The Fortis-Progressive Interface in Leggbó

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Abstract

In Leggbo language (a member of the Upper Cross sub-group spoken in Abi and Yakurr Local Government Areas of Cross River State of Nigeria), two distinctive processes of lenition and fortition correlate with the perfective and progressive aspects respectively. Fortition and lenition in Leggbó can affect all the consonants either in initial or final positions. This paper examines the interface between fortition and the progressive aspect. Within the purview of Optimality theory, we provide a formal analysis of this interface with the discovery that *C_{prog} generally conditions consonant doubling (for fortition) in the progressive aspect to the extent that the doubly articulated single consonant /gb/, for instance, has the need for fortition with the addition of an initial /g/in *gbaa→ggbal* 'sacrifice/is sacrificing'. Vowel truncation during fortition in Leggbó fails to apply when /i/ is part of the radical; thereby instigating a (re)ranking for the non-application of *V: as MCONs >> IO-faith >> MCON. The strength of voiceless consonants over their voiced counterparts (cf. Katamba 1989) plays out in Leggbó, with voiced fricatives replaced by their voiceless counterparts word initially and further strengthened by doubling these fortition-suffused voiceless fricatives. In addition, Goldsmith's (1990) vowel sonority scale (which is conversely proportional to strength) shows positional faithfulness regarding the (strong) suffixed high vowel/i/, and reveals that it is most preferred in word final position than (weak) low vowels.

1. Introduction

When a consonant sound undergoes strengthening (or fortition) from an underlying lenis counterpart, it is due to some phonological conditioning, realized as a sound on the lower rung of the strength hierarchy (cf. Katamba's 1989 consonant strength hierarchy). Goldsmith (1990) represents the consonant strength scale thus (> shows the journey to weakening of segments):

1. stops> affricates > fricatives > nasals > liquids > glides

The hierarchy in (1) shows stops as the strongest while glides are the weakest of all consonant sounds. For the vowels, Goldsmith (1990) shows that low vowels are most sonorous while the high ones are the least sonorous. He represents this thus:

2. low vowels > mid vowels > high vowels

Based on this sonority-based markedness hierarchy, the worst nuclei are the high vowels and the best, the low vowel /a/ (Crosswhite, 1999; Prince and Smolensky, 2004; de Lacy, 2006). It is in line with this hierarchy that Akinlabi and Lee (2006, p.56) assert that "the net effect of the nucleus-sonority

constraint...is to increase sonority in the syllable nuclei". However, it is pertinent to mention that sonority is conversely proportional to strength; hence, the weakest glide in (1) is the most sonorous while the strongest stop is the least sonorous. With this converse relativity between sonority and strength, it therefore implies that the least sonorous high vowels are stronger than the most sonorous low vowels. The vowels strength hierarchy could thus be shown as:

3. high vowels > mid vowels > low vowels

It needs to be mentioned that, even though the traditional view holds that vowel strength and weakness are along the lines of tenseness and laxness (especially for double *vs* single vowels), the case of vowel strength based on height, for the most part, applies to singleton vowels. This work looks at vowel strength from the latter perspective since singleton vowels in Leggbó (irrespective of height, tenseness or laxness) are conditioned to occur in fortis positions.

Leggbó is one language that has in its phonemic inventory, consonants and vowels that contrastively and uniquely occur in pairs to mark fortition and lenition. This propensity for a fortis-lenis pair contrast cuts across morphological and syntactic categories such that the fortis vowels or consonants could be seen to paradigmatically occur to mark one specific syntactic or morphological category while the lenis vowels or consonants do mark another category. This marking of certain grammatical categories does not foreclose their uncontrolled/non-patterned occurrences in non-derived (or radical) constructions. That is to say, fortis consonants occur with lenis vowels and lenis consonants with fortis vowels at the lexical level, but are constrained at the derived (post-lexical) level to occur systematically in an organized pattern. Lenition and fortition in Leggbó respectively correlate with the perfective and progressive aspect marking. These syllable prosodies can affect all consonants either in initial or medial positions.

Udoh (2014) notes that fortition of consonants in Leggbó involves extra compression of the articulators, characterized by obvious consonant lengthening followed by vowel shortening. In that case, long vowels appear in lenis contexts while their short counterparts are found in fortis contexts (Udoh, 2004). The fortis/lenis consonant and vowel systems of Leggbó (Hyman & Udoh, 2007) are thus shown in (4).

4. Leggbó consonant and vowel systems

a. lenis consonants	fortis consonants
p t c k kp	pptt cc. kkkkp
b dggb	bb ddggggb
v z	ffss
l yw	vvddzllyyww
b. short vowels	long vowels
i u	ii uu

e	o	ee	oo
ɛ	ɔ	ɛɛ	ɔɔ
a	aa		

This paper explores the interface between fortition as a phonological process and the progressive aspect by analysing the patterns of matching that change non-fortis consonants and vowels to their fortis counterparts in progressive constructions.

2. Theoretical Issues

This study revolves round the Optimality Theory (OT) - a theory which successfully juxtaposes the complexity and idiosyncrasy of each language's phonology and morphology with the clarity and abundance of solid typological generalisations using ranking permutations (Udoh, 2016). Optimality Theory, is not rule based, not transformational, but comparative because it compares candidates by applying a hierarchy of violable constraints to assess their forms and relationships (McCarthy, 2008). Following Prince and Smolensky (1993), these said constraints are universal. Universal Grammar (UG), which is Core Grammar, are those universal linguistic facts and principles which tend to appear as unmarked grammatical phenomena in all natural languages, and which occur more frequently both language-internally and cross-linguistically than unmarked features (Trauth & Kazzazi, 1998; Rice, 2007). Universal Grammar consists of a constraint component **CON** that contains the entire repertoire of constraints which are present in the grammars of all languages. In that case, constraints are not language-specific statements of phonotactic truths but universal statements of languages' grammars with several formulations. Therefore, these violable constraints are universal, while individual grammars are constructed by imposing a ranking on the Universal set of constraints.

OT proposes that Universal Grammar contains a set of violable constraints which spell out some universal properties of language. These violable constraints, which are always in conflict, are of two types – faithfulness and markedness constraints. Markedness constraints require output forms to meet some structural well-formedness criterion while faithfulness constraints require that outputs preserve the properties of their basic (lexical) forms i.e. prohibits differences between the output and input (Archangeli, 1997; Kager, 1999; McCarthy, 2008). Since every linguistic output form has to be optimal, it follows that it incurs the least serious violations of a set of conflicting constraints.

The Correspondence sub-theory of OT is used in this work. Correspondence is a relation between segments in pairs of a string. Any pair of segments can be correspondents because such relations are supplied by

the GENerator which is then evaluated by the EVALuator using ranked and violable constraints. McCarthy and Prince (1995) define correspondence thus:

> Given two strings S_1 and S_2, related to one another as input-output *...et cetera*, correspondence is a relation $\Re$ from the elements of S_1 to those of S_2. Element $\alpha \in S_1$ and $\beta \in S_2$ are referred to as *correspondents* of one another when $\alpha \Re \beta$ (p. 262).

The structural elements here are segments or even higher order prosodic units like mora, foot and syllable; and the correspondence between them is such that is evaluated (not established) by crucially violable constraints. The violability of these constraints, in the words of Kager (1999), gives rise to the "optimal candidate displaying imperfect correspondence relations. These imperfections appear as 'deletion', 'epenthesis', 'feature change', *et cetera*. As far as correspondence theory in this work is concerned, patterns of fortition arise by the interaction of three constraints types:

(i) Well-formedness constraints: These constraints encode principles of markedness. Markedness is a linguistic concept that can roughly be defined as the tendency for certain linguistic elements to be more frequent in the world's languages, based on issues like naturalness, salience and ease of articulation in terms of phonological features (Hansen, 2006). Markedness then is achieved in a system through a set of redundancy rules logically derived from the markedness constraints (Hansen, 2006; Roca & Johnson, 1999). They trigger change to ensure least marked outputs.

(ii) Faithfulness constraints: These constraints put pressure on lexical forms and their surface counterparts to be identical, without any form of deletion, insertion, feature change, *et cetera*. They oppose all forms of change.

(iii) Input-output identity constraints: These require the input and output to be glued together along the edges of specific prosodic constituents.

It is pertinent to state here that the change in the output (in this case, the progressive construction)might always be towards universally or Leggbó-specific less marked structures. Therefore, the mapping patterns between input and output might mostly be towards non-identity. We employ the combination tableau in our analysis, to ensure that in the course of violation, W (Winner) outranks L (Loser) in respective rows (McCarthy 2008).

3. Fortis-Progressive Marking in Leggbó

The progressive aspect shows an ongoing activity and since every verb in Leggbó has a progressive form, there is no restriction on the formation of progressives of verbs encoding any type of event (Hyman & Udoh, 2005).It has already been mentioned that Leggbó makes use of long (or geminate)

consonants to mark fortition, and the progressive aspect is marked by fortitioning a lenis input segment in its corresponding output form. In that case, stem singleton consonants become lengthened in the progressive output form. The data in (5) bear this out.

Lexical form	**Sentential form**
5.a. tú 'dance'	é-túèzù 'he will dance'
ttú-í 'dancing'	é-ttú-íèzù 'he is dancing'
b. dú 'pound'	é-dúèdèì 'he will pound pepper'
ddú-í 'pounding'	é-ddú-íèdùìsɛ́' he is pounding pepper'
c. ké 'put'	é-kéyɛ́ńkɛ́ǹzúñ 'he will put it in his nose'
kké-í 'putting'	é-kké-íyɛ́ńkɛ́ǹzúñ 'he is putting it in his nose'
d. tɛ 'let/allow'	ɛ́-tɛ̀mánmɛ́sɛ́ñ'he will allow us to go'
ttɛ-i 'letting'	ɛ́-ttɛ́-ímántàmɛ́sɛ́ñ'he is letting us to go'
e. tá 'contribute'	ɛ́-táèkpùànsɛ́ 'he will contribute his money'
ttá-í 'contributing'	ɛ́-ttá-íèkpùànsɛ́ 'he is contributing his money'
g. gbá 'block'	ɛ́-gbáèdensɛ́ 'he will block the road'
ggbá-í 'blocking'	ɛ́-ggbá-íèdénsɛ́ 'he is blocking the road'
h. kpé 'learn'	é-kpénwɛ̀nɛ̀ 'he will learn(book)'
kkpé-i 'learning'	é-kkpé-ínwɛ̀nɛ̀ 'he is learning (book)'

It is glaring from the data in (5) that the progressive aspect does not permit singleton consonants. This accounts for the doubling of onsets in all cases. With this, one aspect of the Leggbó consonant strength hierarchy as far as progressive marking is concerned could be represented as:

6. double consonant > single consonant

In Optimality theory terms, the question of a double consonant being stronger than a single consonant does not come in. It simply and definitely has it that single consonants are dispreferred, therefore banned from progressive constructions. In that case, a constraint, which shows the interaction, in Leggbó, between phonology and syntax to regulate this, would be:

7. $*C_{prog}$

No single consonant in progressive forms

The data in (5) also show a common denominator: the high front vowel /i/ marks the progressive aspect. It is already established that for most verbs, progressives are formed through suffixation of -i plus potential consonant fortition (Hyman, Narrog, Paster & Udoh, 2002; Hyman & Udoh, 2005; Udoh, 2004; Udoh, 2007; Udoh, 2014). It then seems that this morphological condition for progressive constructions is actually conditioned by a phonological constraint, which stipulates that the progressive suffix must be

as strong as the fortis (double) consonant. Following the vowel strength hierarchy in (3) which has high vowels as the strongest in the scale and low vowels as the weakest, the /i/ suffix in the progressive is a strong vowel compared with others. It also seems the high front vowel /i/ is more preferred in Leggbó nuclei than the high back /u/. This may be because front vowels are cross-linguistically (at least in the Central Lower Cross Languages) less vulnerable to deletion in deleting environments compared to their back counterparts (Urua, 1998, 2007; Udoh, 2010, 2016; Udoh, 2014)[1].In that case, a nucleus with the /i/ suffix is more preferable than that with /e/, /o/, /a/, etc. suffix.

Since strength is conversely proportional to sonority, we toe the line of Prince and Smolensky's (2004) constraints which ban high sonority nuclei in the segmental make-up of syllables in a language. Their nucleus sonority constraint, which prefers non-high (more sonorous) vowels to the high (less sonorous) vowels, is meant to avoid unwanted less sonorous vowel sequences in adjacent syllables. The constraint is stated thus in short form: *nuc//i,ʉ>>*nuc/ə>> *nuc/i,u>> *nuc/e,o>> *nuc/ɛ,ɔ>> *nuc/a.The constraint could be interpreted to mean that the banning of the high vowels /i, ʉ/ is more paramount to a said language than banning of the low /a/ because the former sounds are less sonorous than the latter. The substance in this proposition is heightened by Akinlabi and Lee's (2006) assertion, earlier mentioned, that the nucleus-sonority constraint resultantly increases sonority in syllable nuclei. Since the Leggbó language does not have the vowels/i, ʉ, ə/ in its kitty, the sonority-induced constraint would begin at *nuc/i,u. As a reverse of this, the strength constraint would prefer nuclei with /i/ to those with /a/ or any other non-high vowel. This constraint could be represented thus:

8. **nuc/i>nuc/...**

Nucleus with /i/ is stronger than that with any other sound

Here, strength is seen as a natural phenomenon; hence, weaker segments are seen as marked compared to their stronger counterparts in a word (or construction). Therefore, Leggbó progressive constructions without the /i/ nucleus, especially at the suffix position, are adjudged weak, less natural and

[1]This is quite different from the case in Yoruba where the vowel [i] typically deletes in associative constructions, whether it is in VI or in V2 position (Pulleyblank 1988). As Pulleyblank (1988, who also supports his claim with Bamgbose 1966; Coutenay 1968; Oyelaran 1971, 1985) notes, even when the deletion paradigm is towards V1 only, V2 becomes deleted if it is [i]. This disruption in q the pattern of VI deletion that results when V2 is [i], is the automatic consequence of the underspecified nature of that vowel.

marked. Since OT is about constraint interaction, Tableau 1 shows how markedness constraints (MCON) and faithfulness constraints (FCON) interact to bring out the optimal output.

Tableau 1: MCON >> FCON (4 constraints, 6 candidates)

/kpe + i/ (prog)	*C_{prog}	nuc/i>nuc/...	MAX-IO	DEP-IO
a. kpee	*!W	*W		L
b. kkpee		*!W		*
c. ☞kkpei				*
d. kkpeei				**!W
e. kpei	*!W			L
f. pe	*!W	*W	*W	L

The first thing to note in the analysis above is that the markedness constraints outrank the faithfulness constraints in the course of exploring the fortis-progressive interface in Leggbó. This is not unconnected with the fact that the input and output are always inevitably non-identical due to the addition of a consonant and/or vowel in the output to mark progress. Candidate (d) would have done as well as (c) if not for the violation of DEP-IO once more than (c). A competing candidate like *kpeei* would have had the same violation of DEP-IO as the optimal (c), but would have already fatally violated the high-ranking markedness constraint *C_{prog}. However, a candidate like *kkpii* would hold the optimal (c) to a deadlock because it has the same number of DEP-IO violations as shown in Table 2.

Tableau 2: MCON >> FCON (4 constraints, 7 candidates)

/kpe + i/ (prog)	*C_{prog}	nuc/i>nuc/...	MAX-IO	DEP-IO
a. kpee	*!W	*W		*
b. kkpee		*!W		**W
c. ?☞kkpei				*
d. kkpeei				**!W
e. kpei	*!W			L
f. pe	*!W	*W	*W	L
g. ?☞kkpii				*

The question mark beside the winning hand pointer indicates that there is a problem with the analysis; that is, either the winning hand is pointing at a wrong winner, or there are two winning candidates, which runs contrary to the basic assumption of OT that only one winner, the optimal candidate, must emerge. This case of two winners in our analysis is occasioned by the introduction of candidate (g) with its strange structure. The deadlock in the analysis does not mean that candidate (g) ought not to have been brought in. OT allows for freedom of analysis; only the right constraints and their correct ranking are needed to give rise to the optimal

candidate that can withstand all forms of tests. A look at the data in (5) shows that the progressive marker /i/ is inserted as a singleton suffix, not a double vowel. The pattern shows that apart from the doubled onset and /i/ suffix for the progressive construction, every other segment in the output is identical to the input. Therefore, the identity constraint needs to be introduced to regulate this pattern.

9. IDENT-IO (S)

Every segment (S) in the output must be identical with the input. Since the introduction of a new segment to mark fortition in the output is inevitable in Leggbó, the anti-insertion constraint (DEP) has to be ranked lower than the pro-identity constraint. The next table has this analysis.

Tableau 3: MCON >> FCON (5 constraints, 7 candidates)

/kpe + i/ (prog)	*C_{prog}	nuc/i>nuc/...	MAX-IO	IDENT-IO (S)	DEP-IO
a. kpee	*!W	*W			*
b. kkpee		*!W			**W
c. ☞kkpei					*
d. kkpeei					**!W
e. kpei	*!W				L
f. pe	*!W	*W	*W		L
g. kkpii				*!W	*

While the optimal candidate (c) does not violate IDENT-IO (S) at all, candidate (g) commits this violation of introducing replacing the input /e/ with /i/ in the output. This implies that analyses of Leggbó data with this pattern need both faithfulness and identity constraints in their right ranking.

The sketch in (4) concerning the Leggbó consonant and vowel systems shows that the lenis consonants are single, while their fortis counterparts are double. In the same streak, one would expect the single vowels to be weak and the long ones, their fortis counterparts. This follows from the fact that long vowels are tense, while their short counterparts are lax; and tense vowels are stronger than lax vowels (Hall, 2006; Matthews, 2007; Davenport and Hannahs, 2010). Some Leggbó data however, show that stems with double vowels rather have these vowels truncated in the progressive form, which is a pro-fortisphono-syntactic construction in Leggbó. In that case, to mark the progressive aspect in Leggbó, instead of a long vowel, the progressive marker /i/ is inserted as a singleton suffix. The following data bear this out.

10. (a) mɔ̀ɔŋɔ'return' mɔ̀ŋŋi'returning'
(b) doom 'burn' ddɔ̀mmi 'burning'
(c) kpàal 'scrape' kkpàlli 'scraping'
(d) kɔ̀ɔ'vomit' kkɔi'vomiting'
(e) wee 'swim' wwei 'swimming'
(f) tèe 'rain' ttèi 'raining'
(g) yaa 'itch' yyai 'itching'

In (10 d-f), the long vowel sequence is done away with by deleting the second vowel and replacing it with a final /i/ after onset doubling. The rest of the data has the long vowels truncated before and after consonant doubling. These scenarios therefore suggest that Legbbo seems not to permit a sequence of long vowels and double consonants or vice versa; hence, the shortening of the long vowels sequel to the doubling of the hitherto single consonants in the progressive forms. To regulate this sort of data in the Leggbó progressive constructions, we therefore invoke Bat-El's (2002) constraint which bans double (or lengthened) vowels.

11. ***V:**
Assign one violation mark for every long vowel

This constraint may not be applicable to radical stems in Leggbó, but mainly to the output progressive forms. The analysis using *V: with other markedness and faithfulness constraints already used ensues in the next table with *doom* 'burn'.

Tableau 4: MCON >> FCON (6 constraints, 9 candidates)

/doom + i/ (prog)	*$C_{prog.}$	nuc/i>nuc/…	*V:	MAX-IO	IDENT-IO (S)	DEP-IO
a. doomo	*!*W	**W	*W		*	L
b. doomi	*!*W	*	*W			L
c. ddomi	*!W	*				L
d. ☞ddommi		*				*
e. ddoommi		*	*!W			**W
f. ddommo		**!W				*
g. ddoimi	*!W	L				*
h. ddo		*		*!W		L
i. ddoomm		*	*!W			*

A cursory look at the analysis in table 4 would reveal that if *V: were not included in the analysis, candidate (i) would have held the optimal (d) to a deadlock. Therefore, the table looks good, with the constraints and ranking

working towards the realization of the optimal and unmarked candidate. Two more data from the pool in (10) – *kpaal* 'scrape' and *wee* 'swim' are used to firm up these constraints and their ranking in the next analysis.

Tableau 5: MCON >> FCON (6 constraints, 9 candidates each)

/kpaal + i/ (prog)	*C_{prog}	nuc/i> nuc/…	*V:	MAX-IO	IDENT-IO (S)	DEP-IO
a.kpaala	*!*W	**W	*W		L	L
b. kpaali	*!*W	*	*W		L	L
c. kkpali	*!W	*			*	L
d.☞kkpalli		*			*	*
e. kkpaalli		*	*!W		*	**W
f. kkpalla		**!W			*	*
g.kkpaili	*!W	L			*	*
h.kkpa		*		*!W	*	L
i. kkpaall		*	*!W		*	*
/wee + i/ (prog)						
a. wee	*!W	*W	*W			L
b. weei	*!W		*W			L
c. wweei			*!W			*W
d. ☞wwei						
e. wweii			*!W			*W
f. we	*!W	*W		*W		
g. wa	*!W	*W		*W	*	
h. wei	*!W					
i. wwiei						*!W

Even though the last three analyses show that *V: seems indispensable to the survival of the optimal candidate in the Leggbó progressive form, we are faced with a problem where stems with final /i/ have their progressive counterparts realized with a double (or lengthened?) /i/, since the /i/ suffix still has to be added to mark the progressive aspect. This is seen in the following data.

12. (a) ni 'give' nnii 'giving'
(b) vi 'exit' ffii 'exiting'
(c) si 'do' ssii 'doing'
(d) lli 'bury' llii 'burying'

If we apply the pattern of analysis as those of the last three which have shown us a perfect set of constraints with their ranking, the palpable result will be as seen in the next analysis.

Tableau 6: MCON >> FCON (6 constraints, 6 candidates)

/ni + i/ (prog)	*C_{prog}	nuc/i>nuc/ …	*V:	MAX-IO	IDENT-IO (S)	DEP-IO
a. nii	*!W		*W			L
b. ni	*!W					L
c. ? ☞nni						*
d. nnii			*!W			*
e. n	*!W	*W		*W		L
f. nna		*!W			*W	*

Candidate (c) is not an acceptable form as far as the progressive form of *ni* 'give', is concerned. The correct, acceptable and unmarked form is candidate (d), which has lost out in the competition to candidate (c) due to its violation of *V: constraint. The problem here looks like a functional and active constraint has not been put in place for the analysis. Before searching for a functional constraint, we need to reiterate the fact that this paper is on an interface issue. While the progressive aspect needs to be marked using double consonants, the vowel which marks this aspect is a fortis (high) vowel in a fortis position (an open syllable). In that case, this high vowel /i/ is at the suffix position, implying that a working constraint to keep the optimal candidate in the analysis needs to be worked out. This constraint needs to show this syntax-morphology interface in a phonological issue, which will design an escape route for double vowels (precisely /ii/) in Leggbó constructions. The constraint then is:

13. **Prog.M= -i**
The progressive marker is an -i suffix

It is pertinent to point out that, in OT, a change from an input to an output implies a crucial violation of a faithfulness constraint. A markedness constraint more frequently compels potential output forms to exhibit certain structural requirements than assess an output vis-à-vis an input. Therefore, even though /i/ is part of the putative input (which *V: cannot see), this morpho-syntactic constraint needs to function, to regulate this. Prog. M= -i would need to rank higher than some phonological markedness constraints, especially *V: which seems to be the albatross to the acceptable form. The workability of this constraint and its ranking suggestion is seen in the next analysis.

Tableau 7: MCON >> FCON (7 constraints, 6 candidates)

/ni + i/ (prog)	*C_{prog}	Prog.M= -i	nuc/i>nuc/	*V:	MAX-IO	IDENT-IO (S)	DEP-IO
a. nii	*!W			*			L
b. ni	*!W	*W		L			L
c. nni		*!W		L			*
d. ? ☞nnii				*			*
e. n	*!W	*W	*W	L	*W		L
f. nna		*!W	*W	L		*W	*

With the inclusion/high-ranking of the morpho-syntactic constraint, Prog. M= -i, in the analysis, the acceptable form in the Leggbó progressive wins as the optimal candidate. However, the winning status of this candidate (d)has been challenged by the domination of W by L (that is L >W) in rows (e) and (f), at intersection *V: which implies that the analysis is wrong. The recurring constraint in this wrong analysis is *V: (*V: *vs* MAX-IO and *V: *vs* IDENT-IO (S)). In this case, there has to be a re-ranking for correct analysis. It is obvious that the constraint that needs to be moved in this re-ranking move is *V:To solve this problem, there is a need to concentrate on its origin. It is already made certain that the progressive forms in Leggbó do not take lengthened or double vowels. When the consonants are doubled to mark fortition, the radically doubled vowels become truncated, meaning that double vowels cannot occur before or after double consonants in Leggbó progressive forms. This vowel truncation make-up will therefore fail to apply in this case, and we are left with no other option than to invoke McCarthy and Prince's (1995) ranking for non-application which, in the case of reduplication, is IO-faith, BR-identity >> MCON.

Non-application, which is one of the ways of explaining how alternations apply in the reduplicant morpheme vis-à-vis the base or stem, is mainly used in the domain of reduplication (the others are normal application, under-application, over-application and emergence of the unmarked or TETU). It is a situation where a phonological process fails to apply in a given environment (McCarthy & Prince, 1995). In a study on Anaañ reduplication by Udoh (2016), the ranking schema for non-application of tonal polarization, tonal simplification and coda deletion is re-defined as IO-faith >> (MCON), BR-identity >> MCON (p.187). In both works, the non-applying MCON is ranked the least, and since this work is not on reduplication, we do a redefinition of non-application without the BR-identity (Base-Reduplicant identity) constraints. IO-faith will replace BR-identity because top-ranking IO-faith will be inimical to the well-being of the unmarked structure which will always insert an identical or non-identical

segment in the output. Our proposed ranking for non-application is therefore: MCONs >> IO-faith >> MCON. We now put this re-ranking to test in the next analysis.

Tableau 8: MCON >> IO-faith >> MCON (7 constraints, 6 candidates)

/ni + i/ (prog)	*C_{prog}	Prog.M= -i	nuc/i>nuc/…	MAX-IO	IDENT-IO (S)	DEP-IO	*V:
a. nii	*!W					L	*
b. ni	*!W	*W				L	L
c. nni		*!W				L	L
d. ☞nnii						*	*
e. n	*!W	*W	*W	*W		L	L
f. nna		*!W	*W		*W	L	L

The table looks good and our analysis has no ranking problem. Therefore, inputs of this composition require that the ranking schema should be that of non-application, with the non-applying constraint being downtrodden. Meanwhile, a closer look at the analytic table 8 would tempt one to see *V: as a constraint that could be done without, because its exclusion in the analysis would still have seen candidate (d) as the optimal output. This is not how OT works. All relevant constraints are useful for all analyses; the researcher only needs to know how to rank what, to give the optimal result with a practical account of the ranking. All markedness constraints *CPROG, nuc/i>nuc/…, Prog. M= -i and *V: were useful and indispensable at some point in the analysis of progressive formation in Leggbó. Just as in freedom of analysis, where candidates are not bowdlerized, these same violable constraints must remain useful and indispensable with accurate permutations and matter-of-fact explanations throughout the analysis of progressive formation in the Leggbó language.

Yet another instance of fortition in Leggbó exists, where word initial voiced fricatives are realized as their voiceless counterparts in the progressive form. The following data bear this out.

14. (a) vɛ 'kill' ffɛi 'killing'
(b) za 'reject' ssai 'rejecting'
(c) vɔŋ'look for' ffɔŋŋi 'looking for'
(d) vaal 'plait' ffalli 'plaiting'
(e) zɛɛl 'run' sselli 'running'

The phonological scenario in (14) gives pep to the strength hierarchy already discussed in Vennemann (1988) and Hock (1991). Vennemann shows

that voiceless plosives and fricatives are stronger in the hierarchy than their voiced counterparts, while Hock, in his weakening hierarchy diagram shows the journey from voicelessness to voicing of consonants. Therefore, the strength hierarchy here could be re-sketched as:

15. voiceless obstruents> voiced obstruents

The fact concerning strength of consonants and their hierarchy might have informed McLaughlin's (2000) featural/segmental markedness constraint on voicing of fricatives thus.

16. **Fric/vce**
If a fricative, then not [+voice]

The last analysis (in Tableau 8) is that of non-application of vowel truncation, where the non-applicable MCON is ranked the least. In this analysis, we follow the ranking schema for normal application which is MCON >> FCON because, there is no case of non-application of a phonological process.

Tableau 9: MCON >> FCON (8 constraints, 7 candidates each)

/vɔŋ + i/ (prog)	*C_{prog}	Prog.M= -i	nuc/i>nuc/…	*V:	Fric/vce	MAX-IO	DEP-IO	IDENT-IO (S)
a. vɔŋ	*!W	*W	*		*W	*W	L	L
b. fɔŋi	*!W		*				*L	*
c. vvɔɔŋŋi			**!W	*	**W		***W	L
d. ffɔɔŋŋi			**!W	*			***W	**
e. vvɔŋŋi			*		*!*W		**	L
f. ☞ffɔŋŋi			*				**	**
g. vv		*!W	*			*W	L	L
/zɛɛl + i/ (prog)								
a. zɛɛl	*!W	*W	**W	*W	*W	*W	L	L
b. zzɛl		*!W	*		*W	*W	L	L
c. ☞ssɛlli			*				*	**
d. ssɛɛlli			**!W	*W			**W	**
e. zzɛlli			*		*!*W		*	L
f. zzɛli	*!W		*		*W		L	L
g. zɛl	*!W	*W	*		*W	**W	L	L

But not for *fric/vce*, the ill-formed candidate (e) - vvɔŋŋi, in /vɔŋ/ 'look for' would have won over the acceptable and optimal candidate (f) -

ffɔŋŋi 'looking for', while the acceptable ssɛlli 'running' would have lost to a marked zzɛlli (e) in zɛɛl. One point to note in this phonological outlook is that the position (or ranking) of the MCONs does not matter; the optimal candidate still comes out winning no matter how they are ranked. It is also pertinent to note the case of double strengthening where the voiceless fricative is actually stronger than the voiced fricative and after the replacement of voiced with the voiceless fricative counterpart, the pro-fortis fricative doubling still holds sway in the Leggbó progressive construction. This suggests that the language stops at nothing, or leaves no stone unturned in making sure that all relevant segments are fortified from weakening.

4. Conclusion and Future Work

All what has been discussed thus far concerning fortitioning of segments in the progressive forms are segment-centred, that is, not prosodically induced conditions. Further related research on the Leggbó progressive forms will address exceptions to the fortis make-up of segments, example where long vowels fail to get truncated; where consonants fail to get doubled at certain environments, especially at onset position. We will also explore cases where ghost consonants have different forms in the progressive; voiced fricatives do not change to fortis (voiceless) counterparts; /l/ does not change to a fortis /d/; etc. All these seem to be prosodically conditioned based on foot and moraic structure, not really segments.

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