

Level-Ordering Account of Reduplication in Ibeme Igbo

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Abstract

Levels or strata have been assumed in particularly morphology-phonology interactions across languages. The paper specifically accounts for the interaction of morphology and phonology in reduplication in Ibeme Igbo using the level-ordering theory. Data were collected through oral interviews using Mbah's reduplication glossary. Introspection was involved in data gathering as a native speaker. The study observed three-level morphology-phonology in Ibeme Igbo and they are: Level 1 morphology & phonology rules (Reduplicated gerundive nominal with harmonizing /o-/ prefix (partial c-copying), other reduplicated nominals with different prefixes and reduplicated verbs), Level 2 morphology & phonology rules (Reduplicated gerundive nominal with harmonizing o- (full CV copying), Affix-derived nominals (both prefix and suffix) and (prefix only), and Level 3 morphology & phonology rules (Reduplicated nominals -interfix and prefix both, interfix- derived nominals). These levels show points of interaction of morphology and phonology in the derivation of nominal and verb reduplicated forms in Ibeme Igbo.

Keywords: *Reduplication, Lexical phonology, Levels/Strata.*

Introduction

The existence of levels or strata has been proposed by Kiparsky (1982) in establishing interaction among linguistic levels particularly morphology and phonology. The main idea behind level ordering is the assumption that there is an interrelationship between morphological and phonological behaviours of affixes as regards affix ordering, although, not a perfect one. Siegel (1974) which influenced Kiparsky (1982) shows that the domain of certain phonological rules could be defined in terms of morphologically defined classes. These morpheme classes are called levels or strata. The morphological processes are assigned to specific strata along with applicable or appropriate phonological rules. Languages for which levels have been assumed to be applicable are:

- Dutch (3 levels by Zonneveld 1988, 2 levels by Kager, 1989)
- Malayalam (4 levels, by Mohanan and Mohanan 1984)
- Dakota (3 levels, by Shaw 1985)
- Mandarin (4 levels by Packard 1990)
- Icelandic (2 levels by Kiparsky 1985)
- Germanic (3 levels by Wise 1988)
- Igbo (3 levels, Clark 1990)
- Italian (3 levels, Scalise 1984)
- Basque (2 levels, Hualde 1991)

This study therefore attempts establishing the strata or levels in morphology-phonology interactions in reduplication in Ibeme Igbo.

Ibeme Igbo is a variety used in the Southern Igbo area. According to Nwaozuzu (2008) Ibeme is classified among the South Eastern Group of Dialects (SEGD) of Igbo being one of the varieties used in Obi Ngwa LGA of Abia state. Although her classification does not clearly reflect Ibeme, (having glossed it over with Ngwa- major dialect of the SEGD), we have elsewhere established that Ibeme is a separate dialectal area. (Onwukwe, 2015). The tone convention adopted is that of Green & Igwe (1963) where low and step tones are marked leaving high tones unmarked. The paper is arranged first with an explanation of lexical theory, reduplication in Ibeme Igbo and the level-ordering account then summary and conclusion.

Level-ordering Explained

The notion of level-ordering was introduced as a module for accounting for morphology and phonology interactions in Kiparsky's (1982) Lexical phonology (LP). Lexical phonology theory was introduced into the scene of phonological theories in the early 1980s by Kiparsky (1982, 1985) and Mohanan (1982). Lexical Phonology refers to an approach to phonology that accounts for the interaction of morphology and phonology in the word building process. It is as opposed to post lexical phonology which accounts for beyond the word to phrases, clauses, etc. According to Spencer (1991) it is the most notable efforts of Kiparsky (1982) in re-defining the relationship between morphology and phonology in an explicit and captivating manner.

Lexical phonology stands for a set of related but independent hypothesis about the morphology–phonology interface. The basic assumption of the theory is that morphology and rules of phonology apply in tandem. The theory assumes the following organization of grammar (adapted from Kaisse and Shaw 1985, p4).

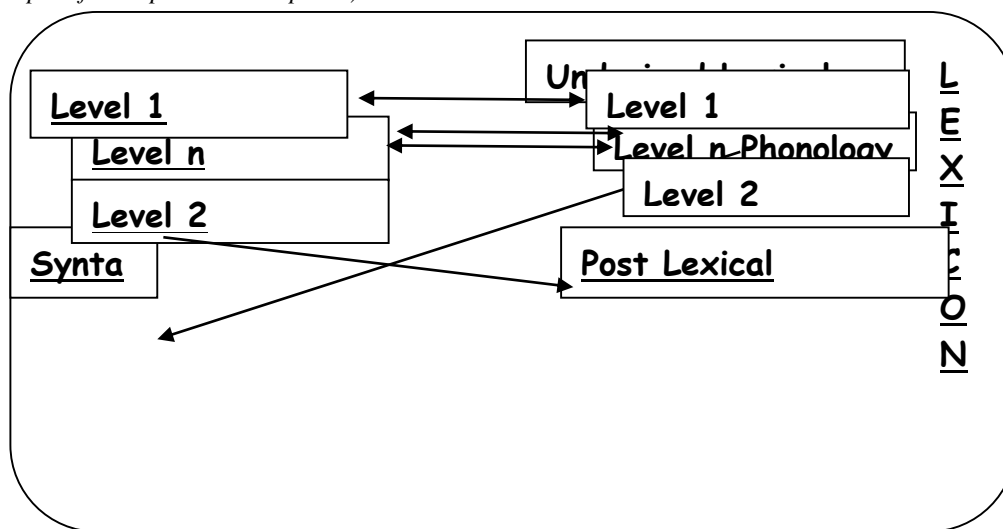
Lexical phonology assumes that phonological rules may apply cyclically. This means that the rules are repeated many times and always happening in the same order. The fundamental idea behind theories of cyclic rule application is to permit one and the same rule to apply more than once in a derivation. Having applied a set of cyclic rules, we then expand the string over which the rules apply, and then, apply the whole rule set to the new string. Each application of the rule set constitutes a single cycle, and the given string to which the rules apply is a cyclic domain.

Kiparsky (1982) extends the theory of cyclic phonology through proposing to obtain the effects of cyclicity by introducing a version of Siegel’s level ordering. Kiparsky (1982) argues that this is key to understanding the operation of all cyclic phonological rules. In kiparsky’s (1982 p.131) own words:

Each level is associated with a set of phonological rules for which it defines the domain of application... The output of each word formation process is submitted within the lexicon itself to the phonological rules of its level. This establishes a basic division among phonological rules into those which are assigned to one or more levels in the lexicon and, those which operate after words have been combined into sentences in the syntax. The former, the rules of lexical phonology, are intrinsically cyclic because they reapply after each step of word- formation at their morphological level. The latter, the rules of post-lexical phonology, are intrinsically non-cyclic.

The diagram below captures the notion of cyclicity and level ordering in the kiparsky’s (1982) lexical phonology.

Fig 1 :(Adapted from Spencer 1991 p.110)



Kiparsky (1982) adopts Siegel’s level – ordering hypothesis in accounting for the interaction between morphology and phonology within the lexicon. The key claim is that the phonological rules which interact with the morphological structure are ordered and in levels as can be seen in figure 2). However, other lexical phonologists like Mohanan (1986) argue that level ordering imposes strong constraints on word formation processes, too strong. Hence, they view that languages will have to break free of the stringent restrictions imposed by level ordering and allow words formed in one stratum (level) to loop back to the previous stratum, as to undergo further word formation. It is easily said that based on this argument, that level- ordering is not the right way to approach the problem of morpheme ordering (Spencer, 1999). Mohanan (1986) explains the idea of loop using compounding. Hence it could be said “that level – ordering in lexical phonology does not clearly explain compound and it poses its own special problems for morphological theories” (Spender 1991 p.115).

An aspect of the theory of lexical phonology which is particularly prone to variation is level ordering. Kiparsky (1982) postulates two or at most three morphological levels for English where as Halle and Mohanan (1985) and Mohanan (1982, 1986) posits four morphological levels.

Reduplication in Ibeme Igbo.

Reduplication is a morpho-phonological process of deriving a new word by copying all or part of the root or stem. The full or partial copy of the stem is known as the Reduplicant (RED), while the stem from which it is copied is known as the base (BASE). Marantz (1982) lends that reduplication is essentially affixation and what is affixed is the CV skeleton. The base of reduplication can be a noun or a verb. Verbs undergo the process of reduplication in Ibeme Igbo. In Ibeme Igbo, it operates in conjunction with affixation. The affixes involved are entirely prefixes or prefixes and interfixes. For the fact that verbs undergo reduplication in Ibeme Igbo, we say that the products of the process are de-verbals by which we mean that they are derivations from verbs – simple verb roots.

We identify reduplicated nominal and reduplicated verbs in Ibeme Igbo. Our discussions on these, focus on their morpho-phonological compositions by which we mean the affixation types (prefixes or prefixes with interfixation or even none) on the one hand and segmental changes and tonal melodies on the other hand. These tonal melodies involve either tone copying (i.e.) they copy the tone of the reduplicant or tone polarization (i.e.) they have combinations of opposing tones in a single unit. This is assigned to the reduplicated words or derived from their simple forms.

Reduplicated Nominal in Ibeme Igbo

We identify that for both reduplicated nominal and verb in Ibeme Igbo, the segmental composition is essentially common but the differences occur on the prefixes and tonal melodies. Here, we identify gerundive nominal with its prefix harmonizing marker /o-/. The gerundive nominal involves prefixation of the harmonizing marker /o- which harmonizes with the vowel of the verb root. There are other nominals with different prefixes, some in conjunction with interfixation also derived in Ibeme Igbo. For each, we discuss their tonal patterns and the affixation type. The common segmental composition is that the vowel of the reduplication syllable must be a [+high] counterpart of that of the reduplicant (the simple verb root) and that the vowel of the reduplication syllable agrees with that of the reduplicant in other features: [X back], [B round] and [Y exp.] with a modifying condition that states that if the consonant of the reduplication syllable is [+labial], the vowel of the reduplication syllable changes to high back rounded vowel /u/ in harmony with the root vowel. For gerundive nominals, the following tables provide examples in Ibeme Igbo.

(A)

Verb root	gloss	Prefix reduplication	Gloss
-k ^h e	cook (soup)	ò-k ^h i –k ^h e	cooking (soup)
-ke	tie	ò-ki – ke	tying
-gwe	take	ò-gwu-gwe	taking
-fo	uproot	ò-fu-fo	uprooting
-do	drag	ò-di -do	dragging
-kpo	call	ò-kpu-kpò	calling
-b ^h o	carry (load)	ò- b ^h u –bo	carrying/ lending (a hand)
-chọ	seek	ò-chi-chọ	seeking

(B)

Verb root	gloss	Prefix reduplication	Gloss
-d ^h u	sew	ò-d ^h u-d ^h u	sewing
-ri	eat	ò –ri-ri	eating
-di	endure	ò-di-di	enduring
-zù	train	ò-zù-zù	training
-rù	work	ò-rù-rù	working
-lù	marry	ò-lù-lù	marrying
-fù	lose	ò-fù-fù	lost/loosing
-ku	scoop	ò-ku-ku	scooping

Tables A and B are cases of partial and total reduplicated gerundive nominals in Ibeme Igbo. We observe that these gerundive nominals involves prefixation of the harmonizing marker /o-/. We therefore analyze the pattern of operation, tonal melodies of each of the tables.

For table A, the root vowel in all the cases of reduplication is (- high), and this is a pointer to the partial identity between the root and the reduplicant. There is also another aspect of their pattern of operation which is that there is alternation between high front vowels [i /i] and high back vowels [u /u] in the reduplicant. The consonant segments of the verb root influence the alternations. When the root consonant is [+labial], the reduplicant vowel is [u/u] depending on the harmony set of the root vowel as in the following:

- (A) ò -gwù-gwè taking/using
 ò-b^hu - b^ho carrying/lending/ a hand)

When the root consonant is non-labial [-labial], the reduplicant's vowel becomes [I / I] according to vowel harmony rule as in

- (B) ò -k^hi - k^he 'cooking (soup)
 ò -chì -chọ 'seeking/searching'

One feature seems different in Ibeme Igbo and it concerns labiality spreading of the labial consonants onto the high vowel of the reduplicant solely in the case of the vowels emanating from a [-high] verb root as in table A. Round vowels of the verb root also trigger the spreading. In terms of tonal melodies, the tone of root vowel is copied in Ibeme Igbo hence, tonal patterns involve tone copying. The harmonizing prefixes O-/ has inherent low tone which is not altered in the derivation.

For table B, the derivations in Ibeme Igbo are formed by prefixing (o / ọ) and copying in full the simple verb root as can be seen in the table. One glaring feature is that all the root vowels are (+ high) which we suspect led to the full copying of the verb root. We notice again that the root vowels-high front (I / i) and high back (u/ü) are not selective of the consonant to occur with. We suspect too that verb roots with [+ high] vowels always reduplicate fully while those with [- high] vowels do not in reduplicated gerundive nominals. The table below provides examples for other reduplicated nominals with different prefixes in Ibeme Igbo.

Simple Verb root	gloss	Reduplication syllable	prefix	Reduplicated nominals	Gloss
-gba	demarcate	-gbu	a-	a-gbu-gba	fence
-to	grow	-tu	o-	ò-tu-to	Boil
-ma	prophecy	-mu	a-	a-mu-ma	Prophecy
-ro	beg	-ri	o-	o-ri-ro	Petition
-nwa	tempt	-nwu	o-	o-nwu-nwa	Temptation
-kwe	agree	-kwu	o-	o-kwu-kwe	Faith
-bo	accuse	-bu	e-	e-bù-bo	accusation

The examples show that the derivations involve the harmonizing prefixes: o-/ , a-, e-. The prefix o- usually carry low tones in which case there is tone copying in their derivation while the prefixes a-, e- carry high tones in which case there is tone polarization (I.e.) combination of opposing tones in a single unit. Their segmental composition reflect the standard situation where the reduplication syllable has the [+ high] feature of the vowel of the verb root with the modifying condition as stated earlier. However, we must note that the case of 'otuto' 'boil' indicates that the alternation of /I/ and /u/vowels is dialectal. The standard Igbo version is 'otito' "boil".

For those reduplicated nominals involving both interfixes and prefixes, we have the following examples in Ibeme Igbo.

S/N	Simple VR/stem	Gloss	Prefixation	Interfi x	Reduplicated nominals	Gloss
1	-t ^h u	talk	e-	-re-	et ^h u-r-et ^h u	talkative
2	-k ^h a	draw/length	a-	-ra-	ak ^h -r-ak ^h a	length
3	-ri	eat	e-	-me-	e-ri-m-e-ri	food
4	kpu	small	-	-ru-	mkpu-ru-mkpu	small
5	chọ	tiny	-	-li-	nchọ-li-nchọ	tiny feature

Different operational patterns could be observed in the data in Ibeme Igbo. As can be seen, there are two patterns of prefix-interfix reduplicated nominals in Ibeme Igbo; and these are largely surface properties /patterns. First, interfix reduplicated nominals can reflect avoidance of vowel hiatus (i.e. non- sequencing of vowels) hence the constraint that applies is such that prevents vowel hiatus as can be seen in samples 1, 2 and 3, leading to the eliding of the (V) of the interfix syllable. Second, interfix reduplicated nominals reflect the operation of the phonotactic property (i.e.) unpermissiveness of consonant cluster in Ibeme Igbo and indeed Igbo; leading to the retention of the vowel of the interfix syllable as can be seen in samples 4 and 5above.

In terms of tonal patterns, samples 1, 2 and 3 involve tone polarization essentially because of the eliding of the vowel of the interfix in the derivation while samples 4 and 5 involve tone copying. We now turn attention to reduplicated verbs in Ibeme Igbo.

Reduplicated Verbs in Ibeme Igbo

We identify that in Ibeme Igbo, simple verb roots could be reduplicated to form complex verbs and this we call the reduplicated verbs. Structurally, they exist as verb roots only in their reduplicated forms. They are structurally non-decomposable unlike the other complex verbs such as *gwepu*, *tuda*, etc. One major feature of reduplicated verbs is that their derivation does not involve prefixes but only tonal patterns. Below are examples of reduplicated verbs in Ibeme Igbo.

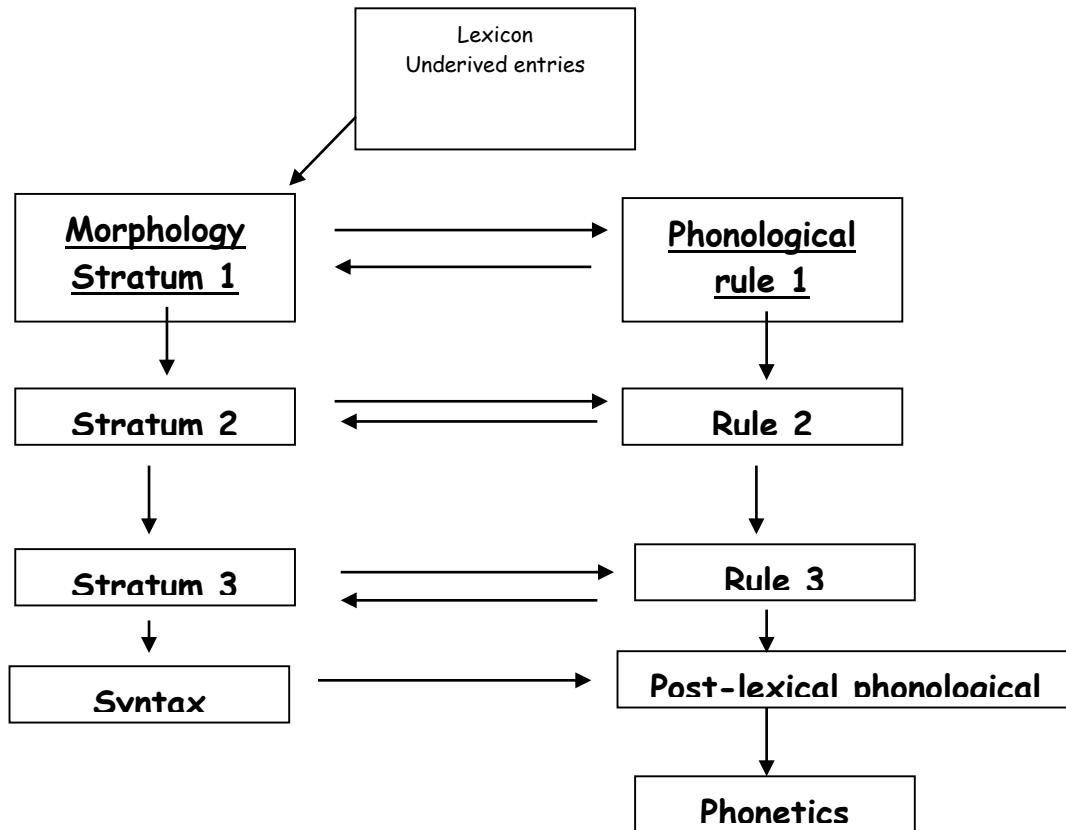
Simple VR	Gloss	Reduplicated syllable	Reduplicated verb	Gloss
-kpa	gather	kpu-	kpukpà	gather all
-sha	grope	shi-	Shishà	grope about
-k ^h o	rise (swell)	k ^h u	k ^h uk ^h ò	behave pompously
-gwe	mess/grind	gwu	gwugwè	mess around or grind thoroughly
-cha	act in...	Ch ^h i	ch ^h ich ^h à	behave without decorum

The table above indicates the common segmental composition for reduplication in Ibeme Igbo. The vowel of the reduplicated syllable is the [+ high] counterpart of that of the verb root however labial feature of the consonant element of the simple verb root conditions the quality of the vowels of the reduplicated syllable making it [+ high, + back, + round] (i.e.) /U/ which harmonizes with the root vowel. The tone melody of the derivation of reduplicated verbs in Ibeme Igbo involves tone polarization and it is essentially High, Low (HL) pattern. Tone polarization in these forms is assigned not derived since it is not dependent on the tone of the root.

Level-ordering Account

For LP, its featural specification is its use of levels. We are adopting the classical lexical phonology model as proposed by Kiparsky (1985). We present the schema of the flow chart below (which is an expansion of fig. 6 adapted from Kaisse & Shaw 1985, P4) and also

Fig. 2.



In the diagram above, a lexical item extracted from the lexicon is processed by morphology at level 1, in the sense that the applicable affixation rule applies, then the derivative fed into the phonological component where all the relevant lexical rules available at that level apply. In the case of a stratum where there is more than one relevant applicable affixation rule for an entry, the derived string is fed back into phonology after each affixation at that level. When no more affixation rules apply, the output is then passed to the next level. Here again, all the applicable morphological & phonological rules defined for that level will apply. At times these rules apply cyclically and continue until the derivation reaches the final level and the appropriate phonetic form is realized, and that is the output of LP.

Based on the above table and some morphological data presented in the previous section, we propose three-level morphology for Ibeme Igbo. We therefore breakdown LP analysis based on the proposed 3-level morphology as follows:

1. Level 1 morphology & phonology rules (*Reduplicated gerundive nominal with harmonizing /o-/ prefix (patial c-copying), other reduplicated nominals with different prefixes and reduplicated verbs*)
2. Level 2 morphology & phonology rules (*Reduplicated gerundive nominal with harmonizing o- (full CV copying), Affix-derived nominals (both prefix and suffix) and (prefix only).*)
3. Level 3 morphology & phonology rules (*Reduplicated nominals -interfix and prefix both, interfix- derived nominals, compounding.*)

We consequently analyze these levels using some of the illustrations in previous section.

Level 1 Morphology & phonology Rules:

Here, we analyze the proposed morphological processes as with level 1 phonological rules. We should note that a given input of level one may not only be affected by the level's morphological & phonological rules. It may as well be affected by any other level's rules before the final output is realized. We had given the following examples of reduplicated gerundive nominals in Ibeme Igbo.

Verb root (VBR)	Gloss	Reduplicated forms	Gloss
/-k ^h e/	cook (soup)	ò-k ^h _i -k ^h e	cooking (soup)
/-gwe/	take	ò-gwu-gwe	taking
/-kpò/	call	ò-kpu-kpò	calling
/-b ^h o/	carry (load)	ò-b ^h _u -b ^h o	carrying (load)
/-chò/	seek/search	ò-ch _i -chò	searching/seeking

As noted earlier, there is the alternation of the reduplicant vowel in the structures above (i/u) and thus accounts for the partial identity between the reduplicant and verb root. This, we identified, is influenced by the consonant of the verb root. We therefore compute the derivations of both the i-root epenthesis and u-root epenthesis. For the i-root epenthesis, we analyze the de-verbal noun O-k^h_i-k^he 'cooking (soup)' as follows: The verb root /-k^he/ extracted from the lexicon is first processed by morphology which of course is based on the Kiparsky's (1985) hypothesis that verb root or stem does not initiate the application of phonological rules. In the level 1 morphology, the consonant segment of the root is copied and prefixed to the verb root, resulting in the form *K^h_ik^he. The formation of consonant cluster is prohibited in Ibeme Igbo and this default form is fed into phonology which applies the rule 'i' epenthesis leading to the break of the consonant cluster to form K^h_ik^he. And since no other level 1 phonology rule is applicable, the form K^h_ik^he is fed back to morphology which has no more morphological effect at this level hence the output K^h_ik^he is passed to level 2.

At this point, another hypothesis of Kiparsky (1985), as identified by Booij (2000) seems to be tenable. That is "apply a rule when possible". Hence, the output of level 1 is first processed by phonological component at level 2 - the rule of high-tone applies before the result /K^h_ik^he/ is subjected to morphological operation. At level 2 morphology, the nominal low tone prefix (o) is affixed to the structure to form o- K^h_ik^he. This derived form is fed into syntax and since no post-lexical rule applies at the post-lexical level, the form comes out as the output of lexical phonology.

Another example of i-epenthesis derivation is as follows:

The verb root /tʃ/ is fed into morphology from the lexicon where the rule of consonant copy applies deriving the form */tʃ tʃ/ /chchò/. This form is scanned by the level 1 phonology and the 'i' epenthetic rule applies leading to *chichò. The vowel harmony rule applies, harmonizing the epenthetic vowel /i/ with the root's vowel resulting in [-ATR] counterpart which is /I/ hence /chIchò/. This form is fed back into morphology and since no more affixation rule applies, it is passed onto the next level 2. In relation to the rule "apply a rule when possible", the level 2 phonology first processes the output and the high tone is assigned to the reduplicant's vowel resulting to /chichò/. The morphology derivation component adds the nominal prefix /o/

to the form and *ochichọ is realized. Phonology again processes the form and assigns vowel harmony rule to the prefix so that the [-ATR] counterpart /ɛ / ‘o’ which harmonizes with the root vowel is derived hence the form / ɛtʃitʃ / ɔchichọ/. This form passes to syntax and post-lexical levels and comes out as the final output of the derivation.

For the u-root epenthesis, we had argued that underlyingly the epenthetic vowel which is assigned the (partial) reduplicant’s vowel is /i/ and that the presence of /u/ at the surface level is as a result of liability spreading. Thus, in Ibeme Igbo, the labial feature of the consonant segment of the reduplicant spreads on the vowel of the reduplicant, thereby turning /i/ to /u/ at the surface level. As illustrated in table A above, reduplicant consonants that are [+ labial] have the vowel as /u/. Some of the illustrations are produced below:

- (i) ɔ-gwu-gwe ‘taking’
- (ii) ɔ-b^hu-b^ho ‘carrying’
- (iii) ɔ-□-kpɔ-kpɔ ‘calling’

We therefore present the lexical phonology account of these structures as follows. For (i), the verb root /gwe/ is processed by level 1 morphology, where affixation occurs – the roots’ consonant is copied and prefixed to the verb root to have */gwgwe/. This form is fed into phonology where the epenthetic /i/ is inserted in between the consonants to break the cluster. Also, liability spreading applies thereby changing the vowel of the reduplicant to /u/ hence /g^wug^we/. This form moves to level 2 phonology first, where high tone is assigned to the vowel of the reduplicant then, morphology, where /o/ prefix is attached to the structure to obtain the gerund og^wug^we. This comes out as the final output of the derivation.

For (iii), the root /-kpɔ/ extracted from the lexicon is processed by morphology where the root’s consonant is copied - */kpkp/. This string is fed into phonology 1 where the rule of /i/ epenthesis applies thereby breaking the consonant cluster. As a result of the surrounding labialized consonants, liability spreading rule applies changing /kpikpɔ/ to /kpukpɔ/. Also, the V-Harmony rule applies to create [-ATR] counterpart of /u/ so as to harmonize with the vowel of the root [-ATR] hence the form /kpukpɔ/ is derived. This form is fed into level 2 morphology. At this level, phonology applies first assigning high tone to the reduplicant’s vowel /kpukpɔ/. And level 2 morphology adds the nominal prefix /o/ to have */o-kpɔ-kpɔ/. At this stage, another level 2 phonology rule V-H rule applies converting /o/ to it’s [-ATR] counterpart /ɔ/ so as to harmonize with the vowel of the root. This form /ɔkpukpɔ/ ɔ kpɔ kpɔ / ‘calling’ that is realized at the phonetic level as the final output.

We therefore show the organization of the interactions between morphology and phonology in the derivations as follows: (for i-epenthesis realized as /i/ and /u/ on the surface structure)

Underlying representations	/- K ^h e/(k ^h e)	/tʃɔ / (chọ)	/kpɔ / (kpɔ)
LEVEL 1			
Morphology component (Reduplication: C copying)	*/ K ^h k ^h e/	/ tʃ tʃ /	*/kpkpɔ /
Phonological component (/i/epenthesis)	/ K ^h k ^h e/	/ tʃi tʃ /	*/kpikpɔ/
Phonology component (labial spreading)	-	-	*/kpukpɔ /
Phonological component (vowel Harmony rule)	-	/ tʃ I tʃ /	/kpukpɔ/
LEVEL 2			
Phonological component (H-tone rule)	/ k ^h i k ^h e/	/ tʃ Itʃ /	/kpukpɔ /
Morphology (affixation rule: nominal prefix /o/)	/o k ^h ik ^h e/	*/ o tʃ Itʃ /	*/okpukpɔ /
Phonology component (V-H rule)	-	/ ɔ tʃ I tʃ /	/ ɔ kpukpɔ /
Phonetic representation	o k ^h ik ^h e ‘cooking’ (soup)	ɔchichọ ‘searching’	okpukpɔ ‘calling’

We observe that the computation of other reduplicated nominals with different prefixes such as a-/e- as indicated with examples such as below: *agbugba* ‘fence’, *ebùbo* ‘accusation’ follows the same processes except that the prefix is either a- or e- depending on the form. We show the organization of the interactions in the derivation below.

Underlying Representation	/-gba/	/-bo/
Level 1		
Morphology component:	*/gb gba/	*/b bo/
C-copying		
Phonology: /i/ epenthesis:	*/gbigba	*/bibo/
Phonology: Labial spreading:	*/gbugba/	*/bubo/
Phonology: V-H rule:	/gbugba/	-

Level 2

Phonology: L-tone assignment:	/gbugba/	/bùbo/
Morphology: a-/e- affixation:	/agbugba/	/ebùbo/
Phonetic realization:	agbugba 'fence'	ebùbo 'accusation'

Similarly, we can as well show the derivation of reduplicated verbs in Ibeme Igbo. This also involves /i/ epenthesis and its surface realization of /u/ depending on the consonant of the reduplication syllable. We show the interactions of phonology and morphology using the following examples: *kpukpà* 'gather all' *ch^hich^hà* 'behave without decorum'.

Underlying representation:	/-kpa/	/-ch ^h a/
Level 1:		
Morphology: C-copying	/kp kpa/	/ch ^h ch ^h a/
Phonology: /i/epenthesis	*/kpikpa/	*/ch ^h ich ^h a/
Phonology: Labiality	*/kpukpa/	-
Spreading		
Phonology: V-H rule	/kpukpa/	*/ch ^h Ich ^h a/

Level 2:

Phonology: H-tone assignment	/kpókpa/	/ch ^h Ich ^h à/
Morphology: Affixation (Prefix)	-	-
Phonetic realization::	/kpukpa/	/ch ^h ich ^h a/

From the organization above, we can buttress some tenets or assumptions of Kiparsky (1985) about lexical phonology in Ibeme Igbo. First, for the fact that some similar rules apply at both levels (1&2) shows that the rules are CYCLICAL or CYCLIC. Second, in level 1, the last three rules are phonological. This shows that the rules can apply in BLOCK and are ORDERED as assumed by Kiparsky (1985).

Thirdly, in level 2, one can notice that the phonological component is the first to process the output of level 1 thereby confirming the assumption of Kiparsky (1985) as captured in Booji (2000) "apply a rule when possible". Also, in level 1, morphology is the first to process the verb root/stem extracted from the lexicon. This confirms Kiparsky's (1985) hypothesis that verb roots or stems do not initiate the application of phonological rules.

It is pertinent to state that in the extant literature which we reviewed; 'i-prespecification' seems to have been favoured by particularly some scholars who are auto-Segmentally oriented (Oyebade 2004, Marantz 1982) in explaining partial reduplication as evident in many African languages. By 'i-Prespecification', they mean a "mechanism by which templatic or reduplicative morphemes have invariant melodic material" (Marantz, 1982p.61). Their argument is that the partial nature of reduplicative forms in African languages including Igbo is as a result of prespecifying the vowel /i/ in the V-slot of the reduplicant thereby blocking or over-riding the association of any other vowel to the V-slot. This explanation is illustrated in the form below: (o K^h_i k^h_e) 'cooking (soup)'.

(83). VR-/ k^h_e/

Reduplication - K^h_i + k^h_e
 (i -Prespecification)
 Nominal Prefix - o K^h_i k^h_e
 Phonetic form: ok^h_ik^h_e

The crux of their argument is that for partial reduplication, the verb root is fully copied but the prespecification of /i/ gives rise to the partial copying but for full reduplication, the (i) prespecification is blocked (Oyebade 2004) or cancelled.

We hold strongly here that our LP analysis of partial reduplication as evident in most African languages including Igbo and indeed Ibeme Igbo is a superior argument. Based on the LP model, our analysis reveals that partial reduplication is as a result of not fully copying the monosyllabic verb root (only the consonant segment is copied onto the reduplicant) leading to a form that is prohibited in Igbo phonotactics: consonant cluster. This necessitates an /i/ epenthesis to break the cluster. And the labiality feature of the consonant segment of the reduplicant influences the 'i' epenthesis to /u/ leading to alternations of (i) and /u/ in partial reduplicated structures. Also, for full reduplicated structures, we hold that the idea of pre-specification is cancelled as total reduplication show melodic invariants. How then do we account for the

following full reduplicated structures: ò-d^hud^hu ‘sewing’, ọ-lulụ ‘marrying’ etc. How can one account for the prespecified can? We hold therefore that our /i/ epenthesis of the LP analysis better explains partial reduplication structures in Ibeme Igbo. This position corroborates Onukawa (1991), (1992a), (2002) and Onwuka (2007) among others.

Level 2 Morphology and Phonology Rules

Here, we focus on cases of reduplicated gerundive nominal involving full CV-copying with o- harmonizing prefix. We observe that, this kind of reduplicated gerundive nominals involve [+high] vowel of the roots which are completely or fully reduplicated. Our simple generalization on these structures is that the root vowels that are [+high] reduplicated fully as opposed to those that are [-high] which reduplicate partially. The following examples were presented in Ibeme Igbo.

Verb root	Reduplicated form	Gloss
-d ^h u	ọ d ^h u d ^h u	sewing
-lụ	ọ-lulụ	marrying
-di	o-didi	enduring
-zụ	ọ zuzụ	training

The LP analysis of the derivation of the reduplicated gerundive nominal òd^hud^hu ‘sewing’ is presented below: The root /-d^hu/ is processed by the morphological component of level 1 where there is no morphological and as well phonological effect. It proceeds to level 2. At this level, it is processed by morphology where the CV root is copied and prefixed to itself leading to the form / d^hud^hu/. Also, the nominal prefix /o/ is added to create */o d^hud^hu/. This is fed into phonological component of level 2 where V-H rule applies transforming /o/ to /ọ /, /ɛ/ and /ɔd^hud^hu/ (òd^hud^hu) is derived after passing into syntax and post lexical components. We present the organization of the interactions below:

Underlying representations:	/d ^h u/(d ^h u)	/l ụ /(lụ)	/zụ /(zụ)
Level 1			
Morphological component	-	-	-
Phonological component	-	-	-
Level 2			
Morphological: (CV reduplication)	/d ^h ud ^h u)	/lulụ /	/zuzụ/
Morphological: (nominal prefixing)	*/o d ^h ud ^h u /	*/olulụ/	*/ozuzụ
Phonological (V-H rule)	/ọ d ^h ud ^h u/	/ọ lulụ/	/ọ zuzụ/
Phonetic realization	òd ^h ud ^h u ‘sewing’	ọlulụ ‘marrying’	ọ zuzụ ‘training’

We had earlier identified that in the above structures, the roots (CV) are copied including their tone patterns; a reason for which we described them as full reduplicated gerundive nominals and that they are so dubbed became full copying of CV roots precedes prefixation of the nominal agent marker.

Let us now consider LP analysis of cases of affix-derived nominals involving only prefixes on one hand and both prefixes and suffixes on another hand. We had identified the former as prefixed-derived nominals with such prefixes as o-, a-, m-, n- in Ibeme Igbo and the latter as operating with prefixes in conjunction with -rV derivational suffixes in Ibeme Igbo. We have the following examples.

Prefix-derived nominal

ò-k ^h e	(kwukwọ)	‘cook’	<	k ^h e	‘cook’
à-ma		‘witness’	<	ma	‘know’
n-chọ		‘invitation by the bereaved’	<	-chọ	‘search/seek’
ò-gbụ		‘killer/cutter’	<	-gbụ	‘kill/cut’
m-ke		‘calabash rung’	<	-ke	‘tie’

Some examples for suffix-derived nominals in Ibeme Igbo with prefixation include:

ichiri	‘heel’	<	-chi	‘rub against’
ibàrà	‘joyful’	<-ba		‘be plenty’
feelings’				
mbara	‘wide space or village square’	<	-ba	‘be plenty’

We present the organization of the interactions of morphology and phonology in the derivations below: However, for prefixed-derived norminals; it involves the affixation by the morphological component of the level 2. The inherent tone patterns of the verb roots are not affected in the derivations. The prefixes carry inherent low tones unaltered in the derivation.

Underlying representation:	/-chì/	/-bà/	/-bà/
Level 1: (No effects)			
Level 2:			
Morphology: suffixation; (-rV derivational suffix)	-chiri	-bara	-bara
Morphology: Prefix	i-chiri	i-bara	m-bara
Phonology: V-H rule		-	I-bara
Phonology: (L-tone copying on rV suffix)	I-chìrì	I-bàrà	m̀-bara
Phonetic realization:	ichìrì	ibàrà	m̀bara

Level 3 Morphology and Phonology Rules

We propose that reduplicated nominals involving both interfixation and prefixation, interfix-derived nominals and compounding are under this level. For the reduplicated nominals involving interfixation, the following examples were given in table 6 in Ibeme Igbo.

(a)	ak ^h a	‘length’	-ra-	ak ^h a-r-ak ^h a	‘long/tall’
(b)	udi	‘type’	-li-	udi-l-udi	‘species’
(c)	mkpu	‘small part’	-ru-	mkpu-ru-mkpu	‘smallness’
(d)	ncho	‘tiny part’	-li-	ncho-li-ncho	‘tiny feature’

We notice in the above structures that Obligatory Contour Principle (OCP) is blocked by the interfix CV; hence, there is complete copying of the tone features of the roots unto the reduplicants. In (a) and (b) above, there is avoidance of vowel hiatus resulting in deletion of the interfix vowels while in (c) and (d), deletion of vowel is blocked by the phonotactic constraint which disallows consonants cluster resulting in maintenance of the vowel of the interfix.

We proceed to compute the LP derivation of some of the structures below. We must note that the structures (a-d) are essentially noun-root reduplication with interfixation. For (a), the noun root $|ak^h a|$ is scanned by level 1 and 2 morphology and since there are no effects, it proceeds to level 3 morphology, there is therefore complete copying of the noun root resulting in the form $*|ak^h aak^h a|$. This form is processed again by morphology, leading in the interfixation of the CV (-ra) and the form $*|ak^h araaka|$ is derived. This default form is fed into phonology, where the V-deletion rule applies; leading to the deletion of V of the interfix and $|ak^h arak^h a|$ is created. This comes out as the output of the derivation.

For the other variant, $|mkpuru mkpu|$, the noun root $|mkpu|$ is fed into level 3 morphology leading to complete copying of the noun root and interfixation of the CV stem resulting in $*|mkpuru mkpu|$. This form is fed into phonology where V-H rule applies converting the (+ATR) vowel of the interfix to [-ATR] counterpart to harmonize with the noun root vowel hence the form $|mkpuru mkpu|$ is created.

However, there are some changes in the derivation of the reduplicated nominals involves prefixation and interfixation as in the form $|et^h uret^h u|$ ‘talkative’. This is a case of prefixation and interfixation in Ibeme Igbo. The form is broken down as follows:

Verb root	Gloss	Prefix agentive	Interfix	Reduplication	Gloss
-t ^h u (uka)	Talk	-e	-re	et ^h uret ^h u	Talkative

We proceed to complete the LP derivation of this form in Ibeme Igbo as follows:

The verb root $|t^h u|$ is fed into level 1 morphology since no effects, it proceeds to level 2. At this level 2, the agentive prefix $|e-|$ is attached to the root by the morphological component resulting in the form $|et^h u|$. This form is fed into level 3 morphology, where the morphological component processes it first resulting in the copying of the base/stem and interfixing of the CV-interfix material to realize the form $*|et^h uret^h u|$. The default form is fed into phonology, where the V-deletion rule applies leading to the deletion of the vowel of the interfix material and this form $|et^h uret^h u|$ is realized as the output.

Summary and conclusion

The domain of operations of the morphological and phonological rules in the structure of Ibeme Igbo represents three-level morphology consistent with that of Clark (1990) in Igbo language. In each stratum,

morphological and phonological rules apply in tandem and the rules (phonological) are cyclic in line with the tenets of Lexical Phonology theory adopted for this study. The level-ordering shows the organization of the interactions between morphology and phonology in the derivations involving affixation, and reduplication.

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