A CONSTRAINT-BASED ACCOUNT OF KORING SYLLABLE STRUCTURE

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Abstract
*The syllable is very vital in phonological analysis. This is because phonological processes occur within syllables and across syllable boundaries. The law of syllable phonotactics forces the sequence of words in syllables to agree with the acceptable order of any given language. Within the broader framework of optimality theory, this paper examines the syllable structure of Koring, an East Benue Congo language spoken in Ebonyi, Benue and Cross-River States of Nigeria. Optimality theory allows us to analyse Koring syllable structure constraints within the purview of universal grammar without the need to generate phonological rules for syllable phenomena in the language. Data for the study were obtained from three native Koring speakers. The study reveals that the constraint *COMPLEX is ranked high in the language, as such, the language does not permit consonant clusters. In cases where there are double consonants at the onset position in the input, the constraint COMPLEX forces such clusters to be realised as either labialized or palatalized consonants.*

Keywords: Optimality theory, consonants, vowels, syllable structure, phonological processes

Introduction

The syllable is very important in phonological analysis. As a matter of fact, phonological processes occur within syllables and across syllable boundaries. The combination of syllables to form words triggers phonological processes, and also, the phonotactic constraints of languages force the sequence of words in syllables to concur with the acceptable order of languages. These result in processes such as vowel harmony, assimilation, deletion, insertion etc. This paper, therefore, uses the Optimality Theory (OT) framework to investigate the syllable structure of Koring, an East Benue-Congo language spoken in Ebonyi, Benue and Cross-River States of Nigeria (Williamson and Blench 2000).

Optimality Theory (OT), first introduced by Prince and Smolensky (1993) and developed by McCarthy and Prince (1994), is a constraint-based phonological system that allows violable constraints in deriving output surface forms from underlying forms. OT assumes that linguistic items are restricted by a set of universal, mutually inconsistent and violable constraints from which an optimal surface output will be selected. Oyebade (1998) quoting McCarthy and Prince (1993:4) summarizes the basic assumptions and principles of the theory thus:

> ...Optimality Theory assumes that ... the role of a grammar is to select the right output form from among a very wide range of candidates, including at least all of the output that would be possible in any language whatsoever.... Language-particular rules or procedures for creating representations have no role at all in the theory and the ...

> burden of accounting for the specific patterns of individual languages falls on the well-formedness constraints.

McCarthy and Prince (1994:336) present five basic principles of Optimality Theory. The three most important ones are:

a. UNIVERSALITY: U.G. provides a set CON of constraints that are universally present in all grammars.
b. VIOLABILITY: Constraints are violable; but violation is minimal.
c. RANKING: The constraints of CON are ranked on a language particular basis; the notion of minimal violation is defined in terms of this ranking. A grammar is a ranking of the constraint set.

The rest of the paper is organized as follows: Section two presents the review of related previous research. Section three sifts through the syllable in optimality theory. Section four briefly discusses the Koring language and analyses the data. Section five gives summary of major findings and conclusion.

Some previous studies on syllable

The syllable is seen as a unit of connected speech. Although several attempts have been made towards defining the syllable, there has not been a strict definition of a syllable. Matthews (1997:366) claims that the syllable is, 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." Crystal (1997:164) views a

syllable as, "an element of speech that acts as a unit of rhythm, consisting of a vowel, syllabic, or vowel/consonant combination." Urua (2000:66) adds that "the syllable provides an anchor on which a number of segmental and suprasegmental phenomena hinge."
Eyisi (2003:251) attempts a definition of the syllable thus:

> ...a syllable may be defined as a segment which may constitute a single sound or a sequence of sounds of a given language produced with one chest pulse and possessing 'a peak of prominence' which is usually the vowel or a syllabic consonant.

The above definitions of a syllable are only guides to using the term. There has not been a satisfactory definition of the syllable. Sommerstein (1977:199) affirms the above notion by stating:

> Perhaps the main reason for the reluctance of GP (Generative Phonology) to operate with the syllable concept has been the apparent difficulty of pinning down that concept itself ….We are still without a satisfactory definition of the syllable.

Let us consider the English word *information*. It consists of four syllables – information
We can think of the information about the syllable structure as being contained within a syllable tier. Trask (1996:346) notes that syllable structure is usually seen as "the requirements and constraints which determine the shapes of possible syllables, usually formulated in terms of sequences of

consonants and vowels, but also in terms of onset plus rhyme, or onset plus nucleus plus coda."

Yule (1996) also maintains that a syllable must contain a vowel (or vowel-like) sound. The basic syllable is consonant before a vowel. He points out basic elements of the syllable as:

Onset (one or more consonants)

Rhyme (consists of the vowel which is treated as the nucleus, plus any following consonant(s), treated as the coda)

The symbol σ is used to represent a syllable. The nucleus (N), rhyme is represented as (R), onset is (O). The consonants following the nucleus are grouped together as the coda (Co).

The syllable in optimality theory

Prince and Smolensky (2004:34), in summarizing optimality theory analysis of the syllable, assert;

The theory we examine is this: Basic CV Syllable Theory

- Syllable structure is governed by the basic syllable structure constraints – Onset, *Coda, Nucleus, *Complex, *M/V, *P/C, Parse and Fill.
- Of these, Onset, *Coda, Parse and Fill may be relatively ranked in any domination order in a particular language, while the others are fixed in superordinate position.
- The basic syllable structure constraints, ranked in a language-particular hierarchy, will assign to each input its optimal structure, which is the output of the phonology.

Based on the afore-mentioned, we can identify the following constraints in OT for syllable analysis:

i. ONSET: a syllable must have an onset
ii. *CODA: a syllable must not have a coda
iii. PARSE: underlying segments must be parsed into syllable structure
iv. FILL: syllable positions must be filled with underlying segments
v. NUC: a syllable must have nuclei
vi. *COMPLEX: no more than one C or V may associate to any position node
vii. *M/V: V may not associate to margin nodes (onset and coda)
viii. *P/C: C may not associate to peak (nuclei) nodes

(Prince and Smolensky, 2004; Tesar, 2004; Tesar and Smolensky, 2004; Oyebade, 2004; Archangeli, 1997)

The first two constraints are markedness, that is, structural constraints. They enforce the universally unmarked characteristics of the structures involved. The next two constraints are faithfulness constraints and they demand that perfectly formed syllable structures are those in which the input segments are in one to one correspondence with syllable positions in the output, while the rest are syllable form constraints. PARSE and FILL, in recent OT literature are known as MAX and DEP respectively. NUC and *COMPLEX are structural constraints. The last two dictate specific segments that could fill syllable nodes (positions), these could be referred to as syllable constraints. In this paper, we shall examine how the Koring language ranks these constraints.

The Koring language

Koring belongs to the Upper-Cross group of the Delta-Cross sub-branch of the Cross River language phylum of East Benue Congo family (Williamson and Blench, 2000). It is the language of the Oring people who live in parts of Ebonyi, Benue and Cross-River States of Nigeria. The Koring-speaking communities are located at Okpoto, Ntezi and some part of Nkalagu in Ishielu Local Government Area, Effium in Ohaukwu Local Government Area, and Amuuda in Ezza Local Government Area of Ebonyi State. Koring is also spoken at Utonkon and Offia in Benue State and the Wanishan dialect is spoken at Okpoma in Yala Local Government Area of Cross-River State. The variety of Koring spoken in Okpoto, on which this study is based, is widely recognized as the standard dialect of Koring.

It has been observed that thirty-seven phonemes exist in the Koring language (see Iloene, 2006). These comprise thirty consonants and seven vowels.

Consonants

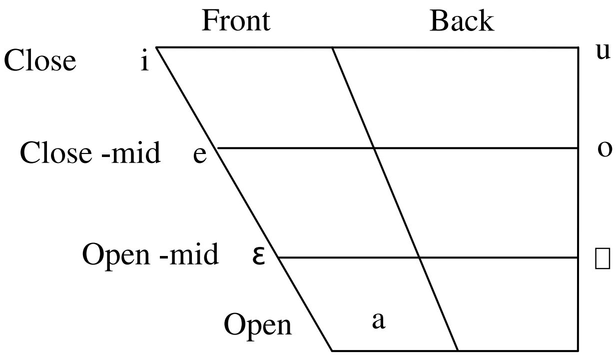
	Bilabial	Lab. Dent.	Dental	Alveolar	Post alveolar	Palatal	Velar	Lab. Vel.
Plosive	p b			t d			k g	kp gb
Affricate					tʃ dʒ			
Implosive	ɓ			ɗ				
Nasal	m			n		ɲ	ŋ	
Trill				r				
Fricative	ɸ	f v		s z	ʃ	ç	ɣ	
Approximant						j		w
Lateral Approx.				l				

Labialized Velars: kw, gw, ŋw

Phoneme	Phonemic Representation	Gloss
p	/pà/	dig
b	/bàlà/	inscribe
t	/tùlà/	hunt
d	/diɛ/	be rotten
k	/kàdà/	levy
g	/gùà/	drink
ɓ	/ɓàlo/	urine
ɗ	/ɗèɸ/	buy
m	/mà/	run
n	/nààŋ/	build
ŋ	/ŋúè/	roll
ɲ	/ɲí/	give

□	/□ìè/	hear, see
f	/félè/	leave
v	/□̀v□̀n/	thing
s	/sùèrè/	scrub
z	/zàà/	wash
□	/k□̀□i′/	cross
ç	/íçìàr/	soap
□	/□i′/	steal
t□	/t□ìŋàlɛ/	roll
d□	/d□ìr/	shy
r	/ràà/	choose
l	/lèbù/	kolanut
j	/jàm/	leap
w	/wò/	swim
kw	/kw□̀m/	call
gw	/gwóò/	greet
kp	/kpáà/	hook
gb	/gbàdàà/	flat
ŋw	/ŋwɛ̀/	shake

Vowels



Phoneme	Phonemic Representation	Gloss
i	/ìdèŋ/	louse, lice
u	/ùgìè/	small rod for picking yam
e	/èbùr/	traditional canopy
o	/ògàn/	gourd
□	/ɛ□kpè/lion, tiger	
□	/□kà/	in-law
a	/àbi/	a species of yam

Syllable

Koring syllable is a simple one. The language does not permit consonant clusters. So, we find one consonant at the onset and one also at the coda. All the consonants except /ŋ/ occur at the onset. The following are the attestable syllable structures found in the Koring language:

i. V: examples – e 'yes'
ii. VC: examples – um 'scarce'
iii. CV: examples – da 'contribute'
iv. CVC: examples – gum 'one'
v. C: examples – m 'me'

We can identify the constraints each of them satisfied and violated as follows:

i. V satisfies: DEP, MAX, *CODA, NUC, *COMPLEX, *M/V and *P/C. It violates ONSET.
ii. VC satisfies: DEP, MAX, NUC, *COMPLEX, *M/V and *P/C. It violates *CODA and ONSET.
iii. CV satisfies: ONSET, MAX, DEP, NUC, *COMPLEX, *M/V, *P/C and *CODA. It violates none.
iv. CVC satisfies: ONSET, MAX, DEP, NUC, *COMPLEX, *M/V and *P/C. It violates *CODA.
v. C satisfies: MAX, DEP, NUC, *COMPLEX and *M/V. It violates ONSET and *P/C.

In instances where there may be CC in a syllable at the onset position, the CC is realised as C in the output because the constraint *COMPLEX is ranked high in the language. These are illustrated in the following examples:

i. Input /ag□ŋ/ 'a species of cocoyam'
    Candidate set: [ag.□ŋ; a.g□ŋ]

TABLEAU 1

/ag□ŋ/	MAX	DEP	ONSET
ag.□ŋ			**
☞ a.g□ŋ			*

In tableau 1, the candidates satisfied the two high ranked constraints. Therefore, the optimal candidate is determined by the lowly ranked constraint. Although the optimal candidate [a.g□ŋ] violates ONSET, it still emerges as the winning one since the violation is only at a point, unlike the [ag.□ŋ] that violates ONSET at two points.

ii. Input /nsumale/ 'forget'
Candidate set: [n.su.ma.le; nsu.mal.e; su.ma.le]

TABLEAU 11

/ nsumale/	MAX	*COMPLEX	ONSET	*CODA
☞ n.su.ma.le				
nsu.mal.e		*!	*	*
su.ma.le	*!			

In tableau 11, [nsu.mal.e] and [su.ma.le] cannot emerge as the grammatical form in the language since they violate high ranked constraints.

iii. Input /pwa/ ‘dig’

Candidate set: [pu.wa; p^wa; pa; pwa]

TABLEAU III

/pwa/	*COMPLEX	MAX	DEP	LINEARITY
pu.wa			*!	
☞ p^wa				*
pa		*!		
pwa	*!			

In tableau III, [p^wa] emerges as the optimal candidate since it does not violate any of the high ranked constraints in the language, compared to the other candidate which totally violate the high ranked constraints in the language. Here, we have to introduce another constraint, LINEARITY, which according to Pater (2004:274), is defined as ‘S_1 reflects the precedence structure of S_2 and vice versa.’ Linearity prohibits the fusion of two segments. It is important to note here that due to the constraint *COMPLEX, the language exhibits labialized and palatalized consonants. These occur whenever there is a sequence of an obstruent and a semi-vowel, either /w/ or /j/. For example:

1. a./lw□/ ‘weave’ realized phonetically as [l^w□]
   b./twa/ ‘chew’ realized phonetically as [t^wa]
   c./bwu/ ‘butcher’ realized phonetically as [b^wu]

2. a./pjee/ 'brief' realized phonetically as [p^{j}ee]
   b./tjie/ 'inform' realized phonetically as [t^{j}ie]
   c./kjee/ 'remember' realized phonetically as [k^{j}ee]

From these attestable structures in Koring, we can easily establish the constraint hierarchy of the language as *COMPLEX, NUC or PEAK, MAX, DEP, *M/V>>ONSET, *CODA, *P/C, LINEARITY. It is noteworthy that not all of these constraints come to play in the analysis done in tableausI-III. For instance, for the last syllable structure, that is C, we will not need *M/V because the input may not necessarily contain a V. This permits us to only make use of the relevant constraints for the analysis of a particular set of candidate. However, all constraints are applicable in theory (Prince and Smolensky, 2004; Tesar, 2004).

We take the constraint hierarchy as applying to all, from which we can deduce the hierarchy of any syllable structure of the language. Furthermore, in Koring, there is a constraint that bars voiced obstruents as codas since there is no voiced obstruent in the coda position in the language. This constraint is represented as *CODA $^{\text{VOICED OB}}$. This makes all the segments in the coda position to be voiceless obstruent. It is a high ranked constraint in the language. Therefore, if the language has /biβ/ as an input, the output will be /bi□/ which violates a member of the MAX constraints – MAX IO $^{\text{VOICE}}$. This implies that constraints of the syllable need to be re-ranked thus: *COMPLEX, NUC, DEP, *M/V, *CODA $^{\text{VOICED OB}}$, MAX>>ONSET, *P/C, LINEARITY. This hierarchy implies that in all Koring syllables, the constraints

*COMPLEX, NUC, DEP, MAX, M/V and *CODA $^{\text{VOICED OB}}$ must not be violated.

The operation of the constraint *CODA $^{\text{VOICED OB}}$ is illustrated in the example below:

iv. Input: /□odum/ 'sunfly'

Candidate set: [□o.dum, □od.um]

TABLEAU IV

/□odum/	*CODA $^{\text{VOICED OB}}$	NUC	MAX
☞ □o.dum			
□od.um	*!		

In tableau iv, / □od.um/ violates *CODA $^{\text{VOICED OB}}$, therefore, it cannot emerge as the optimal candidate.

If we assume that the language has a word with a voiced obstruent in the coda position such as /bod/, since Koring will adhere to Faithfulness constraint, it will not delete the violating voiced segment. It will rather turn it to a voiceless segment in the output. An OT representation of possible outputs is shown in tableau v below.

TABLEAU V

/bod/	*CODA $^{\text{VOICED OB}}$	NUC	MAX	FAITH VOICE
bod	*!			
☞bot				*

bo			*!	
bodo		*!		

In tableau v, [bot] emerges as the winning candidate because it is the only candidate that does not violate any of the identified highly ranked constraints of the Koring language. Another constraint, FAITH VOICE, is introduced here. This is as a result of the change in voicing of the alveolar plosive. The segment /d/ has to become devoiced because of the highly ranked constraint *CODA $^{\text{VOICED OB}}$ which will never permit voiced obstruent in coda position.

Summary and conclusion

The study has examined Koring syllable structure using optimality theory approach. It observed that the syllable in Koring can be well accounted for using OT. However, the import of tableau v is seen in a second language learning situation. If Koring speakers attempt to acquire a second language, say English, going by contrastive analysis theory, Koring speakers will encounter difficulty acquiring voiced obstruents in coda positions. The analysis of labialized and palatalized consonants of the language as resulting from obedience to a constraint, *COMPLEX, helps to explicitly achieve economy, simplicity and generality which are important in linguistic analysis. This suggests that labialized and palatalized consonants should be viewed as resulting from processes at the output level of the language.

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