly evaluate input representations (Bermúdez-Otero, 2006). In other words, no structural conditions are placed on the input or underlying representation; rather, faithfulness and markedness constraints evaluate the well-formedness of surface forms only. Faithfulness constraints evaluate the output's relative identity or resemblance with the input while markedness

constraints evaluate the well-formedness of the output without any regard to input specifications.

The OT approach employed in this work focuses on addressing the ranking problem, which characterizes the relevant constraints that produce the optimal (that is, the actual) syllabic parses of various categories of basic nominals in Yorùbá. In the words of McCarthy (2008, p. 48), "the ranking problem arises whenever we are trying to analyze some data: the winners are known because they are the data of the language, and we are trying to figure out a ranking that will account for the data". Thus, as far as the ranking problem is concerned, the winner is already known ahead of the analysis of some given data; the task therefore is to unravel the constraint hierarchy (i.e., the ranking permutations) which will produce the winner, that is, the optimally observable form. In a nutshell, identifying the particular ranking which justifies the choice of the winner solves the ranking problem.

In the OT literature, three tableau formats are proposed: violation tableaux, comparative tableaux and combination tableaux. The violation tableaux, which focus on constraint violations, were proposed by Prince and Smolensky (1993). Prince (2002) introduced the comparative tableaux, which focus on favouring relations between winner and loser(s) while the combination tableaux include information about violations as well as the Winner (W) and Loser (L) annotations of the comparative tableaux (McCarthy, 2008). Because the combination tableau format is usually more informative than the other two, and is best suited to account for the ranking problem, it is the one that is used in this study. Violations of constraints by candidates are indicated in each tableau using asterisks (stars) while an arrow is used to refer to the winning candidate.

The following constraints (adapted from Kager (1999) and McCarthy (2008)) are employed in this study:

(5) a. ONSET: Syllables must have onsets.

b. NO-CODA (*CODA): Syllables must be open.

c. *COMPLEX-ONSET (*COMP-ONS): Tautosyllabic cluster of onsets is prohibited.

d. *C^{unsyll}: Avoid unsyllabified consonant.

e. MAX: Input segments must be maximally represented in the output; hence, deletion is prohibited.

f. DEP: Output segments must have input correspondents; hence, no epenthesis.

g. *V#: A phonological word must not end in a vowel.

4. Methodology

This study adopted the qualitative research methodology both for its data collection and analysis. According to Fawole, Egbokhare, Itiola, Odejide and Olayinka (2006, p. 6), "Qualitative research involves collection of narrative

data in a natural setting in order to gain insights into phenomena of interest." Explaining further, Fawole et al. (2006) claim that the most common methods of data collection in qualitative research include observations, interviews and focus group discussions, for the purpose of guiding and supporting construction of hypothesis. By and large, qualitative research is usually undertaken to generate new ideas or information that can serve as a basis for definition of variables or development of theories (Jegede, 2006). Using age and years of residence at the study area as criteria for selecting the participants for the study, data were collected from four (4) native speakers of Yorùbá within the age bracket 35-60 years and who have been residing in the south-western region of Nigeria since birth. The rationale behind using these two criteria for the selection of the participants was borne out of the fact that the older generation of a language's speakers who have stayed long in the natural setting where the language is spoken would provide authentic data. Similar studies that have used these criteria are Rabo (2018) and Adekunle (2019). The instrument for data collection was the Ibadan wordlist which consists of 400 basic English lexical items whose semantic equivalents were provided in Yorùbá by the selected participants. The adopted wordlist is a research instrument produced by the Department of Linguistics and African Languages at the University of Ibadan in Nigeria. What is peculiar about the wordlist is that it contains lexical items whose semantic equivalents are basic or evident in every natural language; the words include parts of the body, kitchen utensils, numerals, general terms, simple verbs, among others. In addition to this method of data collection, some data were also supplied by the researchers owing to the fact that they are native speakers of the language.

Giegerich (1992) has asserted that speakers of a language hardly have difficulty in determining the number of syllables a given word in their language contains. In this light, the participants of this study were asked to syllabify some of the words (nominals) so as to test their competence in recognizing syllable boundaries within Yorùbá words. More importantly, their performance in the given task formed the basis for the theoretical generalisations made in this study about the syllabification of Yorùbá words. The data were subjected to content (descriptive) analysis within the chosen framework – OT. This was done by presenting the data first, followed by some descriptive generalisations, then visual presentation of the analysis using tableaux, and, finally, explanatory discussions of the information displayed in each tableau.

5. Data Presentation and Analysis

The focus in this section is on four categories of NYN: Initial onset-less bi-syllabic nominals, onset-filled bi-syllabic nominals, initial onset-less tri-syllabic nominals and onset-filled tri-syllabic nominals.

5.1 Initial Onset-less Bi-syllabic Nominals

These are bi-syllabic nominals whose first syllable does not begin with an onset, as exemplified in (6).

	Underlying form	Surface form	
(6)	/orí/	[o.rí]	'head'
	/irũ/	[i.rũ]	'hair'
	/ɔmɔ/	[ɔ.mɔ̃]	'child'
	/irɔ/	[i.rɔ]	'lie'
	/olè/	[o.lè]	'thief'
	/àjè/	[à.jè]	'space'
	/ilá/	[i.lá]	'okra'
	/àrṹ/	[à.rṹ]	'disease'
	/ife/	[i.fe]	'cup'
	/ɛbɔ/	[ɛ.bɔ]	'sacrifice'

The descriptive generalizations about the syllable structure of the data in (6) are provided in (7):

(7) Descriptive generalizations for onset-less bi-syllabic nominals.

a. An inter-vocalic consonant is optimally syllabified as an onset to the second syllable rather than as a coda to the first.
b. Onsets are not obligatory.
c. Unsyllabified consonants are prohibited.
d. Syllables cannot end in consonants.
e. Complex onsets are disallowed.

According to McCarthy and Prince (2001, p. 14), "the function GEN produces a candidate set of syllabic parses for each unsyllabified input." The candidate set is then assessed by the function EVAL in order to figure out the syllabic parse that is maximally harmonic with the most fundamental structural principles of syllabification in conjunction with the constraint hierarchy that is favoured in the grammar of a given language. In this light, examples from the given data are selected for analysis as follows:

(8) /orí/ → [o.rí] 'head'

The input /orí/ is optimally syllabified as [o.rí], and some candidates are compared with it as shown in the following tableau:

(9) Ranking argument: *CODA, *C^{unsyll}, MAX, DEP >> ONSET

/orí/	*CODA	*C^{unsyll}	MAX	DEP	ONSET
a.→ o.rí					*
b. or.í	*W				*
c. o.r.í		*W			**
d. o.í			*W		**
e. ho.rí				*W	L

With respect to tableau (9), the analysis illustrates that [o.rí] is the only syllabic parse that is maximally harmonic with the most fundamental structural principle of syllabification in Yorùbá, vis-à-vis the given input /orí/, which

requires a single inter-vocalic consonant to be syllabified as an onset to the latter syllable rather than as a coda to the preceding one. Candidate (b) loses out by violating *CODA, a higher-ranked constraint, having syllabified the inter-vocalic central liquid as a coda to the first syllable rather than as an onset to the second. The third candidate fatally violates *C^{unsyll} by not parsing the central liquid [r] into a syllable, while the deletion of the central liquid by the fourth candidate incurs a fatal violation of MAX, a faithfulness constraint which prohibits deletion. The last candidate also loses out for an obvious reason: it introduces the glottal fricative [h] to create an onset for the first syllable, thereby violating the higher-ranked faithfulness constraint DEP. The last item in data (6), repeated here in (10), is analysed below:

(10) /ɛbɔ/ → [ɛ.bɔ] 'sacrifice'

On the basis of the input /ɛbɔ/, the optimal syllabic parse is [ɛ.bɔ], ruling out any potential competing output candidate. The ranking argument which produces the winner is presented in (11):

(11) Ranking argument: *CODA, *C^{unsyll}, DEP >> ONSET >> *V#

/ɛbɔ/	*CODA	*C^{unsyll}	DEP	ONSET	*V#
a. →ɛ.bɔ				*	*
b. hɛ.bɔ			*W	L	*
c. hɛ.bɔʔ	*W		**W	L	L
d. ɛh.bɔʔ	**W		**W	*	L
e. ɛ.b.ɔ	*W	*W	**		**
f. ɛb.ɔ	*W			*	*
g. hɛʔ.bɔʔ	**W		***W	L	L

Out of the seven (7) competing candidates with respect to the input /ɛbɔ/ in the tableau presented in (11), only the first wins as a result of its satisfaction of the constraint hierarchy in the best way – at least, better than the rest. The absence of an onset in its first syllable and allowing a word-final vowel could not prevent it from being picked as the optimal syllabic parse for the input since it obeys three higher-ranked constraints: *CODA, *C^{unsyll} and DEP. Candidate (b) fatally violates DEP by introducing [h] which is not originally present in the input although such a move enforces a satisfaction of ONSET which stipulates that every syllable must have an onset. The tableau in (11) also shows that syllable-final consonant insertion comes at two costs: violation of DEP (which prohibits epenthesis) and violation of *CODA, a markedness constraint against syllable-final consonants. Thus, candidates (c), (d) and (g) all violate the two constraints owing to their choice of consonant epenthesis in order to fully satisfy *V#, a constraint militating against open syllables. The failure of candidate (e) to syllabify the inter-vocalic stop [b] forces it to violate *C^{unsyll} whereas candidate (f) violates *CODA by syllabifying it as a coda to the first syllable.

It can be deduced from the tableau in (11) that markedness constraints

*CODA and *V#, antagonists of closed and open syllables respectively, are mirror-images, and that the satisfaction of one implies violation of the other and vice-versa. However, satisfaction of the former takes priority over satisfaction of the latter since the former dominates the latter in the entire grammar of Yorùbá. Finally, notice that the winner and candidates (e) and (f) are segmentally faithful to the input. To this effect, they are the only candidates that satisfy the only faithfulness constraint DEP in the tableau. However, EVAL picks candidate (a) as the winner because the other two candidates violate the higher-ranked markedness constraints *C^{unsyll} and *CODA, respectively. This justifies the priority that markedness constraints have over their faithfulness counterparts in the well-formedness of linguistic forms.

5.2 Onset-filled Bi-syllabic Nominals

These are bi-syllabic nominals in which the syllables begin with an onset. The data in (12) exemplify this.

	Underlying form	Surface form	
(12)	/bàtà/	[bà.tà]	'shoe'
	/bàbá/	bà.bá]	'father'
	/dòdò/	dò.dò]	'fried plantain'
	/fìlà/	[fì.là]	'cap'
	/gbãgã̀/	[gbã̀.gã̀]	'auditorium'
	/kpélé/	[kpé.lé]	'tribal mark'
	/kpákó/	[kpá.kó]	'plank'
	/tòbí/	[tò.bí]	'apron used by women'
	/gèlè/	[gè.lè]	'scarf'
	/ʃíbí/	[ʃí.bí]	'spoon'

The descriptive generalisations of the data in (12) are given in (13).

(13) Descriptive generalizations for onset-filled bi-syllabic Yorùbá nominals.
   a. Syllables can begin with onsets but cannot end with codas.
   b. Complex onsets are disallowed.
   c. Unsyllabified consonants are prohibited.

The first item in data (12) is picked for analysis. The syllabification of the word is given in (14) while the analysis is provided in (15).

(14) /bàtà/ → [bà.tà] 'shoe'

Since the function GEN is free to generate any number of candidates for analyses, the following competitors can be compared with the actual output on the basis of the input, so as to determine the ranking that is responsible for the choice of the optimal candidate: *[bàt.à], *[bà.à], *[bà.ttà], *[bàt], *[b.àt.à], *[bà.t.à], *[b.à.tà] and *[bbà.tà]. For a systematic analysis, the first four candidates are picked and we have the following ranking argument:

(15) Ranking argument: *CODA, *COMP-ONS, MAX, DEP >> ONSET

/bàtà/	*CODA	*COMP-ONS	MAX	DEP	ONSET
a. → bà.tà					
b. bàt.à	*W				*W
c. bà.à			*W		*W
d. bà.ttà		*W		*W	
e. bàt	*W		*W		

The winner, candidate (a), satisfies all the constraints in the tableau in (15) whereas others are ruled out because they all disobey the hierarchy at one point or the other. Candidate (b) loses by syllabifying [t] as a coda to the first syllable, thereby violating the higher-ranked markedness constraint *CODA. Violation of MAX by candidate (c) via deletion of [t] knocks it out as a potential winner. Candidate (d) inserts another [t] to create a complex onset for the second syllable, a move which incurs two violations of DEP (which prohibits insertion) and *COMP-ONS, a markedness constraint which militates against tautosyllabic cluster of onsets. Candidate (e) favours deletion of the final vowel, and this precipitates a serious violation of MAX (which is against the loss of input segments in the output). Worse still, the deletion allows the inter-vocalic alveolar stop [t] to be syllabified as a coda to the first syllable. This, therefore, incurs a fatal violation of *CODA. Notice that ONSET has already been proved as a lower-ranked constraint in the previous arguments. For this reason, it is still ranked below all the other constraints in the tableau even if it is obeyed by the winning candidate.

The other four losing candidates are compared with the winner in (16).

(16) Ranking argument: *CODA, *C^{unsyll}, *COMP-ONS, DEP >> ONSET

/bàtà/	*CODA	*C^{unsyll}	*COMP-ONS	DEP	ONSET
a. → bà.tà					
b. b.àt.à	*W	*W			*W
c. bà.t.à		*W			*W
d. b.à.tà		*W			*W
e. bbà.tà			*W	*W	

Given (16), candidate (a), [bà.tà], wins. Candidate (b) parses the input into three syllables; the first 'pseudo-syllable' (for its lack of nucleus) is ruled out by *C^{unsyll} while the second syllable also violates *CODA for allowing a syllable-final consonant. The next two candidates similarly violate *C^{unsyll} by not parsing the inter-vocalic [t] and the syllable-initial [b], respectively, into a syllable. The last candidate could not also win for its violation of *COMP-ONS, an antagonist of complex onsets.

5.3 Initial Onset-less Tri-syllabic Nominals

These are tri-syllabic nominals whose initial syllable lacks an onset. These are exemplified in (17).

	Underlying form	Surface form	
(17)	/òkété/	[ò.ké.té]	'a specie of big rat'
	/ɔ̀kɛ́rɛ́/	[ɔ̀.kɛ́.rɛ́]	'squirrel'
	/àgbàdo/	[à.gbà.do]	'maize'
	/ɔ̀gɛ̀dɛ̀/	[ɔ̀.gɛ̀.dɛ̀]	'banana'
	/ìdodo/	[ì.do.do]	'navel'
	/ìranũ̀ /	[ì.ra.nũ̀]	'nonsense'
	/abɛ́rɛ́/	[a.bɛ́.rɛ́]	'needle'
	/àkísà/	[à.kí.sà]	'rag'

The generalisations about the data in (17) are made in (18).

(18) a. Onsets are allowed but not obligatory.
b. Complex onsets are not allowed by the syllables that attest them.
c. Syllables cannot end in a coda.

The syllabification of the first item in (17) is shown in (19), and the analysis of the item is presented in (20).

(19) /òkété/ → [ò.ké.té] 'a species of rat'

The winner can be compared with the following losers while the constraints used hitherto are still utilised: *[òk.é.té], *[ké.té], *[ò.két.é], *[ò.kt.é] and *[ò.kté]. Consider the tableau in (20) for the justification of candidate (a) as the winner over the five syllabically ill-formed competing candidates.

(20) Ranking argument: *CODA, *C^{unsyll}, *COMP-ONS, MAX >> ONSET

/òkété/	*CODA	*C^{unsyll}	*COMP-ONS	MAX	ONSET
a. → ò.ké.té					*
b. òk.é.té	*W				*
c. ké.té				*W	L
d. ò.két.é	*W				**
e. ò.kt.é		**W		*W	**
f. ò.kté			*W	*W	*

The analysis in (20) shows the precedence that the first candidate has over the others. Candidates (b) and (d) are segmentally faithful to the input /òkété/ just as candidate (a) is. However, they are ruled out by *CODA. Candidate (b) parses the second syllable's supposed onset as a coda to the first while candidate (d) parses the third syllable's supposed onset as a coda to the second. Deletion of the initial onset-less syllable by candidate (c) violates MAX, although this motivates the satisfaction of ONSET. Candidates (e) and (f) also lose because they violate *C^{unsyll}, COMP-ONS and MAX. Thus,

notwithstanding its violation of the lower ranked markedness constraint ONSET, candidate (a) emerges as the winner.

5.4 Onset-filled Tri-syllabic Nominals

These are tri-syllabic nominals whose syllables begin with an onset, as exemplified in (21).

	Underlying form	Surface form	
(21)	/kpàkúté/	[kpà.kú.té]	'trap'
	/dʒàgùdà/	[dʒà.gù.dà]	'hooligan'
	/mádʒèlé/	[má.dʒè.lé]	'poison'
	/mádʒɛ̀mű/	[má.dʒɛ̀.mű]	'covenant'
	/kúlúsɔ/	[kú.lú.sɔ]	'ant-lion'
	/kùkùté/	[kù.kù.té]	'stump of a tree'
	/koríko/	[ko.rí.ko]	'grass'
	/garawa/	[ga.ra.wa]	'bucket'

Two descriptive generalizations about the data in (21) suffice:

(22) a. Onsets are allowed but must be simple.
b. Syllables must not end in a coda.

Picking /kpàkúté/ for analysis, the syllabification is presented in (23):

(23) /kpàkúté/ → [kpà.kú.té] 'trap'

Before arriving at the ranking which produces [kpà.kú.té] as the syllabic parse to which the input /kpàkúté/ is mapped, some other candidate outputs are needed for evaluation. Let us examine the syllabic parse *[kpàk.ú.té] first.

(24) Ranking argument: *CODA >> ONSET >> *V#

/kpàkúté/	*CODA	ONSET	*V#
a. → kpà.kú.té			*
b. kpàk.ú.té	*W	*W	*

In the ranking in (24), ONSET is ranked below *CODA because it has been established earlier that the former is lower-ranked while the latter is higher-ranked in Yorùbá. The syllabification of [k] as a coda to the first syllable by candidate (b) is a serious violation of *CODA. The mirror-image of this constraint is *V#, which is violated by both candidates. Since it is dominated in the language, its relative activity in the choice of the optimal syllabic parse is irrelevant in the assessment process.

If we compare the actual output form, [kpà.kú.té], with two other candidate analyses, *[kpà.kút.é] and *[kpà.kté], the analysis will expand. This is presented in tableau (25):

(25) Ranking argument: *CODA, *COMP-ONS, MAX >> ONSET

/kpàkúté/	*CODA	*COMP-ONS	MAX	ONSET
a. → kpà.kú.té				
b. kpà.kút.é	*W			*W
c. kpà.kté		*W	*W	

In (25), candidate (b) syllabifies the supposed onset of the final syllable as a coda to the penultimate syllable. This leads to a fatal violation of *CODA, a constraint that favours the winner in the tableau. The third candidate incurs two fatal violations: it deletes the supposed nucleus of the second syllable, hence flouting MAX (a faithfulness constraint which frowns at deletion of input segment in the output). The move, consequently, forces the emergence of a complex onset for the final syllable – that is, a violation of *COMP-ONS. The first candidate wins for an obvious reason; it satisfies or obeys all the constraints in the tableau.

Finally, the winning candidate, [kpà.kú.té], can be compared with another loser using a fraction of the ranking arguments employed hitherto. Consider the analysis in tableau (26):

(26) [kpà.kú.té] versus *[kpà.kú.t]: *C^{unsyll} >> *V#

/kpàkúté/	*C^{unsyll}	*V#
a. → kpà.kú.té		*
b. kpà.kú.t	*W	L

There is a conflict between the two markedness constraints made available by the function CON in tableau (26). Avoiding a word ending in a vowel in order to satisfy *V# implies that deleting the final vowel is the best strategy. Candidate (b) resorts to this strategy. However, the attempt leaves the supposed onset of the final syllable unsyllabified, which, in turn, leads to a severe violation of the markedness constraint *C^{unsyll}. Therefore, since candidate (a) correctly parses all the input segments into their respective syllables, it satisfies *C^{unsyll} and, therefore, emerges as the optimal form. Note that even if the constraint *C^{unsyll} is ignored, the second candidate would still not win because it fatally violates MAX though this constraint is not represented in the tableau. Thus, the analysis points out an important fact: both *C^{unsyll} and MAX dominate *V#.

6. Findings and Discussion

This study was driven by three principal research questions: (1) What is the preferred syllable structure and typology of NYN? (2) What is the motivation for such preference in the language? (3) What is the constraint hierarchy of markedness and faithfulness constraints that govern syllabic well-formedness of NYN? With respect to the first question, although Yorùbá attests other types of syllable, such as the one consisting of a single Vowel (V) – without an onset or a coda – as well as the one having a syllabic nasal

(N) as the only element in the syllable, this study has established that the basic syllable type or structure in Yorùbá is a sequence of a Consonant and a Vowel – CV. By implication, the language operates the open syllable typology. This structure is attested in the literature, as Adewole (1995), Seidl (2000) and Ehineni (2017) show. It should be noted, however, that these previous studies did not give a theoretical justification for their findings; they only made "observational" statements. Using non-derived nominals as a case study and employing the framework of a constraint-based theory (OT), this paper has provided a more principled account of Yorùbá's preference for the CV syllable structure, which is governed by the fact that every inter-vocalic consonant is consistently parsed as an onset to the next syllable rather than as a coda to the preceding one because the language generally dis-prefers the presence of a coda in a syllable.

Still on the first research question, it has been shown in this study that even though certain non-derived Yorùbá nominals allow onsets in their syllabification in order to produce the basic syllable type, CV, such onsets are kept simple because the language does not entertain consonant clusters in its entire grammar. This is also justified by the higher-ranking status of the constraint *COMP-ONS in Yorùbá. Even when words with consonant clusters are loaned into the language, the illicit sequence is repaired by either vowel insertion or reduction of the clusters by deletion, e.g., *búlọ̀ọ̀kù* from 'block', and *góòlù* from 'gold'. This is the reason Yorùbá excludes such syllable structures as CCV, CCCV, etc. from its syllable inventory.

With respect to the second research question, the use of OT in the present study has helped in providing an adequate explanation for Yorùbá's dis-preference for a syllable-final consonant and its choice of open syllable typology. Again, this is due to the fact that an inter-vocalic consonant is optimally syllabified as an onset to the following syllable instead of being parsed as a coda to the preceding one. This entrenches the motivation for the higher-ranking status of *CODA in the entire grammar of the language, which is also evident in loanwords with word-final consonants that are usually modified by vowel insertion to open the closed syllable, e.g., *kọ́ọ̀pù/kọ́ọ̀bù* from 'cup', and *pọ́ọ̀tù* from 'pot'. The complete inertness of the markedness constraint *V# in Yorùbá also justifies the fact that the language operates the open syllable typology. Therefore, the discovery that Yorùbá predominantly attests the CV syllable structure is another empirical evidence to corroborate the long standing cross-linguistic finding that languages generally prefer their syllables to begin with an onset and end with a coda (Jacobson, 1962; Malmberg, 1963; Kager, 1999, among others).

Regarding the third research question, the study found that the constraint hierarchy of markedness and faithfulness constraints that govern syllabic well-formedness of NYN is: *CODA, *C^{unsyll}, *COMP-ONS, MAX, DEP >> ONSET >> *V#. The ranking relationship between the three markedness constraints *CODA, *C^{unsyll}, and *COMP-ONS cannot be established because none of them can be dominated in Yorùbá, as the language generally disallows

coda, unsyllabified consonant and a complex onset, respectively. Also, the given ranking shows that the faithfulness constraints MAX and DEP are highly-ranked in the syllabification of NYN because deletion and insertion are banned, although there are cases, which are beyond the scope of the present study, where the constraints are violated in the language. The five constraints (*CODA, *C^{unsyll}, *COMP-ONS, MAX, DEP) dominate the last two markedness constraints, ONSET and *V#, for an obvious reason: in Yorùbá, there are syllables that are onsetless even though the basic syllable type in the language is CV, and no word ends in a consonant, respectively.

Finally, it is important to state, holistically, that the aspect of phonology to which OT was first applied was the syllable (see Prince & Smolensky, 1993). Over the years, scholars have empirically justified the contribution of the syllable phenomena especially in African languages to the evolution of OT, and have also theoretically justified the analytical efficiency of OT over other existing theories as regards the phenomena of the syllable. It could be argued that OT satisfies the explanatory adequacy criterion in its account of the syllable more than other theories. The present study has clearly demonstrated this in terms of giving a simple, straightforward account of Yorùbá syllable structure and typology in a more principled fashion. It is, therefore, recommended that more effort should be devoted to a continuous application of OT to African language data in order to widen the scope of the theory and test its applicability to other phenomena other than the syllable, as well as place African languages on a pedestal of remarkable scientific research within the contemporary linguistic theories.

7. Conclusion

This paper carried out a descriptive study of the syllable structure and typology of four categories of non-derived Yorùbá nominals (NYN) within the framework of Optimality Theory (OT). Driven by three research questions, the study made the following three crucial findings. First, the syllable structure and syllable typology preferred in Yorùbá are CV and open syllable, respectively. Second, the motivation for such syllable preference is governed by the fact that Yorùbá optimally syllabifies an inter-vocalic consonant as an onset to the following syllable rather than as a coda to the preceding one, thereby justifying why *CODA is undominated in the language. And third, the optimal syllabic parses of all categories of NYN arise from optimal satisfaction of a hierarchy involving markedness and faithfulness constraints, namely *CODA, *C^{unsyll}, *COMP-ONS, MAX, DEP >> ONSET >> *V#.

To further justify Yorùbá's preference for CV using OT, the study also established that the two constraints *COMP-ONS and *CODA are accorded a higher-ranking status in the language's grammar because syllables that allow onsets must keep the latter strictly simple and all syllables must be open. Thus, it could be argued that the optimal syllabification of NYN is determined by the satisfaction of highly-ranked markedness constraints *COMP-ONS and *CODA at the expense of minimal violation of ONSET and maximal

violation of *V#. On this premise, in consonance with the findings of the previous studies, this paper concludes that the basic or preferred syllable structure in Yorùbá is CV.

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