Syllable Structure and the Association of Tones in Koring

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Abstract
Koring language belongs to the Upper-Cross group of the Delta Cross sub branch of the Cross River in the Niger Congo language family (Simons and Fenning (ed) 2017), spoken by the Oring people who live in parts of Ebonyi and Benue states. Primary and secondary sources are employed for data collection and autosegmental phonological framework adopted for analyses. Koring is a coda language with V, CV, and CVC syllable structures. Koring has two basic tones: the high and the low tones with non-distinctive falling and rising contour tones. Tones are associated only to the vowels of the language. Floating tones and contour tones are appropriately linked with reference to the Well-Formedness Condition (WFC). Contour tones in Koring are not distinctive but result by: collapsing of adjacent phonetic lengthened vowels on different pitch level, merging of a floating tone with a vowel at some point during derivation which passes its tonal specification to such vowel, resulting either to a glide or get simplified to same level tone. This is observed in "spreading", an autosegmental principle and language specific rule, where the toneless vowel /e/ representing the Koring article automatically acquires the tone which spreads to it from this preceding vowel.

 Key Words: Koring language, Autosegmental framework, spreading, syllable structure, floating tones, contour tones.

1. Introduction

Tone, according to Kirsten (2002), is one of the prosodies observed in tone languages. For Anagbogu, Eme and Mbah (2001), it is a feature realized on the syllable in tone languages. It gives meaning to lexical items and differentiates two otherwise identical lexical items. The precise definition of a tone language is controversial but it is common among linguists to stress lexical relevance as seen in various definitions by different authors. In tone language, tone is "a feature of the lexicon, being described in terms of prescribed pitches for syllables or sequences of pitches for morphemes of words" (Cruttenden 1997:8-9). Emenanjo (1987), views a tone language as one which makes use of the pitch of the voice to make a difference to the meaning of the word utterance. Similarly, Mbah and Mbah (2000), define tone languages as languages that apply pitch on a word by varying the pitch forms on syllables so that different meanings could be got from words that have the same phonemic compositions. In tone languages, tones are associated to tone bearing units within syllables. Some phonological processes encountered in African languages make an isolative discussion of the association of tone to tone bearing units of syllables clumsy. Autosegmental phonological framework is apt in the discussion of tone and its association to the tone bearing unit within the syllable as it accounts for some of these phonological processes encountered in a language.

Autosegmental phonology is one of the most prominent of the frameworks collectively known as non-linear approaches. In this framework, a phonological representation takes the form of a chart typically consisting of two or more parallel tiers. Each tier is a linear sequence of elements called autosegments. These autosegments on different tiers are related by association lines. The principle tier, variously called the skeletal tier, the CV tier, the timing tier or the X-tier, serves as a kind of backbone to which elements on the other tiers are associated. Various types of phonological information are distributed among some number of additional tiers, typically including at least the segmental tier, and in tone languages, the tonal tiers (tones). The number of distinct tiers recognized is highly variable.

This framework is derivational in conception. Phonological processes apply so as to modify particular tiers or to modify association between tiers. Among the principles of this framework are several well-formedness conditions, notably, the association convention and the no-crossing constraint.

Autosegmental phonology solves the problem seen in SPE framework in the standard generative phonology. In the Sound Pattern of English (SPE) framework, the purely segmental representations do not even recognize the syllable as a unit. This implies that tones are specified as features of vowels. This becomes difficult however if (as in some approaches) contour tones i.e. rise and falls are regarded as sequences of pitch level since two successive features must be assigned to the same vowel. Furthermore, in many tone languages, particularly those of Africa, the number of tones is not always the same as the number of vowels since more than one tone may occur on a given syllable and tones may "spread" to adjacent syllables. This problem is therefore solved in autosegmental framework as it does not regard the tones as features of the vowels but rather as a separate autonomous level or tier of representation, related to the segments by rules of association. Autosegmental framework therefore proves efficient in handling some autosegmental phenomena like: tone, nasalization, stress etc.

1.1. Ethnolinguistic Information

Koring, a tone language with two basic tones: the high and the low tones, is one of the African languages. It is the language of the Oring people who live in parts of Ebonyi and Benue States of Nigeria. Koring belongs to the Upper-Cross group of the Delta-Cross sub-branch of the Cross River language family (William and Blench 2003:3, Crozier and Blench 1992:118). It is a tone language as it fulfills all the characteristics of a tone language as earlier discussed in this work.

2. An Overview of Tone and the Syllable Structure of Koring

Koring is a tone language with two basic tones: the high and the low tones. The down step, rising and falling tones also exist in the language, however, they are not distinctive. While the downstep which is a relational tone follows an immediate preceding high tone, the rising and falling tones occur usually, when the pronunciation of a vowel glides from one tone to another. Koring is also a coda language since it operates a V (vowel), CV (consonant, vowel) and CVC (Consonant Vowel Consonant) syllable structures (cf. Ezenwafor, Enekebe, Akadu, Efobi and Onuorah 2005).

The syllable patterns and autosegmental representation of the monosyllabic, disyllabic and trisyllabic words are illustrated as follows:

3. Syllable Patterns of Koring Words

Koring language is a coda language and so operates a V, CV and CVC syllable structures. Each of the syllables bears a tone with the tone mark on the tone bearing units (TBUs). The tone bearing units in Koring are the vowels. In Koring, we have as much as six syllables in a word. However, using an autosegmental representation, the monosyllabic, disyllabic and trisyllabic words would be illustrated, noting the syllable patterns and the tones obtainable in each.

3.1. Syllable Patterns of Monosyllabic Words in Koring

The monosyllabic words in Koring take the CV or CVC pattern as in examples (1-5) below. While the monosyllabic verbs and nouns can have the CVC pattern as seen in examples (3-5) below, the CV pattern is restricted to the monosyllabic verbs as in examples (1) and (2) below. The two basic tones of Koring: the high "′" and the low "`" tones are clearly represented in the syllables. Unlike in some African languages, a vowel cannot be a monosyllabic word in Koring. The following exemplify the above claims.

(1). bọ /bɔ́/ 'beat' (sb)

```
Tonal tier         H
                   │
CV tier            c v
                   │ │
Segmental tier     b ɔ
```

(2). ma /mà/ 'run'

```
Tonal tier         L
                   │
```

CV tier   c v
                       | |
Segmental tier   m a

(3). zọl /zɔ̀l/   'nose'
Tonal tier   L
                       |
CV tier   c v c
                       | | |
Segmental tier   z ɔ l

(4). sọr /sɔr/   'body'
Tonal tier   H
                          |
CV tier   c v c
                       | | |
Segmental tier   s ɔ r

(5). yeṅ   /jeŋ/   'see'
Tonal tier   L
                          |
CV tier   c v c
                       | | |
Segmental tier   j e ŋ

3.1.2. Syllable Patterns of Disyllabic Words in Koring

As shown in examples (6-10) below, the disyllabic words in Koring, reveal a V-CV, V-CVC, CV-V, CV-CV and CV-CVC syllable patterns with the two basic tones: the high and the low tones clearly marked on them.

(6) ọ.ka /ɔ́.kà/ 'in-law'
Tonal tier   H L
                          | |
CV tier   v c v
                       | | |
Segmental tier   ɔ k a

(7) ẹ.fur /ɛ.fur/   'axe'
Tonal tier   L L
                          | |
C V tier   v c v c
                       | | | |
Segmental tier   ɛ. f u r

(8) kụ.ọ /kʊ.ɔ/   'vomit'
Tonal tier   L H
                          | |
CV tier   c v v
                       | | |
Segmental tier   k ʊ ɔ

(9) kọ.bu /kɔ́.bù/ 'bow'(n)
Tonal tier   H L
                          | |
CV tier   c v c v
                       | | | |

Segmental tier   k ɔ b u

(10) kẹ.sẹl /kɛ̀.sɛ̀l/   'cockroach'

Tonal tier   L   L
                      | |

CV tier   c v   c v c
                   | | | | |

Segmental tier   k ɛ.   s ɛ l

3.1.3. Syllabic Patterns of Trisyllabic Words in Koring

Trisyllabic words in Koring comprise a: V-CV-V, V-CV-CV, CV-CV-V, CV-CV-CV patterns as seen in examples (11) - (13).

(11) o.le.le /ò.lè.lè/   'anger'

Tonal tier   L   L   L
                     | | |

C V tier   v c v c v
                  | | | | |

Segmental tier   o l e   l e

(12) tu.ma.e /tù.mà.é/ 'to punch'

Tonal tier   L   L H
                   | | |

C V tier   c v c v   v
                 | | | | |

Segmental tier   t u m a   e

(13) ku.ji.le /kú.dʒí.lè/ 'outing'

Tonal tier   H   H   L
                    | | |

C V tier   c v c v c v
                  | | | | | |

Segmental tier   k u dʒ   i   l e

It is important to note that the examples cannot be exhausted. However, from the few examples given, the syllable patterns existing in the Koring language are clearly illustrated in the CV tier. The V, CV, CVC structures are prevalent in the examples. While a vowel cannot be a monosyllabic word in Koring as in examples: (1-5), it can be seen at the initial position of disyllabic or trisyllabic words as in examples: (6-7, 11).

3.2. Tonal Associations and Autosegmental Representation in the Koring Language

Having established the different syllable patterns prevalent in Koring, we shall now consider the association of Koring tones to the CV and the segmental tiers. This is done using the autosegmental phonological framework. This is because, it would allow for stating many phonological rules (tonological processes) in a simpler and easier way.

Autosegmental representation is associated with some principles as outlined in Goldsmith (1976). These principles are the guiding rules that must be adhered to while using this model for analysis. While some are language universal, others are language specific.

3.2.1. Well-Formedness Condition (WFC)

1. Each vowel must be associated with at least one tone (therefore, link a sequence of autosegments, for example, tones, with series of elements on the skeletal tier (cv tier) that are capable of bearing them. In other words, link tones with vowels.

2. Each tone must be associated with at least one vowel.

3. No association line may cross. Association lines do not cross in the linking process. When however, association lines cross by chance, a repair operation is put in place. This is rectified by: (i) either associating unassociated tones with vowels or

      (ii) associating associated tones with vowels .

The association convention and no crossing constraint are universal principles and are strictly obeyed in the first thirteen examples above. While association construction states that unassociated vowels

and tones on the same side of an association line should be associated in a one to one fashion, no crossing constraint states that association lines are not allowed to cross. However, association convention can leave tones and vowels unassociated. These tones and vowels are therefore said to be floating. To account for these floating tones and toneless vowels, the WFC is applied.

Beyond tone in isolation, that is, inherent tone(s) of a word(s), we have some changes that prevail when tones interact in speech. These changes result due to some tonal processes. Put differently, the underlying representation of tones is connected with their surface phonetic representation through some tonal processes. These tonal processes that exist in Koring language include: floating tones (segmentalization and contraction of floating tones).

3.2.2. Association of Floating Tones in Koring

The application of autosegmental phonology cannot be exhausted without accounting for floating tones. According to Goldsmith (1990: 20), floating tone has been indiscriminately used with two rather different meanings. At one hand, it refers specifically to a morpheme that is underlyingly only tonal, that is, composed of segments only on a tonal but at the other hand, refers to segments which at a given moment in the derivation are not associated with any other vowel. The latter is obtained in Koring. In this ca se, if a vowel should be deleted, then the tone associated with it may be said to be floating. This is in line with the phenomenon of "Stability" "the tendency of a feature value to persist despite the erasure of the major segment (generally vowel) which appeared to have born that feature" as discussed by Goldsmith (1970:34). According to him, in tone languages, when a tone-bearing vowel is deleted by a phonological rule, the tone that was being borne does not delete also but rather, shows up elsewhere on a neighboring segment. In other words, when the V-deletion deletes just the vowel and not the tone segments associated with the vowel, the tone segment would be left unassociated and therefore floating (Goldsmith 1970:59). When this is the case, the floating tone resulting from the deletion of an adjacent vowel is associated to the vowel next to it. Examples (14) - (16) illustrate the above phenomenon in Koring.
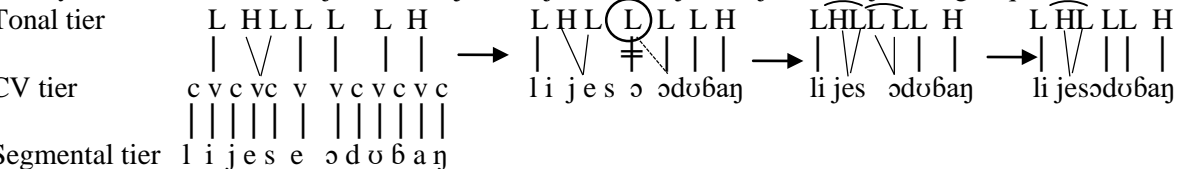
14.   kesa + obila ⟶ késá óbīlà ⟶ késóóbīlà ⟶ késóbīlà 'cooking pot'
       pot   food
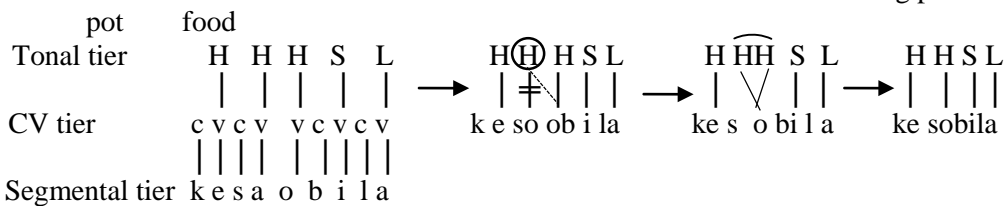
15.   kèkpa   ekuph ⟶ kèkpá èkùɸ ⟶ kèkpé èkùɸ ⟶ kèkpêkùɸ 'water leaf'
       leaf   water
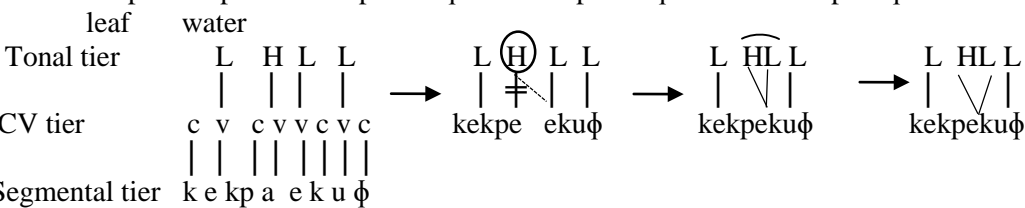
16. liyese + ọdụ̀ɓàṅ ⟶ lìjêsè ɔ̀dʊ̀ɓáŋ ⟶ lìjêsɔ̀ ɔ̀dʊ̀ɓáŋ ⟶ lìjêsɔ̀dʊ̀ɓáŋ 'village square'
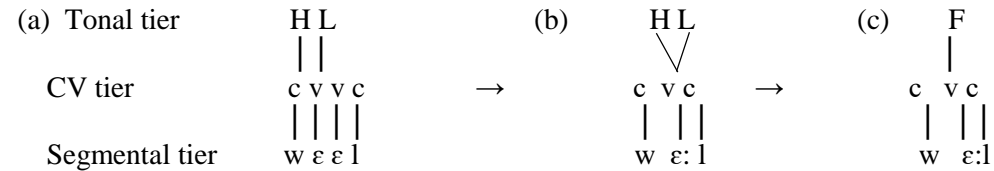

From the above examples, when a floating tone merges with a vowel at some point during derivation, it passes its tonal specification to the vowel which results either to a glide (falling tone) as in example (15) or gets simplified to same level tone as in the simplified low lone (L) as in example (16)
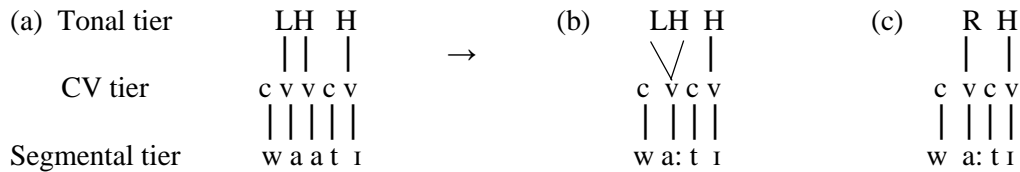
3.2.3.   Association of Contour Tones in Koring

The treatment of contour tones as sequences of level tones is virtually based entirely on the knowledge we can get of the characteristic behaviour of the component pieces of the contour tone; the level tones that compose it. Tonal systems often provide phonologically governed alterations between contour tones and level tones, creating and destroying contour tones by adding or deleting association lines (Goldsmith 1990:66, 71).

The collapsing of adjacent phonetic lengthened vowels on different pitch level in a Koring word results to a glide. This glide can either be rising or falling. However, these contour tones in Koring are not distinctive. This is evident in the examples ((17) - (19) below:
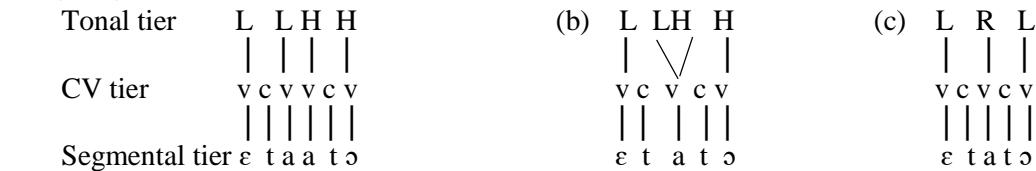
17. weel → wɛ̂:l 'kill'

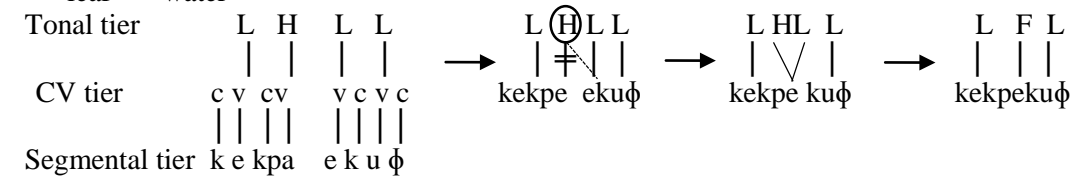|			
(a) Tonal tier	H L	(b) H L	(c) F
CV tier	c v v c →	c v c →	c v c
Segmental tier	w ɛ ɛ l	w ɛ: l	w ɛ:l

18. waati→ wǎ:tí 'child'

(a) Tonal tier	L H H	(b) L H H	(c) R H
CV tier	c v v c v →	c v c v	c v c v
Segmental tier	w a a t ɪ	w a: t ɪ	w a: t ɪ

19. etaato → ɛ̀tààtɔ̀ 'bee'

Tonal tier	L L H H	(b) L LH H	(c) L R L
CV tier	v c v v c v	v c v c v	v c v c v
Segmental tier	ɛ t a a t ɔ	ɛ t a t ɔ	ɛ t a t ɔ

The adjacent high and low tones in example (17a) were collapsed to yield a falling tone in (17b) while in examples (18a) and (19a), the adjacent low and high tones resulted to rising tones in (18b) and (19b). Worthy to note is the fact that these contour tones seen in examples (17-19) are not cases of derivation but rather can be said to be inherent, resulting from collapsing of adjacent phonetic vowels (lengthened vowels) on different pitch level.

When a floating tone at some point during derivation merges with some vowels, thus, passing on its tonal specifications to that vowel, the resultant effect is a glide (contour tone) (Goldsmith, 1976:78). The examples that follow represent contour tones as a result of derivation:

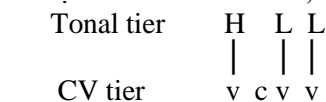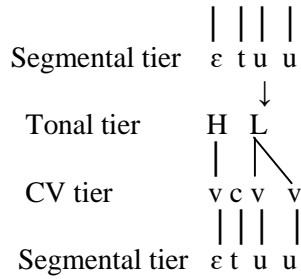20. kekpa   ekuph ⟶ kèkpá èkùɸ ⟶ kèkpé èkùɸ ⟶ kèkpêkùɸ 'water leaf'
    leaf   water

Tonal tier	L H L L	⟶ L (H) L L ⟶	L HL L ⟶	L F L
CV tier	c v cv v c v c	kekpe ekuɸ	kekpe kuɸ	kekpekuɸ
Segmental tier	k e kpa e k u ɸ			

21. liyese + oduɓaṅ ⟶ lìjêsè ɔ̀dòɓáŋ ⟶ lìjêsɔ̀ ɔ̀dòɓáŋ ⟶lìjêsɔ̀dòɓáŋ 'village square'

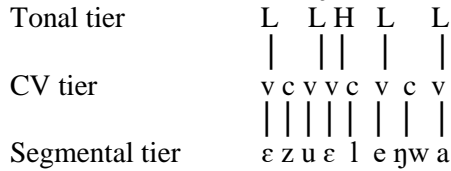|				
Tonal tier	L H L L L L H	⟶ L H L (L) L L H ⟶	LHLLL L H ⟶	L F L L H
CV tier	c v c vc v v c vc v c	l i j e s ɔ ɔduɓaŋ	l ijes ɔduɓaŋ	li jesɔduɓaŋ
Segmental tier	l i j e s e ɔ d u ɓa ŋ			
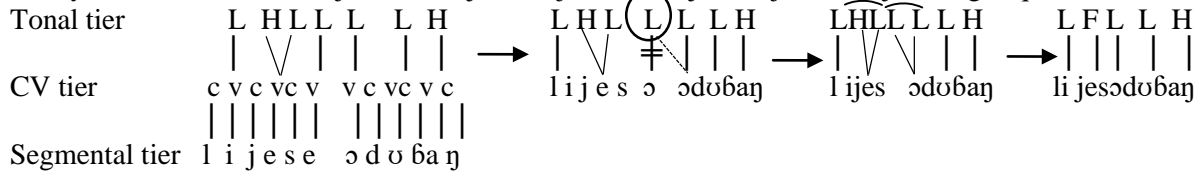
Apart from the WFC, Goldsmith proposed what he called obligatory contour principle (OCP). This has its main objective as handling the problems of contour tones which segmental analysis could not handle. OCP stipulates that when two or more identical tones come in succession during a derivation, the identical tones could be collapsed into one tone, provided that the identical tones do not go across word boundaries. This is illustrated in examples (22) - (26).
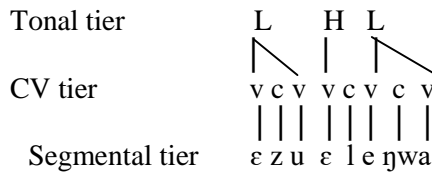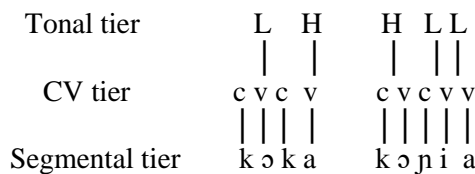
22. etuu ɛ́tùù 'routine', 'method', 'road'

Tonal tier	H L L
CV tier	v c v v

```
                      |  |  |  |
Segmental tier    ɛ  t  u  u
                         ↓
   Tonal tier     H   L
                  |    \
   CV tier        v  c  v   v
                  |  |  |  |
Segmental tier    ɛ  t  u  u
```

23. ẹzu ẹ leṅwa /ɛ̀zù ɛ́ lèŋwà/

```
Tonal tier          L   L H  L    L
                    |   | |  |    |
CV tier             v c v v c  v  c  v
                    | | | | | | | | |
Segmental tier      ɛ z u ɛ  l  e ŋ w a

                         ↓

Tonal tier          L    H   L
                    \    |   \
CV tier             v c v  v c v c v
                    | | |  | | | | |
 Segmental tier     ɛ z u  ɛ  l e ŋwa
```

24. kọka kọnyia /kɔ̀ká kɔ́ɲìà/ 'to be caught in a trap'

```
Tonal tier          L   H     H  L L
                    |   |      |  | |
 CV tier            c v c  v   c v c v v
                    | | | |    | | | | |
Segmental tier      k ɔ k a    k ɔ ɲ i a
                          ↓

 Tonal tier          L   H     H  L
                     |   |     |   \
 CV tier             c v c  v  c v c v v
                     | | | |   | | | | |
 Segmental tier      k ɔ k a   k ɔ ɲ i a
```

25. kọkẹtẹ kuyoṅ /kɔkɛtɛ kujoŋ/ 'to exalt'

```
 Tonal tier          L L L    L  L
                     | | |    |  |
 CV tier             c v c v c v  c v c v c
                     | | | | | |  | | | | |
 Segmental tier      k ɔ k ɛ t ɛ  k u j o ŋ

                         ↓
 Tonal tier              L         L
                      \\\\\|     \\\|
 CV tier             c v c v c v c v c v c
                     | | | | | | | | | | |
  Segmental tier      k ɔ k ɛ t ɛ k u j o ŋ
```
26. kuyẹmẹ kẹnnọ /kújɛ́mɛ́ kɛ́nnɔ́/ 'finger print'

```
   Tonal tier       H  H  H     H H  H
```

```
                     |   |   |      || |
CV tier              c v c v c v    c v n c v
                     | | | | | |    | | | | |
Segmental tier   k u j ɛ m ɛ      k ɛ n nɔ

                              ↓
Tonal tier              H           H

CV tier              c v c v c v    c v c c v
                     | | | | | |    | | | | |
Segmental tier   k u j ɛ m ɛ    k ɛ n n ɔ
```

Notice that the rule of OCP is strictly obeyed in the above examples "22-26". As earlier discussed, obligatory contour principle (OCP) stipulates that when two or more identical tones come in succession during a derivation , the identical tone could be collapsed into one tone as observed in examples "22-26", provided that the identical tones do not go across word boundaries as strictly observed in examples (24)-26.

4. Spreading in Koring

In Koring, the morpheme "e" which is a definite article is basically toneless. It adopts the tone of the previous syllable to which it is enclitisized which therefore, spreads to it. The spreading is important since it is in keeping with the universal linking convention (ULC). This phenomenon is illustrated (27) - (29) below.
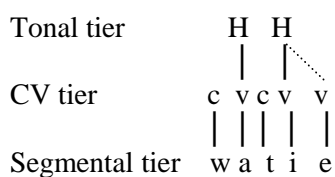
27. ẹtuu e / ɛ́tùù è/ 'the road or pathway'

```
Tonal tier       H   L L
                 |   | |
CV tier          v c v v   v̀
                 | | | |   |
Segmental tier   ɛ t u u   e
```

28. ogba e   /ógbá é/ 'the castor oil'

```
Tonal tier       H     H
                 |     |
CV tier          v c   v v̀
                 | | | |
Segmental tier   o gb a e
```
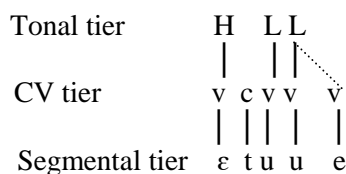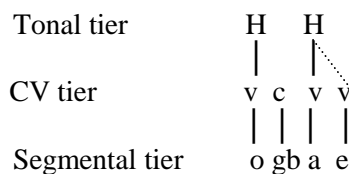
29. waati e →/wătí é/ 'the child'

```
Tonal tier       H  H
                 |  |
CV tier          c v c v  v
                 | | | |  |
Segmental tier   w a t i  e
```

The above illustration is in line with the WFC which says that each vowel must be associated with at least one tone. Therefore even the toneless vowel representing Koring article automatically acquires the tone which spreads to it from an adjacent preceding vowel.

5. **Summary and Conclusion**

We have considered the Koring syllable structure, the mono, di and trisyllabic patterns of Koring words, CV and tonal association in Koring using autosegmental phonological theory. Koring is a coda language with a V, CV and CVC syllable structures. Unlike in some African languages, a vowel cannot be a monosyllabic word in Koring. Monosyllabic words in Koring take the CV or CVC syllable pattern where Koring monosyllabic verbs always have a CV structure. Koring has two basic tones: the high and the low tones with a falling and a rising contours which are not distinctive.

The autosegmental principles have been stated and Koring examples have been used to illustrate where applicable in the language. Beyond tone in isolation (inherent tone(s) of word(s)), some tonological processes resulting to floating tones (segmentalization and contraction) were observed. To account for these floating tones and toneless vowels in Koring, the well formedness condition was applied. Association of contour tones were also considered noting that the contour tones in Koring are not distinctive but result by (a) collapsing of adjacent phonetic lengthened vowels on different pitch level (b) merging of a floating tone with a vowel at some point during derivation which passes its tonal specification to such vowel resulting either to a glide or get simplified to same level tone.

An interesting feature has equally been observed in the language, where the toneless vowel representing the Koring definite article adjacent to a preceding vowel automatically acquires the tone which spreads to it from this preceding vowel.

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Abbreviations

V - Vowel

C - **Consonant**

L - Low tone

H - High tone

R- Rising

F- Falling

. – Syllable boundary

→ - becomes

Autosegmental Notation

│→ An unbroken association line indicates pre-linking i.e. prior association of the tiers in the lexicon.

⋮→ Broken lines indicate linking i.e. the creation of association line.

╫→Cross through association line shows delinking. This means that it is no longer functional, it has been delinked.

Ⓥ→ A free vowel slot that is not linked to any tone. A circle around an item equally indicates that an item has been deleted.

T→ floating or free tone linked to a vowel.