SOME STRUCTURAL PATTERNS OF ÈWÙLÙ LEXICAL TONES

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ABSTRACT

This paper describes some structural patterns of word-based tones in Èwùlù from a phonetic-phonological perspective. Èwùlù is an Igbo dialect with two level tones, a high and a low, with a downstep. It is spoken in the northern part of Delta State, Nigeria, alongside many other related varieties referred to as 'Delta Igbo'. Shedding more light on a number of structural patterns of Igbo lexical tones from a dialectal perspective motivates the current study. In the study, it was found that: (1) regardless of syllable positions, the level high and low tones (with the exception of downstep) are freely distributed lexically, (2) both level tones mark lexical-semantic and tense distinction in nouns and simple verb roots, respectively, (3) high pitch sequence and low pitch sequence occur quite frequently in syllabically complex words, and (4) sequence of level tones may unite to become surface contour tones under the influence of syllabification and segmental OCP. Significantly, the contributions of the present study give some insights into the patterns of lexical tones and their acoustic correlates which typify the tone systems of Benue-Congo to which Igbo/Èwùlù belongs.

Keywords: Èwùlù, Igbo, lexical tones, contour tones, acoustic correlates.

1.   INTRODUCTION

It has been reported that about 70% of world languages are tonal (Yip, 2002, 2007). In sub-Saharan Africa, specifically in Nigeria, which holds mainly the Benue-Congo group of languages, all but a few of the languages are tonal. According to Yip (2007), a language is tonal if it makes use of the pitch of the word to change the meaning of words – not just its nuances, but its core meaning. Notable among Nigerian languages that make use of word/lexical pitch in this way are: Igbo, Yoruba, Hausa, Izon, Urhobo, Isoko, Efik, Ibibio, Nupe, Gwari, among many others. The current paper, whose focus is on a description of some structural patterns of lexical tones (tones whose distinctive pitch levels are carried by the syllable of a word, the essential feature of the meaning of that word) exclusively singles out the Igbo language with special focus on Èwùlù, one of its numerous dialects spoken in the northern part of Delta State, west of the River Niger, Nigeria, alongside several other linguistically related varieties in this area commonly known as 'Delta Igbo'.

A preliminary investigation on Èwùlù tone system (Utulu, 2015a) would reveal that, like central Igbo which has two level tones and a downstep (Emenanjo, 1978; Clark, 1990; Iloene, 2010, among others), Èwùlù has the same number of level tones with a downstep. The domain of assignment of the tones is the syllable. The Èwùlù syllable structure is of three types: (a) V-syllable, (b) CV-syllable, and (c) N-syllable (syllabic nasal /m/) (Utulu, 2009). The /CV.V/ syllable type exists only underlyingly. At the phonetic level, it simplifies to either [CV] or [CGV], ensuring that only one V element is accommodated in the syllable nucleus/rhyme.

While any vowels in the dialect can be specified for the level tones and the downstep, the syllabic nasal /m/ is only specified for the level tones and never the downstep. Conventionally, the level tones and the downstep phenomenon are marked by the acute accent [́], the grave accent [̀] and the macron symbol [̄] (or an exclamation point [!] in transcription) respectively. The respective tonal phenomena are abbreviated to H, L and Ds.

A descriptive summary of the two level tones and downstep are present in the syllabically simple forms in (1) and (2), and the complex forms in (3), taken from Utulu (2015a, 2015b):

(1)	High tone (H)		(2)	Low tone (L)		(3)	Downstep (Ds)	
	lé	'buy'		**gbà**	'shot'		**áwélē**	'luck'
	gú	'dig'		**mè**	'made'		**òkwútē̩**	'stone'
	lá	'lick'		**lù̩**	'worked		**òchíchā**	'cockroach'
	gbú	'kill'		**dà**	'fell'		**ǹgwélē**	'lizard'
	sí	'cook'		**gù**	'dug'		**édékē**	'blood'

In addition to the pitch levels illustrated in (1) – (3), there are two pitch changes found within a syllable referred to as contour/gliding tones, namely the falling tone [ˆ], and the rising tone [ˇ]. The former rises and falls within simplified heterosyllable, that is, two consecutive vowels belonging to different syllables. The forms in (4) and (5) exemplify the two lexical contour tones in heterosyllabic context, respectively:

(4)   Falling tone (H-L)

Basic forms	Phonetic forms	
ìsí-ì	**ìsî**	'six'
è̩sá-à	**è̩sâ**	'seven'
àtú̩-ù̩	**àtû̩**	'an isolated Ewulu land'
ògú-ù	**ògû**	'digger', agentive
ò̩gbá-à	**ò̩gbâ**	'shooter', agentive

In (5), however, the rising contour tone is commonly found in affirmative imperative forms with /V-V/, /i-V/ and /u-V/ sequences. Examples are presented as follows:

(5)   Rising contour tone (L-H)

Basic forms	Phonetic forms	
gù-ú	**gǔ**	'swim'
zò-ó	**zǒ**	'rain'
bà-á	**bǎ**	'enter'
tò̩-ó̩	**tǒ̩**	'live long'
zù-ú	**zǔ**	'converge'
bì̩-á	**bjǎ**	'come'
nù̩-á	**nwǎ**	'come back'

As the basic and output forms show in (4) and (5), it is clear that Èwùlù contour tones originate from sequences of level tones hitherto realised on heterosyllabic /V-V/ sequence which subsequently simplifies to a single [V] phonetically, yielding surface [H-L] and [L-H] contour tones. However, where the /V-V/ sequence carry the same level tone, such as /H-H/ (or /L-L/) sequence in certain disyllabic words, the tones do not form contour; they rather contract to become a single /H/, e.g. fí̩á *'flog'*, bí̩á *'come'*, rí̩ó̩ *'beg'*, núé *'swallow'* become fí̩á, bí̩á, rí̩ó̩ and nué respectively.

Researchers who have worked on the source of lexical/grammatical contour tones in (Benue-Congo) languages (e.g. Akinlabi and Liberman, 2000: Yoruba; Urua, 1995: Ibibio; Aziza, 1997: Urhobo, among others) show that contour tones are basically derived from the combination of level tones. As will be shown in section 6, the patterning of Èwùlù lexical contour tones supports this claim. More importantly, Èwùlù contours are formed via the interaction of the rule of syllabification and the effect of 'segmental' Obligatory Contour Principle (OCP), a constraint that prohibits the occurrence of adjacent identical segmental features on the same phonological node (McCarthy, 1986).

Within the brief illustrations provided in (1) through (5) are other inherent tonal patterns which will be examined in subsequent sections. To this end, the objective of this paper is to shed light on some of the attested word-based tonal characteristics peculiar to Èwùlù/Igbo and widespread in tone languages of the Benue-Congo, sub-Saharan Africa, with a view to understanding the unique or general tone characteristics associated with their tone systems. In addition to the above objective, the paper will examine the fundamental frequency (F0) tracings of the attested pitch levels displayed on the sound spectrogram of the SFS/WASP computerised speech laboratory. The latter objective becomes necessary in order to provide a visual support to the attested structural patterns in the most formal, scientific way possible.

2.   THE DISTRIBUTION OF ÈWÙLÙ LEVEL TONES

In this section, the positional distributions of the Èwùlù level tones, the high (H) and the low (L) tones are presented together with acoustic/visual representations of the pitch contours that reflect the distributional patterns.

2.1   DISTRIBUTION OF THE LEVEL HIGH TONE IN ÈWÙLÙ

Like in central Igbo, the Èwùlù level high (H) tone occurs without positional restrictions in words. By this it means it may be allowed in initial or final positions of disyllabic words as exemplified in (6), see also the forms in (7):

(6)   Level high tone in initial position   Level high tone in final position

	a.			b.		
		ẹ́kwà	'cloth'		èshụ́	'body'
		úkwù	'waist'		òfú	'one'
		ákpị̀	'scorpion'		ùjú	'wealth
		ézì	'swine/pig'		èzí	'outside
		ọ́jì̀	'a tropical tree'		òsú	'slave'
		ágbè	'calabash'		ẹ̀kwá	'egg'
		ógè	'time'		àkú	'door'
		ọ́nyà	'a trap'		òkpú	'cap'
		ézè	'king'		àzụ́	'back'
		ụ́nọ̀	'house'		àkpó	'velum'
		ńchà	'soap'		ǹgá	'prison'

As shown above, the occurrence of level H on the noun group marker prefixes (initial vowels) in (6a) and on the syllable final in (6b) reflect the typical tonal distribution attested in nominals in Igboid/Benue-Congo languages, with the exception of standard Yoruba which prohibits the level H tone in initial position in nominals (Bamgbose, 1990).

Acoustically, the description of the phonetics of tone targets some fundamental frequency (F0) occurring at some point in the segment string (Pierrehumbert, 1980; Gussenhoven and Jacobs, 2011). In Figure 1, the F0 tracings in the pitch track displayed on the spectrogram clearly

capture the two positional targets of the H with a rising pitch formation, as in (6), taking the items, ẹ́*kwà* and è*shụ́*:

Figure 1: High tone distribution in Èwùlù

(high tone in syllable/word initial position)   (high tone in syllable/word final position)

ẹ́kwà *'cloth'*   èshụ́ *'body'*

[ɛ́   kw   à]   [ɛ̀   ʃ   ɔ́]
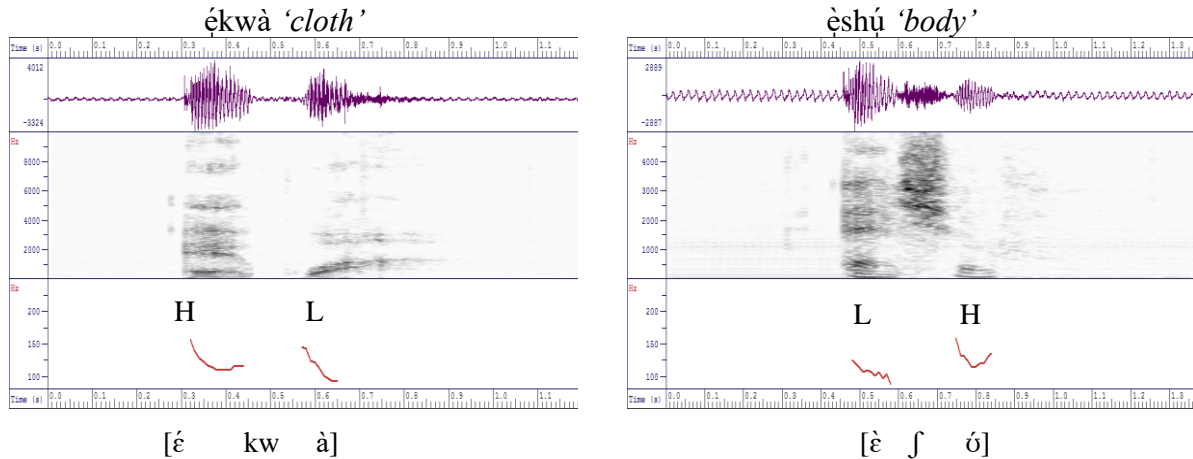
As Figure 1 indicates, the pitch contours of the H, L sequence in ẹ́kwà *'cloth'* and èshụ́ *'body'* are clearly distinct-distinct in the sense that the high tones characteristically have higher F0 than the low tones. As can be noticed, the H has a rising pitch with its 'peak' concentrated at 155Hz as opposed to falling pitch for the L which is concentrated at 144Hz. In the same vein, the high-toned /ɔ́/ peaks at 190Hz higher than the preceding L-tone [ɛ̀], 139Hz. The different peaks simply reflect the psycholinguistic effect that enables the discrimination of H from L by Èwùlù listeners.

## 2.2   DISTRIBUTION OF THE LEVEL LOW TONE IN ÈWÙLÙ

Without restrictions too, the L occurs in any position in disyllabic words as illustrated in (7), see also the forms in (6):

|	Level low tone in initial position			Level low tone in final position	
(7) a.	**è́tọ́**	'three'	**b.**	**ẹ́bù**	'song/armpit'
	ùbé	'pear'		**ḿkpù**	'coconut'
	m̀kpí	'he-goat		**ázụ̀**	'fish'
	Àchọ́	'an Èwùlù name'		**ósè**	'pepper'
	ụ̀lá	'slap'		**áfụ̀**	'half
	òrí	'shea butter'		**ógbè**	'district/quarter'
	ìsé	'five'		**úchè**	'wisdom'
	òbí	'king'		**óshù**	'slave'
	ǹjọ́	'sin'		**ḿbọ̀**	'water yam'
	àsị́	'lies'		**égwù**	'fright'
	àdá	'first girl child'		**óbì**	'heart'

The distributional pattern of the L in the forms in (7) also reflects the type found in Central Igbo and many other Benue-Congo languages. Below in the pitch track displayed on the spectrogram, the distribution of the L pitch level is clearly captured in Figure 2 from the same speaker as follows:

Figure 2: Low tone distribution in Èwùlù
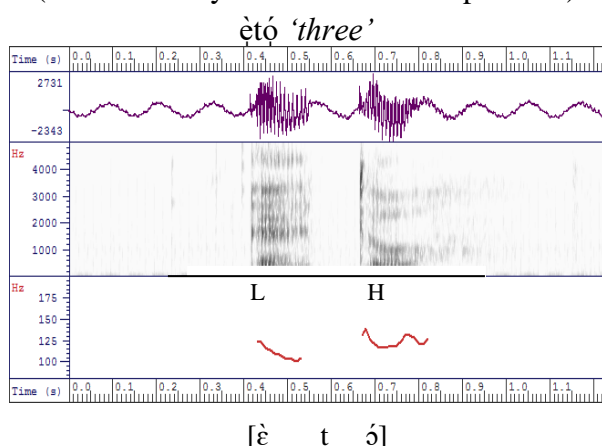
(low tone in syllable/word initial position)   (low tone in syllable/word final position)
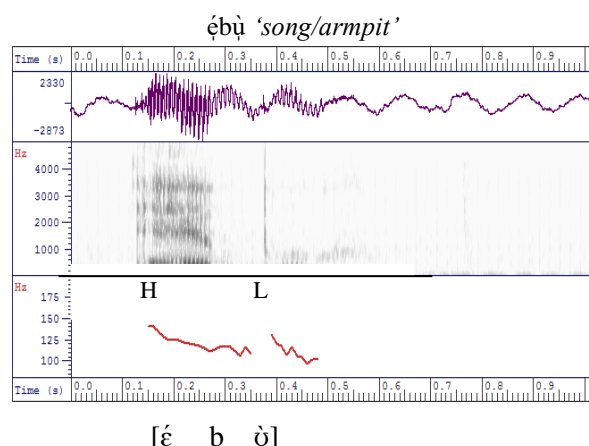
In ètọ́ *'three'*, the F0 of the L is concentrated around 124Hz as opposed to the H, 138Hz. This is visually expressed by the fall-rise, uneven pitch contours of the two opposing tones. The opposite structural pattern is recorded for the H, L sequence in [ɛ́bò] *'song/armpit'*. Here F0 cues for the high-fall pitch contour superimposed upon the two syllables, [ɛ́] and [ò] are 140Hz and 129Hz respectively. The visual representation in Figure 2 thus further expresses the qualitative difference between the low and high pitches superimposed upon each syllable in different word positions.

3. DISTRIBUTION OF ÈWÙLÙ LEXICAL DOWNSTEP

A very common tonal phenomenon which typifies registered tone languages with two level tones is the presence of a 'floating low tone' also referred to as 'downstep', briefly cited in (3). In Èwùlù two types of floating low tones occur: *lexical downstep* and *grammatical downstep* (Utulu, 2015a). Here only lexical downstep commonly found in two distinct tone groups HHH and LHH are explored while leaving out the latter (i.e. grammatical downstep) which is beyond the scope of this study.

Lexical downstep in HH tone sequence is absent in Èwùlù but occurs in central Igbo, where certain two-syllable words with abstract HH e.g. ígwé *'sky/*heaven', égó *'money'*, álú *'abomination'* etc., have their respective H downstepped phonetically as ígwē, égō, álū. Similarly, in certain items in Urhobo (Edoid), downstep target the second H in HH tone sequence, e.g. íghō *'money'*, ọhọ̄ *'chicken'* etc. It has been argued by tone phonologists (e.g. Hyman, 1975; Clements and Ford, 1979; Odden, 1995; Katamba, 1989; Clark 1990; Aziza 1997, among others) that downstep is motivated by the occurrence of an abstract low tone unspecified at the phonetic level. This then triggers surface lowering of the final high tone.

In (8) this fascinating tone phenomenon indicated by the exclamation point [!] in both the HHH and LHH tone groups are illustrated:

(8)   Lexical downstep in HHH tone group

/ḿkítá/	→	[ŋ́kí!tá]	'dog'
/ífélé/	→	[ífé!lé]	'shame/shyness'
/óbélé/	→	[óbé!lé]	'little'
/átóĺó/	→	[átó!ló]	'sheep'
/áɓókó/	→	[áɓó!kó]	'shoe(s)'
/ḿɓóló/	→	[ḿɓó!ló]	'seed/fruit'

Lexical downstep in the LHH tone group

/àɓʊ́ɓá/	→	[àɓʊ́!ɓá]	'millipede'
/àdáká/	→	[àɗá!ká]	'chimpanzee'
/àfʊ́fá/	→	[àfʊ́!fá]	'garden egg'
/m̀ɓʊ́ɓá/	→	[m̀ɓʊ́!ɓá]	'butterfly'
/àɓálá/	→	[àɓá!lá]	'thunder'
/ògéné/	→	[ògé!né]	'Èwùlù traditional greeting code'
/m̀ɓísí/	→	[m̀ɓí!sí]	'local razor'
/m̀ʃíkɔ́/	→	[ǹʃí!kɔ́]	'crab'

Like the tone group in (8), it is expected that the LHH tone group in (9) should exhibit final H downstepping, but surprisingly this is not the case. It is therefore assumed here that Èwùlù lexical downstep is strictly lexically-determined. Downstep tends to target certain lexical items to the exclusion of other types with similar morphological and prosodic structures. The forms with 'zero downstep' asterisked as ill-formed in (9) justify this assumption.

(9)   HHH and LHH tone groups void of downstep in Èwùlù

HHH tone group

[áɓʊ́ɓɔ́]	'leather'	*áɓʊ́!ɓɔ́
[ósísí]	'stick'	*ósí!sí
[ákíkɔ́]	'tale'	*ákíkɔ́
[áfʊ́fʊ́]	'suffering'	*áfʊ́!fʊ́
[ɔ́ɓʊ́ɓʊ́]	'bone'	*ɔ́ɓʊ́!ɓʊ́
[ɛ́ʃʊ́ʃʊ́]	'insect/snake'	*ɛ́ʃʊ́!ʃʊ́

LHH tone group

|		
[òlúlú]	'cotton'	*òlú!lú
[ǹtótó]	'needle'	*ǹtútū
[òɗógwú]	'warrior'	*òɗó!gwú
[ǹsálá]	'a type of soup	*ǹsá!lá

In Figures 3 and 4 versus Figure 5, we present visual/acoustic cues that provide strong evidence in support of, first, the occurrence of lexical downstep in Èwùlù, and second, the claim that Èwùlù word-based downstep is lexically motivated. Two examples each from the two tone groups, [ŋ́kí!tá] *'dog'* and [ífé!lé] *'shame/shyness'* and [àɓʊ́!ɓá] *'millipede'* and [àfʊ́!fá] *'garden egg'* are analysed in Figures 3 and 4 as follows:

Figure 3: Acoustic characteristics of lexical downstep in LHH tone group

[ŋ́kí!tá] *'dog'*	[ífé!lé] *'shame/shyness'*
[ŋ́ kí !tá]	[í fé !lé]
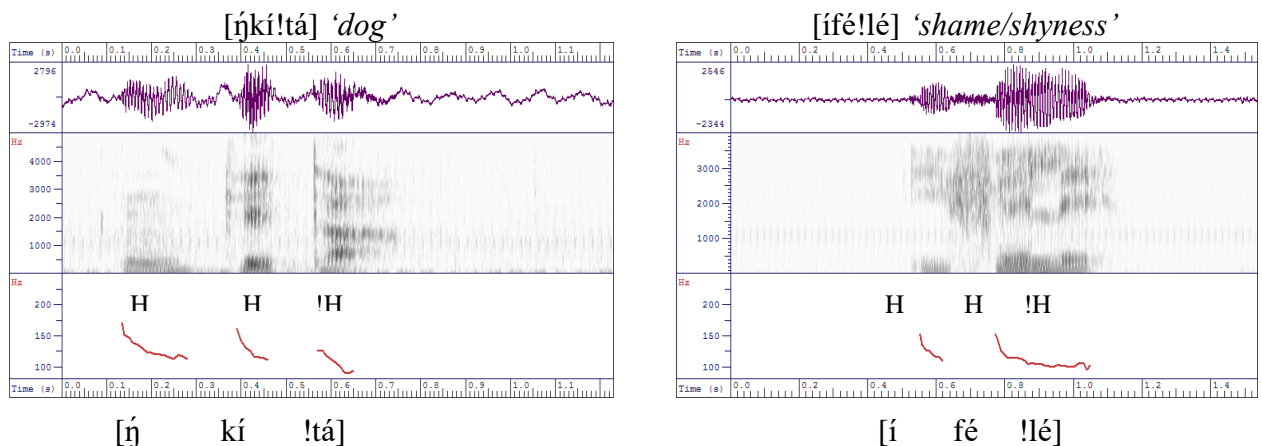
As the pitch contours in Figure 3 indicate, the presence of a downstepped H is captured by the 'extreme downward lowering' of the last pitch contour in final syllables of both item. Of the sequence of Hs, only downstepped […!tá] in [ŋkí!tá] *'dog'* and […!lé] in [ífé!lé] *'shame/shyness'* recorded the lowest F0s: 106Hz and 105Hz, respectively. The non-final Hs in the two items however measured 128Hz, 127Hz and 123, 122Hz, respectively. In Figure 4, the presence of final H lowering is captured in LHH tone group as follows:

Figure 4: Acoustic characteristics of lexical downstep in LHH tone group
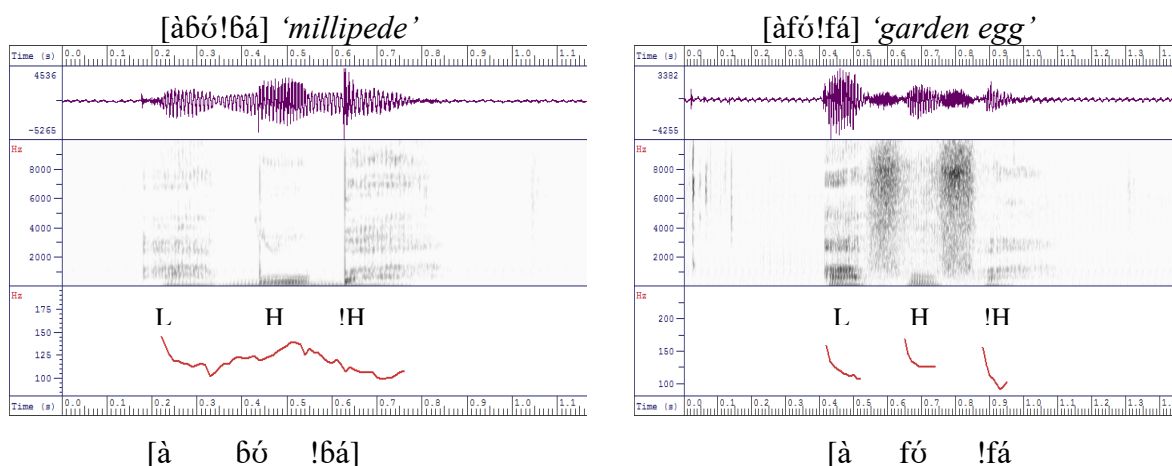
Like the tonal patterns in Figure 3, final H downstepping occurs in Figure 4, as shown by a rather downward sloping of the pitch contour. The downstep F0s for […!ɓá] and […!fá] in [àɓó!ɓá] *'millipede'* [àfó!fá] *'garden egg'* measured about 110Hz and 115Hz, respectively. However, the non-downstepped Hs in both words measured about 139Hz, 138Hz and 153Hz, 143Hz respectively. As the acoustic results show comparatively, downstepped Hs are lower in pitch than that of the preceding Hs.

In Figures 5(a) and (b) however, the scenario is entirely different, as the pitch track structure explicitly captures the fact that final H downstep is void in the asterisked forms in (9), taking *ósí!sí, *òlúlú for analysis thus:

Figure 5: Zero downstep in HHH and LHH tone groups
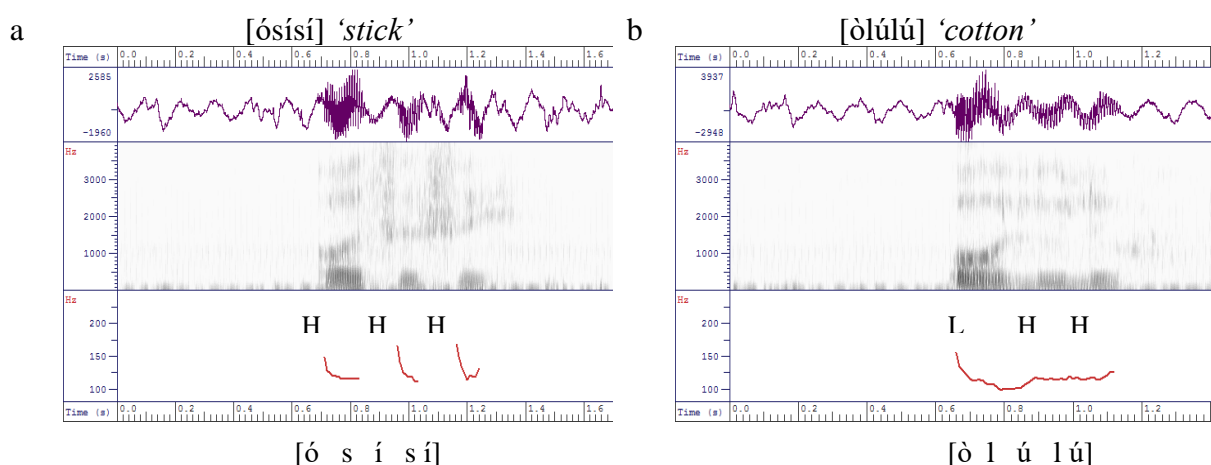
In Figure 5a and b, it will be noticed that the pitch contours of the Hs are structurally similar. They assume the same parallel level at the bottom edge, unlike in Figures 3 and 4 where they hang down much lower than the pitch contours of the preceding Hs. The distinct pitch contour

cues in Figures 3 and 4 as opposed to Figure 5 unambiguously reveal the presence and absence of downstep, which is largely determined lexically.

4.   LEXICAL AND GRAMMATICAL FUNCTION OF ÈWÙLÙ LEVEL TONES

Èwùlù level tones structurally perform two specific linguistic functions: (1) once modulated from H to L or from L to H, the two tonemes trigger lexical-semantic distinction in words which are otherwise homophonous. (2) Once they are altered in minimal pair verb roots, both tonemes trigger present-past tense distinction between the items. These two aspects are examined in the next sub-sections.

### 4.1   LEVEL TONES AS SEMANTIC MARKERS IN ÈWÙLÙ NOUN WORDS

Èwùlù, like other Benue-Congo languages labelled 'tone language', presents quite a number of cases where the meaning of a sub-set of nominals is conveyed by a modulation of its level tones as the forms in (10), taken from Utulu (2015a:113) show:

Level tones as semantic markers in Èwùlù noun words (Utulu, 2015a:113)

| 10. | | | | | | | |
|-----|--------|------|--------------|--------|------|--------------|
| | **ónyá** | H H | 'sore' | **égbé** | H H | 'hawk' |
| | **ónyà** | H L | 'trap' | **égbè** | H L | 'gun' |
| | **éwú** | H H | 'goat' | **òké** | L H | 'mice' |
| | **éwù** | H L | 'fame' | **ókè** | H L | 'boundary' |
| | **úkwú** | H H | 'big' | **ọ́jí** | H H | 'kola-nut' |
| | **úkwù** | H L | 'waist' | **ọ́jì** | H L | 'mahogany' |
| | **ẹ́wọ́** | H H | 'gray hair' | **ísí** | H H | 'head' |
| | **ẹ́wọ̀** | H L | 'frog/toad' | **ìsì** | L L | 'blindness' |
| | **óshú** | H H | 'twenty' | **ẹ́kwá** | HH | 'cry' |
| | **óshù** | H L | 'slave' | **ẹ́kwà** | HL | 'cloth' |
| | | | | **ẹ̀kwá** | LH | 'egg' |

As the noun group pairs show, the H and L largely exhibit a two-way tone group contrast, the HH versus the HL. A possible three-way contrast, LH (see the last form ekwa) is attested but quite uncommon in the dialect. Below in Figures 6 and 7, the F0 tracings of the acoustic signals that underlie the relative pitch levels are analysed, taking the pairs ẹ́wọ́ *'gray hair'* vs. ẹ́wọ̀ *'frog/toad'* and égbé *'hawk'* vs. égbè *'gun'*:

Figure 6: F0 tracings of the two-level contrast between ẹ́wọ́HH versus ẹ́wọ̀HL

a   ẹ́wọ́ *'gray hair'*   b   ẹ́wọ̀ *'frog/toad'*
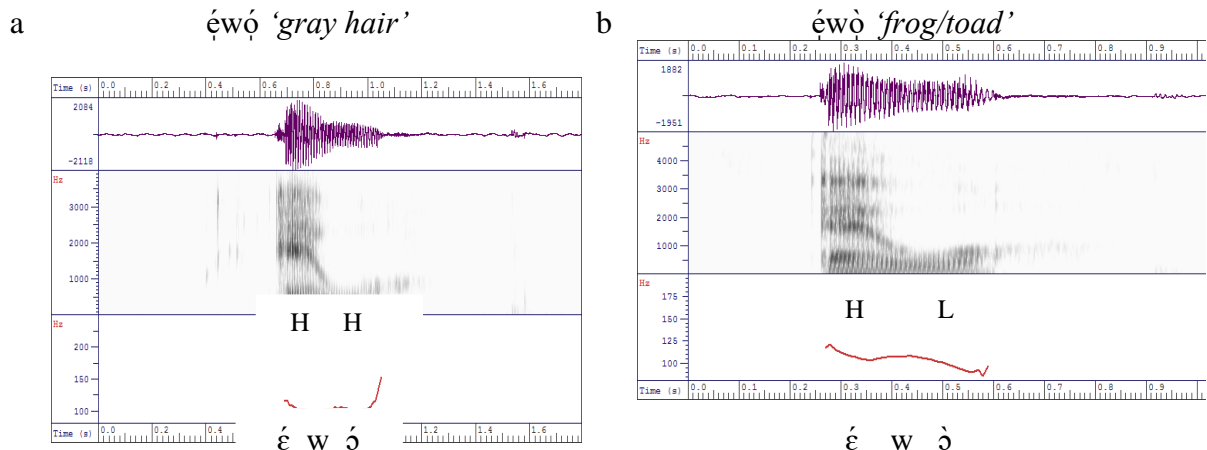
As can be seen in Figure 6, the pitch contours demonstrate the contrast between HH sequence in (a), whose F0 concentrates between 105Hz. and HL sequence in (b) which records distinct F0s, about 114Hz and 106Hz, respectively. The different pitch contour structures underlie the semantic difference in the string ẹ-w-ọ. The pitch structure in Figure 7 further corroborates the semantic undertone of level tones modulation thus:

Figure 7: F0 tracings of the two-level contrast between éwúHH versus éwùHL

a   éwú *'goat'*   b   éwù *'fame'*

[é   w   ú]   [é   w   ù]
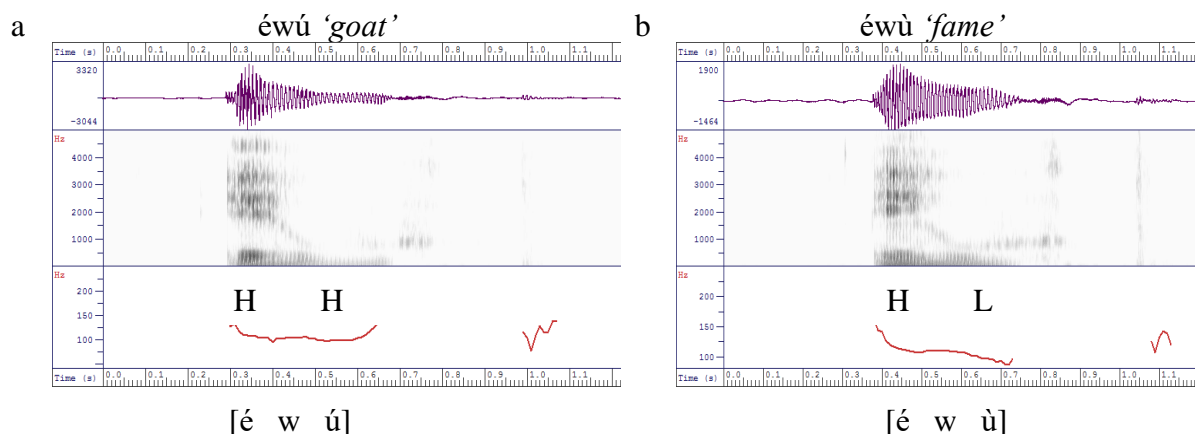
4.2   LEVEL TONES AS TENSE MARKER IN ÈWÙLÙ SIMPLE VERB ROOTS

Aside conveying lexical function by the Èwùlù H and L tonemes, as demonstrated in section 4.1, they mark grammatical function, distinguishing the tense/meaning of verbal homophone by mere modulation of the H and the L. A number of monosyllabic verb roots exhibit this pattern which yields present-past tense contrast. The present-past tense contrast is illustrated in (11) and (12), taking a few examples from (1) and (2) as follows:

11.   H and L tones as tense marker

H tone-group (present tense)		L tone-group (past tense)	
lé	'sell'	**lè**	'sold'
gú	'dig'	**gù**	'dug'
lá	'lick'	**là**	'licked'
gbú	'kill'	**gbù**	'killed'
sí	'cook'	**sì**	'cooked'
gbá	'shoot'	**gbà**	'shot'
mé	'make'	**mè**	'made'
lụ́	'work'	**lụ̀**	'worked
rí	'eat'	**rì**	'ate'
jé	'go'	**jè**	'went'

As the tone patterns in (11) show, it is clear that tense is purely conveyed by the pitch distinction between the H and L. Basically, their respective pitch contour would in some way be analogous to that illustrated in Figures 6 and 7, and consequently it would not be acoustically demonstrated here.

5.   LEVLE PITH SEQUENCE IN ÈWÙLÙ

One of the fascinating patterning of Èwùlù lexical tones is their tendency to spread across syllables within the word. In this case, the H or L may span entire syllables, often lacking distinct pitch target. This level tone behaviour has been tagged 'one-to-many' in the orientation

of the autosegmental theory (Goldsmith, 1990; Odden, 1986). In the following sections, we demonstrate the 'spread' phenomenon.

5.1   LEVEL HIGH PITCH SEQUENCE

Level H pitch sequence occurs amply in Èwùlù words; quite common with syllabically complex words, such as nouns (see examples in (9) and (10)) and adjectives, and widespread in compound words and reduplicated monosyllabic verb roots. The pattern is described in (12) as follows:

Level high pitch sequence

12.	Nominals		Adjectives		Compounds		Verbal Reduplication	
	ísí	'head'	**óchá**	'white'	**ísí-ọ́má**	'good-luck'	**ò-gú-gú**	'digging'
	ílé	'tongue'	**úfié**	'red'	**ẹ́nyá-úkwú**	'greed'	**ọ̀-tí-tá**	'chewing'
	ákpụ́	'cassava'	**élụá**	'heavy'	**tí-gbú**	'lynch'	**ò-lí-lé**	'selling'
	ánụ́	'meat'	**úkwú**	'big/large'	**gbá-wá**	'burst'	**ọ̀-lị́-lá**	'licking'
	ónú	'neck'	**ńjọ́**	'ugly'	**nọ́-gbú**	'squeeze'	**ò-mú-mé**	'making'
	ímí	'nose'			**tí-wẹ́**	'break'	**ò-lụ́-lụ́**	'working'
	ókwú	'word'					**ò-bú-bú**	'carrying'
	ẹ́mú	'laugh'					**ọ̀-zị́-zá**	'swelling'
	óyí	'cold					**ọ̀-pí-pí**	'carving'
	éké	'python'					**ò-fú-fé**	'flying'

As can be observed, sequences of Hs (H)HH occur in the strings in (12). According to post *SPE* tone phonologists, the proponents of autosegmental theory, (e.g. Leben, 1973; Goldsmith, 1990; Myers, 1997), such input tonal sequence are simply one doubly- or triply-linked output H tone rather than sequences of HH or HHH tones. The former assumption is said to be sanctioned by tonal OCP which disfavour adjacency of identical tones in a string.

Acoustically, F0 cues in Figure 8 (see also Figures 5a 6a and 7a) in effect lend credence to the fact of the 'spread', where there is practically a spread of the H on the entire syllable. The F0 cues of the forms ísíọ́má *'good-luck'* and ògúgú *'digging'* , taking from (12) corroborate this fact thus:

Figure 8: F0 tracings of level high sequence in ísí-ọ́má *'good-luck'* and ẹ́nyá-úkwú *'greed'*

a   ísíọ́má *'good-luck'*   b   ẹ́nyá-úkwú *'greed'*

/í   s   í   ɔ́   m á/   [ɛ́   ɲ   ú   kw ú]
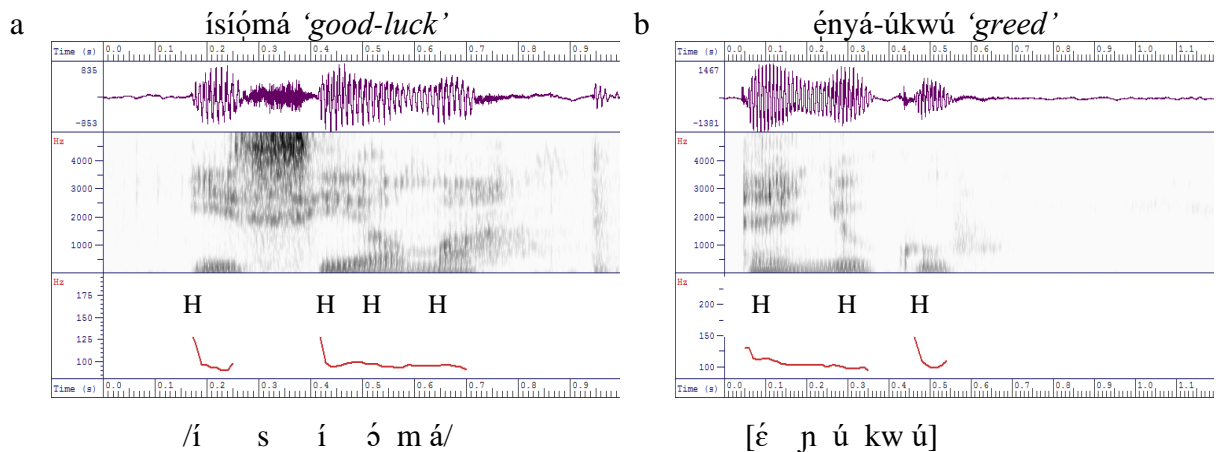
Evidence of the level H sequence/'H spread' can be seen over a long stretch of the pitch contour in Figure 8, measuring between 99Hz and 104Hz for ísíọ́má *'good-luck'* and ẹ́nyá-úkwú *'greed'*, respectively. However, the split/discontinuation of the pitch contour at one end of each of the utterance is an acoustic effect typical of aperiodic, irregular sound wave associated with obstruents, and this case /s/ and /kw/.

5.2   LEVEL LOW PITCH SEQUENCE

Like level high pitch sequence, a number of the data exhibit L tone spread, where a single L spans the entire vowel/syllable of the word, ranging between two-syllable and four-syllable words, most frequent among nominals. This pattern is shown in (13) as follows:

Level low pitch sequence

13.

Disyllabic nouns		Trisyllabic nouns		Polysyllabic nouns	
àgbà	'jaw'	**ọ̀gẹ̀dẹ̀**	'plantain'	**ǹkìrìsì**	'stubble'
ìsì	'blindness'	**ànyìnyà**	'horse'	**Ọ̀chọ̀nọ̀gọ̀**	'a name'
ǹkù	'feather'	**ẹ̀kẹ̀mù**	'pap'	**ọ̀jọ̀gòlò**	'fishing net'
ẹ̀kpà	'bag'	**èbùnù**	'ram'	**ọ̀gẹ̀lẹ̀nyà**	'wealth'
àdù	'bitter-kola'	**m̀bòlò**	'stone'	**ọ̀kịrị̀kà**	'used clothe'
ògò	'farm'	**ọ̀gàzù**	'guinea fowl'	**m̀kpọ̀lọ̀gù**	'herb'
ìzù	'meeting'	**Èwùlù**	'a town'	**ọ̀dọ̀gụ̀mà**	'duck'
ùlù	'bread'	**àkànyà**	'suffering'		
ọ̀gwụ̀	'fight'	**ǹdùdù**	'dampness'		
ọ̀kpà	'cock'	**àkụ̀nà**	'prostitution'		

As can be seen from the forms in (13), F0 cues in Figure 9, illustrating the forms, èbùnù *'ram'* and ọ̀dọ̀gụ̀mà *'duck'*, shed light on the view that the L pitch sequence is simply a single L that spreads in a one-to-many fashion:

Figure 9: F0 tracings of level high sequence in èbùnù *'ram'* and ọ̀dọ̀gùmà *'duck'*

a   èbùnù *'ram'*   ọ̀dọ̀gụ̀mà *'duck'*

[è   b   ù   n   ù]   [ɔ   ɗ   ɔ   g   ʊ   m   a]
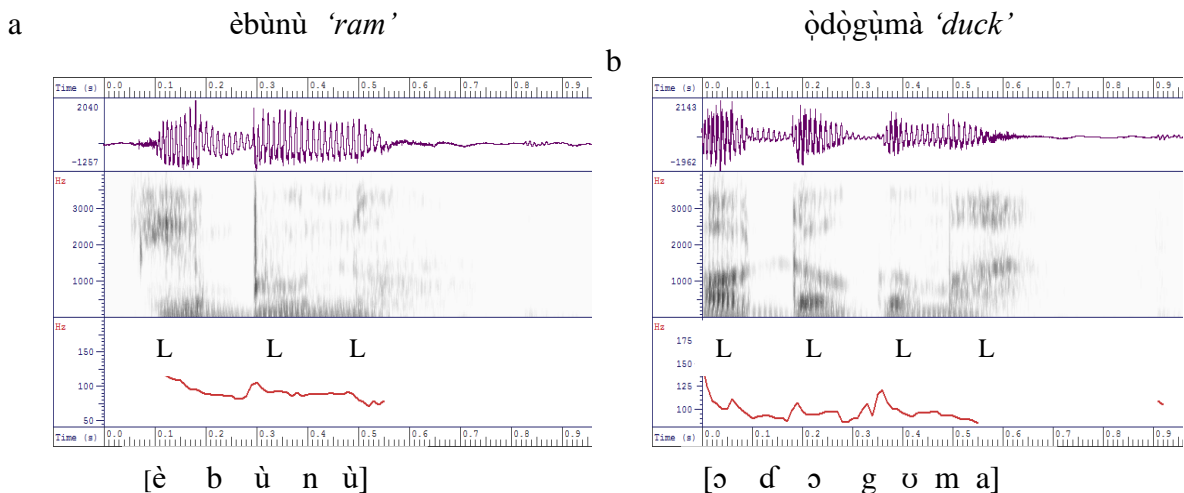
As can be observed, the same *spread* effect in Figure 8 applies in Figure 9. However the overall F0 range of the L spread, which is between 82Hz and 85Hz, are clearly different from that of H spread which is approximately between 99Hz and 104Hz. Significantly, the variation in the F0s validates the cross-linguistic pitch difference between level H and L tones.

6.   CONTOUR TONE IN ÈWÙLÙ

It has been substantiated earlier that the source of Èwùlù contour tones (see (5)) is from the combination of two underlying level tones. In (14), additional data are presented to espouse

their structural patterns, citing agentive nouns and affirmative imperative verbal forms, two of the domains that attract contour tones.

14.

(a)

Falling tone (H-L) (agentive nouns)				(b)	Rising contour tone (L-H) (affirmative imperative verbs)			
Morpheme structure	Input	Output			Morpheme structure	Input	output	
ò-gbú-ù	/ò.ɓú.ù/ ─	**[ò.ɓû]**	'killer'		**dà-á**	/dà.á/	─ **[dǎ]**	'fall'
ò-sí-ì	/ò.sí.ì/ ─	**[ò.sî]**	'cooker'		**zè-é**	/zè.é/	─ **[zě]**	'evade'
ò-rí-ì	/ò.rí.ì/ ─	**[ò.rî]**	'eater'		**gbà-á**	/ɓà.á/	─ **[ɓǎ]**	'suffocate'
ò-tí-ì	/ò.tí.ì/ ─	**[ò.tî]**	'beater'		**kà-á**	/kà.á/	─ **[kǎ]**	'mark'
ò-kú-ù	/ò.kú.ù/ ─	**[ò.kû]**	'sayer'		**zù-ú**	/zò.ó/	─ **[zǒ]**	'nurture'
ò-lé-è	/ò.lé.è/ ─	**[ò.lê]**	'seller'		**kè-é**	/kè.é/	─ **[kě]**	'divide'
ọ̀-kpú-ù	/ɔ̀.ƥú.ɔ̀/ ─	**[ɔ̀.ƥô]**	'moulder'		**yò-ó**	/jɔ̀.ɔ́/	─ **[jǒ]**	'sieve'
ọ̀-pí-ì	/ɔ̀.pɪ.ɪ/ ─	**[ɔ̀.pî]**	'carver'		**bù-ú**	/bù.ú/	─ **[bǔ]**	'enlarge'
ọ̀-zá-à	/ɔ̀.zá.à/ ─	**[ɔ̀.zâ]**	'sweeper'		**zò-ó**	/zɔ̀.ɔ́/	─ **[zǒ]**	'thread'
ọ̀-gú-ù	/ɔ̀.gú.ɔ̀/	**[ɔ̀.gô]**	'counter'		**bì-í**	/bì.í/	─ **[bǐ]**	'dab'

As (14a) and (b) show, suffixal vowels are a copy of verb roots vowel elements, yielding input /…CV.V/ and simplified output […CV] form motivated by the operation of 'suffixal vowel deletion rule'. The deletion rule here is assumed to be governed by the interactions between two phonological constraints: syllabication and segmental OCP. Structurally, the complex input /…CV.V/ violates the Èwùlù preferred simple […CV] syllable structure since, on the one hand, Èwùlù allows maximally a vowel per syllable, and on the other hand, heterosyllabic /V.V/ sequence are identical vowels which are adjacent to each, a sequence that violates the segmental OCP (McCarthy, 1986), a constraint that sanctions distinct adjacent segments/feature but disallows adjacent identical segments.

In obedience of the two constraints, the phonology of the dialect induces 'suffixal vowel deletion' while preserving the tone borne by the suffixal vowel. The preserved tone rather than delete along with it is retained, and consequently shifts leftward and 'segmentalises' with the tone borne by the V-element of the verb root. The after effect of the segmentalisation is surface contour tone. The direction of segmentalisation of the stranded tone seems quite rare. This is so because the retention and subsequent reassociation of tone, as demonstrated consistently in the literature has been one in which 'relinking' proceeds from left-to-right (Goldsmith, 1976). Right-to-left tone reassociation is quite uncommon. Below in Figures 10 and 11, the acoustic cues illustrating patterns of the gliding tones are demonstrated:

Figure 10: Pitch contours of the falling tone in agentives [ò.ɓû] 'killer' and [ò.sî] 'cooker'

a   [ò.ɓû] 'killer'   [ò.sî] 'cooker'

b
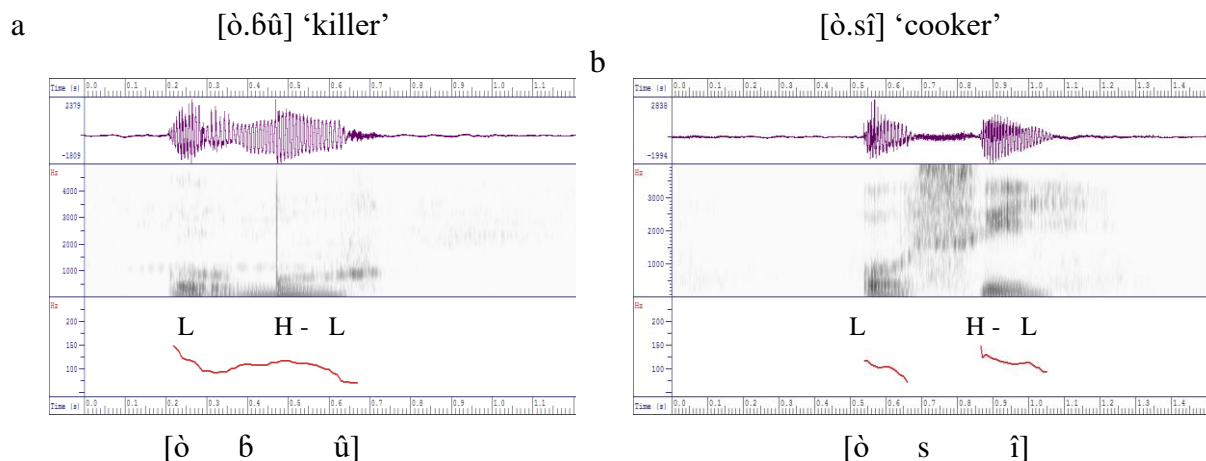
Given the gliding patterns of the pitch contour in Figure 10, it is clear that these are cases of contour tone formation. As can be seen, there is the occurrence of pitch transitions gliding from a fall (94Hz) to a rise (116Hz) and subsequently a fall (90Hz) to the right edge in [ò.ɓû]. The same gliding effect is recorded in [ò.sî]. There is a fall (93Hz) then a rise (120Hz) and finally a fall (93Hz). Similar melody/gliding applies in the affirmative imperative verb forms in (14b) as demonstrated in Figures (11a & b) thus:

Figure 11: Pitch contours of the rising tone in affirmative imperative verbs, [d�̌ã] 'fall' and [zě] 'evade'

a   [dɓ̌ã] 'fall'   b   [zě] 'evade'
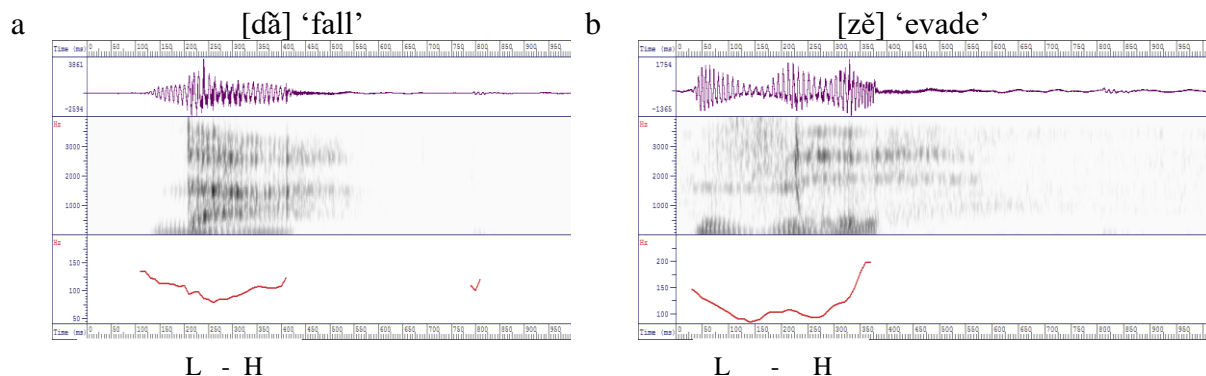
In Figure 11, the gliding contour is laid bare. The F0 tracings demonstrate a fall-rise pitch contour in both cases. The falls measure about 97H and 96Hz and the rises 124Hz and 155Hz.

7.   FINDINGS AND CONCLUSION

This paper has described the structural patterns of word-based tones in Èwùlù, using instrumental means to complement the description. As is characteristic of two-tone languages of the Benue-Congo language family, Èwùlù lexical tones (excluding downstep), irrespective of syllable positions in the word, are freely distributed within the word. The distribution can convey lexical-semantic information whenever both tones are modulated in homophones.

The study also showed that underlying high-high tone sequence in two-syllable words in Èwùlù is never a target for the specification of lexical downstep; unlike in central Igbo where it is quite common, e.g. [í!gwé], 'heaven', [é!gó] 'money', etc. Moreover, findings of this study revealed that lexically specified HHH and LHH tone melodies may attract lexical downstep. This, however, depends on specific word types. This explains why forms with HHH and LHH

tone melodies, such as [ŋ́kí!tá] *'dog'* and [àɓʊ́!ɓá] *'millipede'* are affected by downstep but forms such as [áɓʊ́ɓɔ́] *'leather'* and [òlúlú] *'cotton'* with the same tone melodies are not, otherwise imposing downstep on them, [*áɓʊ́!ɓɔ́] and [*ò!lúlú] would yield ill-formed patterns in the dialect. Besides, Èwùlù lexical tones mark tense distinction if they are modulated from a high to a low pitch or vice versa: present tense and past tense are realised on simple verb stems by specifying high tone and low tone respectively.

As documented in both two-/three-tones languages of the Benue-Congo language family, a single high/low tone may span entire syllables that make up the word. This is never the case with the floating low tone (downstep) which only targets final syllable high tone. In addition, high, low and low, high tone sequence may segmentalise to form surface falling and rising contour tones respectively. As suggested in this work, the contours are driven by the operations of the rules of syllabification and OCP-induced vowel deletion.

Significantly, the contributions of the present study have given some insights into the patterns of lexical tones and their acoustic correlates which typify the tone systems of Benue-Congo to which Igbo/Èwùlù belongs.

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