

## **The Ad-step Tone as a Grammaticalised Particle in Igbo<sup>1</sup>**

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### **Abstract**

The paper explores grammaticalisation in Igbo. Its specific objectives are to explain how the ad-step tone arose as a grammaticalised particle in the language. It tries to determine the generative capacity of the high and low tones. It further determines whether the ad-step tone is an independent tone or manifested terraces of the high and low tones. Tonemic commutability is used to analyse the data. The paper finds out that no canonical Igbo word has a down stepped tone. In other words, the ad-step tone is a structural and or a coalescent tone arising from the grammatically irreconcilable opposition between the two basic Igbo tones, namely, the high and the low tones. To cure the hardship that the Igbo grammar would be imposed on if certain concepts are not duly expressed, the high and low tones became grammaticalised in such a way that the high tone may be stepped down, the low tone may be stepped up or, in their alternative, either of them may be remonstrated to describe an otherwise grammatical indescribability. It finds out that the high and low tones do not change or modify themselves, rather, there is tone, the ad-step, which exists independently at the level of the lexicon, which is used under suitable phonotactic conditions to mark different pitch levels outside the high and low pitch levels. It finds out that the ad-step is a lexical and semantic generator in the language, which the grammar of the language evaluates and crashes outputs devoid of semantic values. It is pointed out that forms with acceptable phonotactics of the language, which do not have meanings assigned to them currently, are potential meaning cells, which may acquire meanings in due course.

### **1.0. Introduction**

The origin of grammaticalisation is ancient. Wikipedia the free encyclopaedia claims that the publications, which built up to form grammaticalisation were those of Bopp (1816), Shlegel (1818), Humboldt (1825) and Gebelentz (1891). The scholar, who firmed it up to its current use, was Meillet (1912). *Grammaticalisation* (Meillet, 1912;

Hoenigwald, 1963; Givon, 1971; Samuels, 1972; Campbell & Newmeyer, 1977; Lass, 1977 etc), *grammatization* (Matissof, 1991) or *grammaticisation* (Hopper, 1991) is used interchangeably in linguistics. Campbell and Janda (2001) claim that in 1912, Meillet a French grammarian introduced grammaticalisation into French grammar. Meillet (1921:131) conceptualises grammaticalisation as:

[Besides analogy] another process consists in the change of an autonomous word into the role of a grammatical element ... th(is) ... process [involving] the attribution of grammatical character to a formerly independent word ...[, is one of] only [two] ways by means of which new grammatical constructs are formed.

Though its origin is ancient, its discourse was abandoned at some point; the interest in its study was revitalised after the publications of Givón's (1977), Heine and Reh (1984), Harris and Campbell (1995) and Lehman (1995). Since then, the term has been used in different ways by different authors (see Campbell & Janda, 2001). The first set of scholars and who appear to be more in number analyse it from the point of view of its having a concurrent weakening of meaning and phonetic form. In other words, in instances of grammaticalisation, semantic loss and phonetic reduction play an important role in making the lexical item a grammatical formative. The argument of this school of thought is on all fours with the original formulation of Meillet (1912). The other scholars sharing this view are Hoenigwald (1966), Samuels (1972), and Lass (1997).

Another school of thought tends to think that grammaticalisation is essentially a grammatical process. The process results in a morpheme changing from a derivational format to an inflectional one. In a nutshell, Kurylowicz (1975) defines it as the range of a morpheme advancing from a lexical to a grammatical status or

from a less grammatical to a more grammatical status. The other members of this school of thought include Traugott and König (1991), McMahon (1994) and Pagluica (1994). Though some other scholars appear to argue that grammaticalisation is a consequence of linguistic evolution, one feels that this is the same as arguing that it is a linguistic process. Such scholars are Givón (1971), Langacker (1977), Lehman (1982, 1995), Heine and Reh (1984), Croft (1990), Craig (1991), Matisoff (1991), Trask (1996), Cowley (1997), Whaley (1997) and Saeed (2003).

Some other school of thought relates grammaticalisation to pragmatics. This school of thought believes that grammaticalisation is a pragmatic strengthening rather than a kind of linguistic impoverishment or deficit or as Traugott (1988) puts it, "a story of attrition or minimisation". To this group of scholars, rather than weakening the meaning and the phonetic form of the morpheme, it leads to its pragmatic strengthening and semantic gain. The pragmatic strengthening relates to the additional function in society, which results from the semantic shift from the original meaning of the form to its new meaning, hence the semantic gain. It needs to be added that consideration must be given to the contexts of social use and structural grammatical position.

Furthermore, Hopper (1987:148) claims that grammaticalisation is emergent grammar; here, there is no grammar yet but only grammaticalisation, that is, movement towards structure. Grammaticalisation, by the argument

of this school of thought, is progressively evolving; until the goal of grammaticalisation is achieved, there is not yet any grammar. This point needs emphasis because there are abundant evidences in historical linguistics where some linguistic forms, such as slang, arise out of elaboration but disappear sooner than later. In its proper semantic coding, grammaticalisation is a process and ipso facto emergent.

Traugott and Heine (1991) advocate a broadened view of grammaticalisation. They argue that there are two kinds of grammaticalisation. The first type of grammaticalisation is where the lexical item changes to a grammatical morpheme. In this instance, there may be phonological reduction and a change of status from being an independent word to a clitic or affix (lexical > grammatical). The second type is where there is a change of discourse structure to morpho-syntactic structure; this may involve fossilisation of the discourse strategies in the syntactic and morphological structure (pragmatic > grammatical). Traugott and Heine (1991) argue that these kinds of grammaticalisation involve semantic bleaching and phonetic reduction; these forms of grammaticalisation may be unified as follows: lexical item used in discourse > [non-lexical item used in morpho-syntax]. They summarise this possible fossilisation in a slogan: today's syntax is yesterday's pragmatic discourse: discourse > syntax > morphology > morphophonemics > zero.

From the above, it would appear that the process of grammaticalisation is unidirectional. However, Ramat

(1985) and Gaeta (1998) have argued that grammaticalisation is not a uniform process. Gaeta (1998) posits that it is a whole range of phenomena that gives rise to grammatical formatives, not merely with those originating from lexical forms. Cabrera (1998) and Haspelmath (1998) further contend that grammatical processes depart from the lexicon and proceed to the syntax; it is a grammatical process that feeds the syntax and bleeds the lexicon.

From the above, it is clear that there is no universally acceptable definition of grammaticalisation or a perspective from where all scholars view it (see also Lassau, 1994). However, it is our considered opinion that grammaticalisation is the transformation of a linguistic component from one form to another. It is also observable that grammaticalisation can be viewed from different perspectives.

## 2.0. Grammaticalisation as a theory

Bybee, Revere and Pagluica (1994) contend that languages are composed of substance, semantic and phonetic, which is potentially universal. The substance is however different among languages because it is constantly changing and, therefore, differs in the ways that it is shaped. This hypothesis is an affront on structuralism; as Bybee, Revere and Pagluica (1994) contend, structuralism asserts that language is a system in which units are defined by the oppositions they enter into. Consequently, the subject matter of structuralism is the internal system of language, which the units are supposed to form. Grammaticalisation rather than

concentrate on the oppositions established by units, deals with linguistic units, which are constantly evolving in their meaning and sound.

They isolate eight hypotheses that a grammatical theory should have and which should identify grammaticalisation. We paraphrase them here as Campbell and Janda (2001) reproduce them:

1. Source determination: The meaning of a construct, which is grammaticalised, determines the path and the eventual meaning of the construct.
2. Uni-directionality: The trajectory of grammaticalisation is always from the less to a more grammatical path.
3. Universal paths: From 1 and or 2 or in their alternative, there are universal paths of grammaticalisation.
4. Retention of earlier meaning: Some nuances of the earlier meaning of a source construct may be retained long after the inception of grammaticalisation.
5. Correspondence of semantic retention: The forms, which a grammaticalised form shows can be used to reconstruct the earlier stages of the language.
6. Semantic reduction and phonetic reduction: The semantic reduction corresponds to phonetic reduction and consequently results in the co-evolution of meaning and form.
7. Layering: The result in new semantic markers does not depend on the loss or dysfunction of its antecedents.
8. Relevance: The more the meaning of a grammatical category is applicable to a stem, the more the

likelihood that it will develop into an affix.

### 3.0. Justification for the study

A lot of work has been done on grammaticalisation across languages. The studies have concentrated on European languages and to a little extent on Asian and African languages. The studies have attempted to properly conceptualise the term, identify the processes that are involved and the types and or domains of grammaticalisation. As also seen from the foregoing, it appears to be agreed that grammaticalisation is language universal; it is also contended that though there appears to be no universally accepted definition of grammaticalisation, the competing definitions can be unified; such generalisations are made without recourse to tone languages. The bulk of the examples given have centred on lexical items, ostensibly, lexical items in intonation languages. In tone languages, semantic contrast may be segmental and or tonal (Goldsmith, 1976, Mbah, 2018, Mbah & Mbah, 2010). Furthermore, there does not appear to be any conclusion as to the processes that grammaticalisation undergoes. However, the domains and processes of grammaticalisation have been identified to include semantic bleaching (see Matisoff, 1991 & Haiman, 1991), morphological reduction or de-categorialisation (Meillet, 1921), phonetic erosion or phonological attrition (Heine & Kuteva, 2002) for English and Chen (2011) (for Chinese). Lehman (1992) has also worked on the obligatoriness and or cycle of grammaticalisation. Of

all the studies mentioned, there is none on African languages. Furthermore, either by commission or omission, none of the scholars has expressly commented on the applicability or otherwise of the phenomenon to tone or language prosody. It is consequently trite to contend that a yawning gap exists in the study of grammaticalisation. This study aims to take an aspect of tone and examine the extent to which grammaticalisation firms up to it.

The paper aspires to answer the following questions: in view of the observation that the stepped down tone is structural in Igbo, how did the down stepped tone, also in this paper called the up stepped tone, arise? What is the effect of the conditioning of the high and low tones to the down-stepped or up-stepped tone affect the generative capacity of the Igbo morphological system? How does the down-stepped and up-stepped tone influence the semantic commutability of the tone in Igbo word formation process?

#### **4.0. Theoretical framework**

The theoretical framework adapted to this study is tonemic commutability. The theory was formulated by Mbah (2007) and later modified and applied in Mbah and Mbah (2010). The theory claims that tones are assigned to segments and by so doing generate meaning differences between or among words, which otherwise would have either appeared similar in form or meaning. The more a linguistic form is capable of taking more tones and or changing its tone patterns, the more it is capable of generating new forms. The capacity for the generation

of new terms may bind over to self shelling or empanelling of tones to yield respectively a down stepped or an up stepped tone. The degrading or firming of the tone merges pre-lexical and lexical structures, and phonomorphological structures into morpho-syntactic structures to produce meanings different from those of the elements comprising the terminal string.

The theory claims that occurrence and or selectional restriction and the logical form of the language impose well-formedness conditions on the generation so that all ill-formed structures crash out of the device.

In analysing data, the theory first selects pre-lexical structures and assigns possible alternate tones to each of the segments. The process generates well formed and ill formed lexical structures. The selectional restriction is imposed on the generated forms to crash unacceptable structures. Consequently, the theory calculates the differences in the numerical capacity of the high tone, the ad-stepped<sup>2</sup> tone and the low tone. Furthermore, the tone determines the number of lexemes that were generated and consequently gained as a result of tone stepping<sup>3</sup> and which otherwise would have been lost were the language not to have been smart enough to engage tone stepping.

This theory is considered more principled and economical than optimality theory, which is similar to it in parts. It is similar to optimality theory in the sense that both of them involve the generation of lexical items from phonological tokens, tokens, which may produce both acceptable

and unacceptable structures. Furthermore, in both theories, the ill-formed structures are discountenanced furtherance to the analysis. However, tonemic commutability goes further by calculating the well-formed structures and determining the generative capacity of each of the tones, with particular reference to additions to the lexicon, which result from the introduction of the ad-step tone. Tonemic commutability is not limited to lexical phonology as does the optimality theory. Tonemic commutability involves phonological, morphological, syntactic, semantic and mathematical tonal analyses of linguistic transformations of tokens. However, optimality theory analyses other variables other than tone.

The theory is also considered better than autosegmental theory, which also deals on segmental and prosodic lexical patterns. The autosegmental theory propounded by Goldsmith (1976) involves the analysis of the segmental and tonal tiers of lexical items, especially in tone languages. Autosegmental theory analyses other variables other than tone; tonemic commutability focuses its analysis on tone alone; furthermore, autosegmental theory has little or nothing to do with the generative capacity of tones, which is the main focus of tonemic commutability.

The other generative phonological or morphological theories, which may be relevant to the current discussion such as distinctive feature (Umeođinka, 2016), feature geometry and feature percolation theory (Lieber, 1980, Williams 1981, Amajoyi, 2017), head feature convention (Gazdar,

Klein, Pullum & Sag, 1985, Benjamin, 2017), the lexicalist hypothesis (Chomsky, 1970, Halle, 1973, Okpalike, 2017) and construction or distributed morphology (Harley & Noyer, 1999, Okpalike, 2017) discuss aspects of words formation, their underlying rules and their government patterns. However, none of them is dedicated to determining how tone modification or change impacts on the lexicon or how tone languages have devised the ad-step not as a new tone but a grammaticalisation of tones to economically generate lexical items that would otherwise not have been possible with the basic high and the low tones of the Igbo language.

### 5.0. The ad-step tone

In this paper, the focus is on how the high and low tones coalesce to become the ad-step for grammatical reasons. Available literature seems to show that there are two basic tones in Igbo, namely the high and low tones (Welmers, 1973, Emananjo, 1978, Nwachukwu, 1995, Mbah, 1999, 2018 & Mbah & Mbah, 2010). It also seems that it is generally agreed that the so called down-stepped tone is assigned structurally (Mbah, 2015). In other words, there is no canonical Igbo word that bears the down-stepped tone. However, what scholars appear to have overlooked is the true nature of the so called down-stepped tone. Let us give an insight into the true nature of the tone by examining the following examples:

1. (a) àlà ǐgbò ǐgbò → àlá ǐgbò  
land igbo Igbo land
- (b) àkwà ǐgwè → àkwá ǐgwè

In example 1, the second syllable of the first words (ala and akwa) is assigned a high tone. This is different from their initial tone, which was a high tone. The question is whether it is the low tone that changes to a high tone or whether it is the high tone that replaces the low tone on account of its phonotactic environment. We believe that it is the high tone that is selected in place of the low tone for that phonotactic environment. It is not the former low tone that changed to a high tone. Let us compare example 1 with that of 2:

2. (a) áká + yá → áká yā  
       hand him his hand  
 (b) nwá + óké → nwá ókē  
       child male male child

The examples in 1a-b show where the second word in an associative construction changes its tone from the high to the down-stepped tone. As recorded by Emenanjo (1978) and Nwachukwu (1995), in associative constructions in Igbo, wherever the word ending the associative construction has a high tone, it must be reduced to the down-stepped tone (see also Green & Igwe, 1963). But if the first word of the associative construction ends in a high tone, it does not change its tone pattern (see also Mbah & Mbah, 2010). There are instances where the low tone changes to the so called down-stepped tone, e.g.

3. (a) ókè + òké → ókē + òké  
       boundary rat - rat's boundary  
 (b) ákwà + òbé → ákwā + òbé  
       cloth crier crier's cloth

In examples 3, the first word starting the associative construction ends in a

low tone whereas the second word starts in a low tone. Here, the two low tones get raised to the so called down-stepped tone. This is also observed by Emenanjo (1978) as one of the tone rules, which underlie Igbo associative constructions. There are other tone rules, which are already reported in the literature (for a detailed reading, see the authors cited in 5.0).

The position, which most scholars appear to have taken that has inspired this paper is the claim that a high tone may be reduced to a down-stepped tone as in examples 1 and also that a low tone may be raised to a down-step as in example 3. The questions then arise; "do these tones actually get stepped down or raised, or do they agree to introduce a different tone in their stead?" What is the propriety of calling the raising of a low tone a down-stepped tone? Which is more linguistically economical between the two tones agreeing to introduce a new tone and either of them changing to different tones, which are coincidental?

We are in favour of the position that the high and low tones get grammaticalised rather than change their pitch level. This follows the synthesis of the synthesis and anti-synthesis of the high and low tones. We also believe that it is theoretically possible to get a high tone reduced in pitch (refer to examples 2) but it is not possible to step the low tone down to a down-stepped tone (refer to example 3). The idea of referring to the changed low tone to down-stepped tone means that the low tone was indeed up-stepped. This means then that labelling it a down-stepped tone is erroneous; while the high tone is

down-stepped, the low tone gets up-stepped. The nature of the synthetic tone is somewhere outside either the high or low tones; it is an ad-step, a corollary of the ad-position (see Radford, 2006).

The idea of up-stepping the low tone raises further issues. Are down-stepped and up-stepped tones the same? Whether the answer to the above question is in the positive or negative, could an up-stepped and a down-stepped tone be properly called a down-stepped tone? Do they have coincident pitch levels? Are they terracing? If they are terraced, do the high tone terrace downwards while the low tone terrace upwards? Or do they terrace arbitrarily? Though the above questions appear rhetorical, there are insider issues that need clarifications.

First, the down-stepped and up-stepped tones cannot be the same. The terracing, which results from different tonotactic patterns, comes from different directions, the down-stepped tone from high pitch levels and the up-stepped tone from low pitch levels. Furthermore, they cannot result from the same associative constructions as they occur in complementary positions. This leads to the second question. It is inappropriate to refer to an up-stepped tone as a down-stepped tone. To call it a down-stepped tone means that the low tone was stepped down, which will rather lead to a lower rather than an up-stepped tone. Given the foregoing, if the terracing formed from the high tone steps downwards, it will naturally be different from the terracing, which results from the up-stepping of the low tone though the pitch levels may

sometimes be coincident. However, this coincidence does not mean that they are in free variation; they are in complementary distribution. As to whether they are terracing, it is evident from the foregoing that while the high tone terraces downwards, the low tone terraces upwards. Being fed by different tonotactic conditions, they are not mirror images of each other; the terracing is not arbitrary but principled. This principle is governed by ad-step, which may in converse yield either the down-stepped or up-stepped tones as exponents.

### **5.1. The ad-step as a grammaticalised tone in Igbo**

As defined in the foregoing, grammaticalisation is the process, where either lexical categories may over time develop into functional categories or independent words become inflections (Saeed, 2003:344). In this section, we wish to argue that the ad-step is the coalescent tone between the high and low tones in morpho-syntactic junctures. In other words, the lexical tones, namely the high and low, became grammaticalised to form the ad-step tone. The question that we wish to determine here is the cost or economy of coalescence against that of self mortification, that is, the process that is easier for the two Igbo basic tones; either to modify themselves or agree to introduce a tone that is a synthesis of either of them and can contrast meanings, which neither of them can.

Minimalism contends that at the level of the computational system, prior to category select, all lexical and grammatical formatives are displayed independently. In other words, every



aspect of the lexicon is autonomous. Consequently, the high and the low tones are displayed each on its own. Should either of them mutate according to the different levels of contrasting terracing tone levels, which they are capable of forming in their tonotactic patterns, then, at the level of the lexicon, all the exponents of mutation of the high and low tones must be represented. This is not plausible because it is unwieldy, inelegant and costly. However, it is our considered opinion that there is just one coalescent tone formed, namely the ad-step. The ad-step, at the levels of category select, is chosen and computationally merged with the selected segments. The tonotactic environment provides the level, where the ad-step docks for merger and spell out to take place. This is more economical than attaching to the high and low tones the environments, which consequently generate different species of down stepped and up-stepped tones and exhibit same within the lexicon space.

## 5.2. The need for the ad-step

Mbah (1997a, 1997b), and Mbah and Mbah (2010) have studied the tone alternations and their ability to generate meaning in Igbo. The grammaticalisation of tone in language is to feed a language need. Each time there is a tone change whether at the lexical or post-lexical level, new meaning results. A lot of hardship will be imposed on the Igbo language if only the high and the low tones are available for contrasting meaning. The more a language is capable of varying its tones, the more likely it is able to generate meanings.

As we will see shortly, a language with three contrasting tones produces more meanings than a language with two tones. Each toneme is a cell with meaning capabilities. This is especially as an already morpho-tonally filled cell may be semantically ambivalent and or have other meanings generated through metaphorical extension. *Àjà*, for instance, is morphologically well formed by having the appropriate segments and tones. However, it has an ambiguous meaning. Denotatively, it may mean *sacrifice*, *kingdom* or the *night-driver-bird*. The denotative meaning may further be extended to a *slippery person*. This meaning changes if the tone is altered: *ájá* (sand), *àjà* (inspiring/encouraging) or *ájà* (exclamation of surprise or pain). Each of these new meanings can be metaphorically extended. The word *ézi* denotes *pig*. Connotatively, it means *fat* (adjective), *fatty* or *dirty*. The word *ézí* (true/good), *èzí* (outskirt; kin; showing) and *èzì* (act of sending) are alternative morpho-tonal alternations, which are capable of further metaphorical extensions. In the above examples, it is the high and low tones that have been alternated to derive the meanings. However, the as-step may further be added to derive further meanings. The words *ájā* (not encouraging) and *ézī* (not showing) are derived by the ad-stepping of the coalescent tone. Though some scholars such as Amucheazi (2018), Ikeokwu, Nwizu and Nnebedum (2018) and Nwaozuzu and Okeke (2018) have argued that the forms involving the ad-step, as in the above examples, are fossilised -ghI forms of negation, Mbah (2018) strongly believes that its meaning is quite different from that of

the -ghI negative construction; when the -ghI suffix hosts the ad-step, it dispels its meaning and generates a new one.

As already broached above, the more tones a language has, the more likely it will generate lexical items and semantic contrasts. Having an ad-step tone is not for linguistic flavouring. It empowers the language to express linguistic realities which would otherwise not be possible. Let us determine how important the ad-step is to the Igbo language. This presentation is elicited from Mbah (1997) and Mbah and Mbah (2010). A monosyllable word in Igbo has a maximum of two tonal alternations.

**Table 1**

High	Chi	Guardian spirit
*Step	Chi	-
Low	chi	screech

In Igbo, because the ad-step tone does not occur in any canonical word, only two lexical items can be formed from a monosyllabic word. It is needs to be observed however that each of the words generated can be ambiguous or polysemous. In monosyllabic words standing in isolation, the ad-step does not influence or contrast meaning. The above picture is different with disyllabic words. Let us examine Table 2:

**Table 2**

TD <sub>2</sub>		TD <sub>1</sub>
High	áká	High
	ákā	Step
	ákà	Low
Low	àká	High
	àkà	Low

*Ad-step in disyllabic word*

A di-tonal word can generate nine tone sequences of word: high-high, high-ad-step, high-low; ad-step-high, ad-step-ad-step, ad-step low; low-high, low-ad-step and low-low. However, since the ad-step does not start a word and does not follow a low tone, then the forms with the tone sequences will not merge. Only five words will successfully merge. They are high-high, high-ad-step, and high-low, low-high and low-low. The first tone domain (TD<sub>1</sub>) is the last syllable. It can contrast three tones, namely high, ad-step and low. TD<sub>2</sub> has two different tone sequences: that starting in high tone and the one beginning in the low tone. The first tone sequence (TS<sub>2</sub>) contrasts high-high, high-ad-step, and high-low tones. The other tone sequence (TS<sub>2</sub>) is where the first syllable or second tone domain starts in a low tone, which may generate low-high and low-low tone alternations, e.g. aka when subjected to tone alternations may form áká (hand), ákā (not bigger than), ákà (bead), àká (last year), and àkà (a type of snake). A di-tonal word produces a maximum of five lexical items (capable of further meanings). Without the ad-step, one word is lost.

A tri-tonal word in Igbo has 16 potential tono-semantic fissiparous words. They include:

**Table 3**

TD <sub>3</sub>	TD <sub>2</sub>	TD <sub>1</sub>	Line	
High	High	high	1	
		ad-step <sup>1</sup>	2	
		low	3	
	ad-step	High	high	4
			ad-step <sup>1</sup>	5
			Low	6
	low	High	high	7
			*ad-step <sup>1</sup>	8
			low	9
ad-step <sup>1</sup>	High	High	10	
		ad-step	11	
		low	12	
	ad-step <sup>1</sup>	High	High	13
			ad-step <sup>1</sup>	14
			Low	15
	Low	High	High	16
			ad-step <sup>1</sup>	17
			Low	18
Low	High	High	19	
		ad-step	20	
		Low	21	
	ad-step	High	High	22
			ad-step	23
			Low	24
	Low	High	High	25
			*ad-step	26
			High	27

Following Table 3, a tri-tonal word in Igbo will generate 27 potential words but only 16 possible words. Out of the 16 words, 6 are generated via the application of the ad-step. They are got from applying the following principles:

- 3(a) delete all words with super-ordinate ad-step tone
- (b) delete all ad-steps preceded by low tones

If rule 3 is applied, 3a, which is the tone domain enclosing lines 10-18, is deleted. By the application of 3a, lines 8 and 26 will be deleted leaving 16

possible words within the tone domains.

The progressive application of rule 3 will produce the following number of words:

- 4 (a) a mono-tonal word commutes a maximum of 2 words
- (b) a di-tonal word generates a maximum of 5 words
- (c) a tri-tonal word generates 16 words.

From rule, it becomes easy to calculate the outputs of tone commutation in Igbo and by extension across register and terracing tone languages. According to Mbah and Mbah (2010), "the tone domain, a set of words governed by a toneme, expands in geometrical progression; each quantum progression determines the number filtered out phono-tactically as impossible sequences within a terraced-level morpho-tonology". In Igbo, a quartri-tonal produces 81 potential lexemes out of which 39 of the potential lexemes are filtered out, leaving 42 semantic outputs.

The algebra of tone commutation and its theoretic semantic reflex can be plotted as follows.

**Table 4**

Number of tone/syllable	Number of words formed	Words formed by ad-stepping
1	2	0
2	5	1
3	16	6
4	48	23
5	64	43
<b>Total</b>	<b>135</b>	<b>73</b>

Table 4 shows that a monosyllabic Igbo word may vary its tone 2 times, a di-syllabic word 5 times, a tri-syllabic

word 16 times, a quartri-syllabic word 48 times and a quintri-syllabic form 64 times. Each tonal variation is a potential source of denotative meaning with further chances of more meanings derivable by metaphorical extension. For every di-syllabic word tone ad-stepping accounts for a word, for tri-syllabic 6 words, for quartri-syllabic 23 words and for quintri-syllabic words 43 words<sup>4</sup>. It needs to be noted that the ad-step plays a more critical role in lexical and meaning generation in associative and other post-lexical constructions.

The importance of the ad-step can now be better appreciated. Ad-stepping is not a linguistic ornament but an elegant economical way that the Igbo language and by extension terraced level languages have devised to generate meanings that would have otherwise been impossible to produce or generated through other less economical ways.

#### Note

1. This paper was first presented in the 2019 Igbo language symposium held at Nnamdi Azikiwe University Awka
2. The ad-step tone is the tone, which is yielded when the high tone reduces in pitch to a down-stepped tone or the low tone gets raised into an up-stepped tone. The down-stepped tone and the up-stepped tone synthesise and crystallise into the arche-tone, namely, the ad-step tone. Put differently, the ad-step tone is the mother of the down-step tone and the up-step tone.
3. Tone ad-stepping is used in this study to refer to the process in which the high tone reduces its height by stepping down to a down-stepped tone or the low tone stepping up to an

up-stepped tone. We believe that tone stepping is an economical way in which tone languages rather than introduce a fresh tone or form modify two or more tones into one tone that is midway to either of the coalescing tones. Thus, what is traditionally called a down-stepped tone is indeed a tone midway of either the high or low tone. This is informed from the observation, as is seen in the examples above that the high tone may get stepped down but not the low tone. It is therefore erroneous to regard the up-stepped tone as a down-stepped tone.

4. We stop at the quintri-tonal words; for now, it is believed that the longest canonical Igbo word is *òkòkòb̀yòk̀ò*, which has five syllables.

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